USEC
A Global Energy Company

April 13, 2006
GDP 06-0024

Mr. Jack R. Strosnider
Director, Office of Nuclear Material Safety and Safeguards
Attention: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Portsmouth Gaseous Diffusion Plant (PORTS)
Docket No. 70-7002, Certificate No. GDP-2
Transmittal of 2006 Annual Update to Certification Application

Dear Mr. Strosnider:

In accordance with 10 CFR 76, the United States Enrichment Corporation (USEC) hereby submits six (6) copies of the 2006 Annual Update to the certification documents for the Portsmouth Gaseous Diffusion Plant. The 2006 Annual Update consists of the following documents:

> Revision 82 (April 13, 2006) to USEC-02, Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant.

The 2006 Annual Update (Application Revision 82) includes the following:

- Changes to the Safety Analysis Report (SAR) to reflect plant changes implemented during the period of January 14, 2006 through April 1, 2006.

- Fundamental Nuclear Materials Control Plan (FNMCP) to reflect plant changes implemented during the period January 14, 2006 through April 1, 2006.

The above changes have been reviewed in accordance with 10 CFR 76.68 and have been determined not to require prior NRC approval. Revision bars are provided in the right-hand margin to identify changes. Revision 82 was implemented effective April 13, 2006.

The Revision 82 changes to the FNMCP contain certain trade secrets and commercial and financial information exempt from public disclosure pursuant to Section 1314 of the Atomic Energy Act of 1954 (AEA), as amended, and 10 CFR 2.390 and 9.17(a)(4). In accordance with 10 CFR 76.33(e) and 2.390(b), the Revision 82 changes to this plan are being submitted under separate cover (USEC letter GDP 06-0023).

NMSS01

Should you have any questions regarding this matter, please contact Mark Smith at (301) 564-3244. There are no new commitments contained in this submittal.

Sincerely,

S. A. Toelle

Steven A. Toelle
Director, Regulatory Affairs

Enclosures:
1. Oath and Affirmation
2. USEC-02, Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant, Revision 82, Copy Numbers 1 through 6.

cc: G. Janosko, NRC HQ	(w/o)
J. Henson, NRC Region II	USEC-02, Copy Nos. 21, 172
M. Thomas, NRC Senior Resident Inspector - PGDP	USEC-02, Copy Nos. 22
D. Martin, NRC Project Manager - PGDP	(w/o)
D. Hartland, NRC Region II	(w/o)
R. DeVault (DOE)	USEC-02, Copy Nos. 24 through 28

Enclosure 1
GDP 06-0024

Oath and Affirmation

OATH AND AFFIRMATION

I, Steven A. Toelle, swear and affirm that I am the Director, Regulatory Affairs of the United States Enrichment Corporation (USEC), that I am authorized by USEC to sign and file with the Nuclear Regulatory Commission Revision 82 (April 13, 2006) to the USEC Application for United States Nuclear Regulatory Commission Certification, Portsmouth Gaseous Diffusion Plant (USEC-02), as described in USEC Letter GDP 06-0024, that I am familiar with the contents thereof, and that the statements made and matters set forth therein are true and correct to the best of my knowledge, information, and belief.

S. A. Toelle

Steven A. Toelle

On this 13th day of April, 2006, the person signing above personally appeared before me, is known by me to be the person whose name is subscribed to within the instrument, and acknowledged that he executed the same for the purposes therein contained.

In witness hereof I hereunto set my hand and official seal.

Rita Peak-Campbell

Rita Peak-Campbell, Notary Public
State of Maryland, Montgomery County
My commission expires December 1, 2009

Enclosure 2 to
GDP 06-0024

USEC-02
Application for the United States
Nuclear Regulatory Commission Certification
Portsmouth Gaseous Diffusion Plant
Revision 82 (April 13, 2006)

NUCLEAR REGULATORY COMMISSION CERTIFICATION
PORTSMOUTH GASEOUS DIFFUSION PLANT
USEC-02
NRC
REMOVE/INSERT INSTRUCTIONS

REVISION 82
Effective 04/13/06

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Section 10-1.2.1.1 - all
Section 10-1.2.1.2 - all
Section 10-1.2.1.3 - all

1.15 ANSI B30.20, Below the Hook Rigging Devices, 1993 Edition

PORTS satisfies the requirements of the following sections of this standard for lifting fixtures used to handle liquid UF_6 cylinders and used to transport heavy equipment above/around cascade equipment that is intended to be operated above atmospheric pressure:

Section 20-1.3 - all
Section 20-1.4.1 - only paragraphs (a) and (b)

1.16 ANSI NB-23, National Board Inspection Code, 1992 Edition

PORTS satisfies the requirements of this code as described below:

Autoclave shell and head are visually inspected to section U-110.1 of this standard.

PORTS utilizes Chapter V of this code as guidance to develop the inspection program for ASME pressure vessels.

1.17 ANSI N323, Radiation Protection Instrumentation Test and Calibration, 1978 Edition.

PORTS satisfies the requirements of this standard except as described in SAR Section 5.3.5.

For references to this standard, see SAR Sections 3.5.1.1.1.1 and 5.3.5.

1.18 ANSI N509, Nuclear Power Plant Air Cleaning Units and Components, 1989 Edition

New and existing fixed HEPA filter systems needed to ensure compliance with release limits or to control worker radiation exposure satisfy the requirements of this standard with the following exceptions and clarifications:

Section 5.2 - Do not satisfy. No credit is taken for adsorbers.

Section 5.5 - Do not satisfy requirements for air heaters.

Section 8.0 - Quality assurance requirements for applicable systems are identified in SAR Section 3.8 and the Quality Assurance Program Description

Appendix A - Do not sample adsorbents.

Appendix B - Do not use allowable leakage guidance.

Appendix C - Do not use manifold design guidelines.

Appendix D - The manifold qualification program uses this appendix as guidance only.

For references to this standard, see SAR Section 5.1.1

1.19 ANSI N510, Testing of Nuclear Air Treatment Systems, 1989 Edition

New and existing fixed HEPA filter systems that satisfy the requirements of ANSI N509 and are needed to ensure compliance with release limits or to control worker radiation exposure satisfy the requirements of this standard with the following exceptions and clarifications:

Section 6.0 - Only satisfy this section for new seal-welded duct systems or for connections to a system where this section has been previously applied.

Section 7.0 - Do not use guidance for monitoring frame pressure leak tests.

Existing fixed HEPA filter systems that do not satisfy the requirements of ANSI N509 will be tested using the requirements of this standard or another industry accepted standard as guidance only.

For references to this standard, see SAR Sections 5.1.1 and 5.3.2.10.

1.20 ANSI N543, General Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV, 1974 Edition

PORTS satisfies Sections 3.2, 7, and 8.1.2 of this standard for the X-326 Radiographic Facility,as they apply to Enclosed Installations.

For references to this standard, see SAR Section 3.5.1.6.1.

2.0 American Society of Mechanical Engineers (ASME)

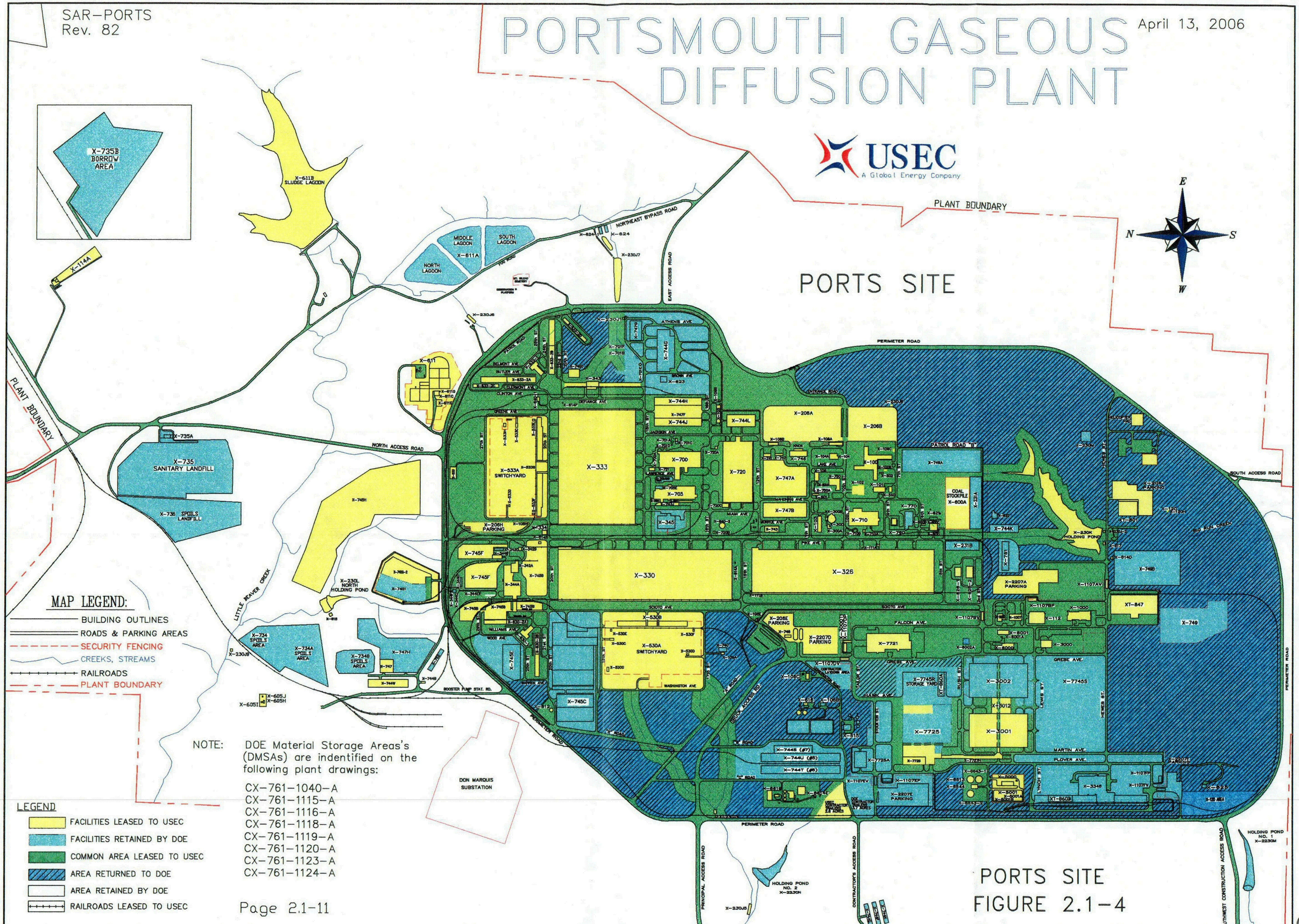
2.1 ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities, 1989 Edition

PORTS satisfies the requirements of this standard, including Basic and Supplementary Requirements, with exceptions and clarifications identified in the Quality Assurance Program Description. See also SAR Sections 6.6.12, 6.8.1 and 6.8.2 and Section 7.5 of the Emergency Plan.

2.2 ASME Boiler and Pressure Vessel Code, 1995 Edition

PORTS satisfies the following sections of this code as clarified below:

Section VIII - The following pressure vessel components and systems satisfy the requirements


SAR-PORTS
Rev. 82
PORTSMOUTH GASEOUS DIFFUSION PLANT
April 13, 2006
USEC
A Global Energy Company
PLANT BOUNDARY
E
N
S
W
PORTS SITE
X-735B BORROW AREA
X-611B SLUDGE LAGOON
MIDDLE LAGOON
SOUTH LAGOON
NORTH LAGOON
X-611A
NORTHEAST BYPASS ROAD
EAST ACCESS ROAD
PERIMETER ROAD
X-114A
X-735A
X-735 SANITARY LANDFILL
X-736 SPOILS LANDFILL
NORTH ACCESS ROAD
X-333
X-533A SWITCHYARD
X-330
X-326
X-530A SWITCHYARD
X-720
X-700
X-705
X-747A
X-747B
X-208A
X-208B
X-710
X-749A
COAL STOCKPILE X-600A
X-744K
X-231B
X-2207A PARKING
XT-847
X-749B
X-749
X-7721
X-7745R STORAGE YARD
X-3002
X-7745S
X-7725
X-3001
X-3346
X-745C
X-745F
X-745H
X-230L NORTH HOLDING POND
LITTLE BEAVER CREEK
X-734 SPOILS AREA
X-734A SPOILS AREA
X-734B SPOILS AREA
X-747H
X-22070 PARKING
X-205E PARKING
X-206H PARKING
SOUTH ACCESS ROAD
DON MARQUIS SUBSTATION
PRINCIPAL ACCESS ROAD
CONTRACTOR'S ACCESS ROAD
SOUTHWEST CONSTRUCTION ACCESS ROAD
HOLDING POND NO. 2
HOLDING POND NO. 1
MAP LEGEND:
BUILDING OUTLINES
ROADS & PARKING AREAS
SECURITY FENCING
CREEKS, STREAMS
RAILROADS
PLANT BOUNDARY
LEGEND
FACILITIES LEASED TO USEC
FACILITIES RETAINED BY DOE
COMMON AREA LEASED TO USEC
AREA RETURNED TO DOE
AREA RETAINED BY DOE
RAILROADS LEASED TO USEC
NOTE: DOE Material Storage Areas's (DMSAs) are indentified on the following plant drawings:
CX-761-1040-A
CX-761-1115-A
CX-761-1116-A
CX-761-1118-A
CX-761-1119-A
CX-761-1120-A
CX-761-1123-A
CX-761-1124-A
PORTS SITE
FIGURE 2.1-4
C01

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Facility Number	Facility Description	Facility Number	Facility Description
X-232F	Fluorine Distribution System		
X-232G	Supports For Distribution Lines	X-2215A	Underground Electrical Distribution to Process Buildings
X-240A	RCW System (Cathodic Protection)	X-2215B	Electrical Distribution to Areas Other Than Process Buildings
X-300	Plant Control Facility	X-2215C	Exterior Light Fixtures
X-300A	Process Monitoring Building	X-2220C	Fire and Supervisory Alarm System
X-300B	Plant Control Facility Carport	X-2220D	Telephone System
X-300C	Emergency Antenna	X-2220L	Classified Computer System
X-326	Process Building (Note)	X-2220N	Security Access Control and Alarm System
X-330	Process Building	X-2230A	Sanitary Water Distribution System
X-333	Process Building	X-2230B	GCEP Sanitary Sewers
		X-2230C	Storm Sewers
X-342A	Feed, Vaporization Fluorine Generation Building	X-2230F	Raw Water Supply Line
X-342B	Fluorine Storage Building	X-2230G	Recirculating Water System
		X-2230H	Fire Water Distribution System
X-343	Feed, Vaporization and Sampling Facility	X-2230J	Liquid Effluent System
X-344A	UF6 Sampling Facility	X-2230T1	Recirculation Heating Water System
X-344B	Maintenance Storage Building	X-2232B	Dry Air Distribution System
		X-2232D	Steam and Condensate System
X-501	Substation	X-2232G	Supports for Distribution Lines
X-501A	Substation	X-3000T1	IAEA Trailer
X-502	Substation		
X-515	330 KV Tie Line		

Figure 2.1-5a (Continued)

Note: The seven areas permitted to contain RCRA Waste in X-326 (2 of which are caged) and the glove box room area adjacent to East L-caged area will not be leased.

Facility Number	Facility Description	Facility Number	Facility Description
X-530A	Switch Yard	X-3001	Process Building
X-530B	Switch House	X-3002	Process Building (Transfer Corridor only)
X-530C	Test & Repair Facility	X-3012	Process Support Building
X-530D	Oil House	X-5000	GCEP Switch House
X-530E	Valve House	X-5001	Substation
X-530F	Valve House	X-5001A	Valve House
X-530G	GCEP Oil Pumping Station	X-5001B	Oil Pumping Station
X-533	Transformer Storage Pad	X-5015	HV Electrical System
X-533A	Switch Yard	X-6000	GCEP Cooling Tower Pump House
X-533B	Switch House	X-6001	Cooling Tower
X-533C	Test & Repair Facility	X-6001A	Valve House
X-533D	Oil House	X-6609	Raw Water Wells
X-533E	Valve House	X-6613	Sanitary Water Storage Tank
X-533F	Valve House	X-6614E	Sewage Lift Station
X-533H	Gas Reclaiming Cart Garage	X-6614G	Sewage Lift Station
X-540	Telephone Building	X-6614H	Sewage Lift Station
X-600	Steam Plant	X-6614J	Sewage Lift Station
X-600A	Coal Pile Yard	X-6619	Sewage Treatment Plant
X-600B	Steam Plant Shop	X-6643	Fire Water Storage Tanks #1 & #2
X-600C	Ash Wash Treatment Building	X-6644	Fire Water Pump House
XT-801	South Office Building	X-7721	Maintenance Stores Training Building (Training)
XT-847	Waste Management Staging Facility	X-7725	Recycle/Assembly (only the area west of column line C8 [except the Gas Test Area], Container Wash, Container Dry, Rotor Balance, Level IV Control Room, and all of the Level V Area)

Figure 2.1-5a (Continued

Facility Number	Facility Description	Facility Number	Facility Description
X-611A	Lime Sludge Lagoons (North, Middle, South)	X-2207-F	South Parking Lot
X-615	Old Sewage Treatment Plant	X-2210	Sidewalks
X-616	Liquid Effluent Control Building	X-2230-M	Holding Pond #1
X-622	South Ground Water Treatment Building	X-2230-N	Holding Pond #2
		X-2230-T2	Recirculating Heating Water System
		X-3000	Office Building

Figure 2.1-5b. (Continued)

Facility Number	Facility Description	Facility Number	Facility Description
X-623	North Ground Water Treatment Building	X-3002	Process Building (except transfer corridor)
X-624	Little Beaver Ground Water Treatment Facility		
X-624-1	Little Beaver Groundwater Treatment Facility	X-3346	Feed and Withdrawal Facility
X-625	Pilot Scale Treatment Facility	X-6002	Boiler System (NE Corner X-3002 Facility)
X-700	Converter Shop and Cleaning Building (only South half of Weld Shop)		
X-627	Groundwater Treatment Facility		
X-701A	Lime House	X-6002A	Oil Storage Facility
X-701B	Holding Pond (Drained)	X-7725	Recycle/Assembly (except the area west of column line C8 [except the Gas Test Area], Container Wash, Container Dry, Rotor Balance, Level IV Control Room, and all of the Level V area)
X-701C	Neutralization Pit and Tank	X-7725A	Waste Accountability Facility
X-701D	Water Deionization Building		
X-701E	Neutralization Building	X-7726	Centrifuge Training and Test Facility (only Gas Test Stand Area)
X-701F	Effluent Monitoring Station		
X-705A	Incinerator		
X-705B	Contaminated Burnable Storage Facility	X-7745R	Recycle/Assembly Storage
X-705E	Oxide Conversion Area		
X-720A	Maintenance and Stores Gas Manifold Shed		
X-734	Old Sanitary Landfill	X-7745S	Area South of X-3001/X-3002
X-734A	Construction Spoils Disposal Area	XT-860A	RUBB Building at X-7725
X-734B	Construction Spoils Disposal Area	XT-860B	RUBB Building at X-3346
X-735	Sanitary Landfill	Z-SWMU-QUAD-IV	Southern end of railroad spur which is used as drum storage area
X-735A	Landfill Utility Building	Z-SWMU-QUAD-IV	Chemical and petroleum containment tanks east of X-533C
X-735B	Borrow Area		
X-736	West Construction Spoils Landfill	Z-SWMU-X701	Northeast oil biodegradation plot area, which was formerly used for the disposal of X-615 sludge

Figure 2.1-5b (Continued)

Facility Number	Facility Description	Facility Number	Facility Description
X-740	Waste Oil Storage Facility	Z-SWMU-X710	Inactive "hot pit" in the area of X-710 that was once used for the storage of radioactive wastewater
X-744G	Bulk Storage Building		
X-744K	Warehouse K		
X-744N	Warehouse N - Non UEA	Z-SWMU-X744	Retrievable waste storage area
X-744P	Warehouse P - Non UEA	Z-SWMU-XXXX	Solid Waste Management Units, as identified on Portsmouth Environmental Information Management System Drawing, printed 2/9/93.
		DOE's Contractor Trailer Area	Approximately 3.7 acres; bounded S. by X-2207E Parking Lot, E. by security fence, W. by railroad tracks & N. by construction road.
X-744Q	Warehouse Q - Non UEA	Contractor Laydown Area	Triangular area about 3 acres northwest of X-7721, west of X-2207D, southeast of Construction Road and west of Truck Access Road
		X-120 Area	About 5 acres located south of X-2207F, bounded on the west and south by railroad and on the east by a line drawn south from the west end of X-2207F Parking Lot to the railroad and adjacent to Perimeter Road/Railroad

a) Use of facility includes area necessary for ingress, egress, and proper maintenance of facility.

b) All existing and future DOE monitoring wells, piezometers, extraction wells, and borings (temporary or permanent) used for the purposes of collecting water level measurements and/or samples for physical and/or chemical analyses are the property of DOE and shall be considered nonleased facilities. The nonleased facility associated with each monitoring well, etc., will include all land within 10 feet of the well, etc. DOE/USEC and their subcontractors shall be allowed ingress to and egress from each well, piezometer, or boring location as necessary. Activities conducted in these locations, including ingress and egress, will be managed in accordance with applicable DOE requirements.

c) All existing SWMUs/AOCs are the property of DOE. DOE/USEC and their subcontractors shall be allowed ingress to and egress from each SWMU/AOC as necessary, including those that are operating.

Figure 2.1-5b (Continued)

Facility Number	Facility Description	
X-3001	Process Building – (Partial: Train 3, Train 6, and north mezzanine and utility bay)	
X-3012	Process Support Building – North Half	
X-7727H	Interplant Transfer Corridor	
X-7726 (Partial)	Centrifuge Training and Test Facility (except for the Gas Test Stand Area)	
X-7725	Recycle/Assembly Building (Container wash, container dry, rotor balance, Level IV Control Room, all of the Level V area and all of the area west of column line D1 [except the Gas Test Area]).	

Figure 2.1-5c. Facilities Subleased to USEC, Inc. at PORTS Site

Product withdrawals are typically made at the X-326 ERP Facility and the X-333 Low Assay Withdrawal (LAW) Facility. The Tails Withdrawal Facility, located in X-330, is where the tails stream is normally condensed and withdrawn. The Tails Withdrawal Facility can also be configured as a product withdrawal station. The feed and withdrawal facilities are described in Section 3.2.

Contaminant gases that enter the cascade through leaks or through operations and maintenance activities are removed in the purge cascades. The purge cascades are described in Section 3.1.2.

The cascade is equipped with multiple surge and power control systems that may be used to handle inventory shifts and facilitate efficient operation, including the Intermediate Surge System, the Bottom Surge System, and the F/S Systems.

Process equipment, piping, and instrument lines that contain PG are enclosed in housings to prevent condensation, or freeze-out, of UF_6. The housings retain the heat generated in the enrichment process, or they are provided with supplementary heating to ensure that the UF_6 remains a gas. The housings are described in Section 3.1.1.3.

Auxiliary systems that support the cascade include cascade coolant systems, lube oil systems, buffer systems, and UF_6 leak detection, as well as typical utilities, such as electrical power, compressed air, nitrogen (N_2), and various plant water systems. Fire protection is provided in each process building.

The PORTS enrichment operations have been shutdown and most of the cascade equipment is either in "cold standby" or shutdown. A summary of the status of equipment in each major cascade building is provided in Sections 3.1.1.1.5.

A portion of the cascade equipment placed in cold standby is utilized in transferring Affected Inventory UF_6 (near-normal enriched UF_6 contaminated with Tc-99 above ASTM Specification C-787-90) from DOE Non-DOT Compliant Cylinders to ANSI N14.1 compliant cylinders. The UF_6 is fed as a gas (using both normal and controlled feeding at the X-342 and X-343 autoclaves) to cascade equipment and routed to the X-326 building (specifically cells in Unit X-27-1) and then sent to the ERP Station for withdrawal as liquid UF_6 into ANSI N14.1 compliant cylinders. After the prescribed cooling period, the full cylinders are transferred by a straddle carrier to the X-344 facility for Tc-99 reduction and transfer into shipping cylinders.

3.1.1.1.5 Process Buildings

This section contains general descriptions of the principal facilities and systems located in the three process buildings. The building structures are important to safety as described in Section 3.8.

The buildings are constructed of structural steel framing with reinforced concrete floors. The overall size varies among the three buildings; however, each includes an operating floor at grade, a cell floor above grade, and valve platforms at various levels above the cell floor. The buildings are composed of structural modules that are separated by construction joints (gaps) at the cell floor and the roof. In general, two support columns exist at each column line—one for each adjoining module—though shared columns exist at some column lines. Where separate columns are used for adjacent modules, the columns are not linked structurally, but they share a common foundation. Where shared columns are used, module separation is augmented by slotted connections at the beam-to-column joints. These connections transmit vertical loads, but the slots limit the transmission of lateral loads. The wide-flange columns extend through the grade slab where they are connected to baseplates that are anchored to foundation piers or footers. The ground floor slab is soil-supported and is not tied to the building column footings.

Siding is corrugated cementitious board attached to building girders. The buildings' roofs are composition roofing supported by steel trusses and purlins. The roofs are sloped to facilitate draining. Curbs (parapets) equipped with scuppers surround the roofs.

All three buildings are above the maximum flood elevation for the site, and no damage would be experienced from a flood. Accumulation of rainwater could occur on the roof as a result of heavy rainfall. However, no loss of UF_6 primary system integrity is expected to result from heavy rainfall. The buildings are expected to maintain their structural integrity in the most severe evaluation-basis earthquake event. High winds could cause siding failures at X-326, X-330 and X-333; however, no structural failures are expected to occur.

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The separative, or PG, equipment and associated valves and piping are located on the second, or cell, floor of each building. In general, the ground, or operating, floor is the location for the control facilities, electrical switchgear, ventilation fans, unit auxiliary equipment, cell servicing facilities, and maintenance facilities.

3.1.1.1.5.1 X-333 Process Building

X-333 is approximately 1,456 ft long, 970 ft wide, and 82 ft high. It houses the largest of the process equipment (X-33 size) and the LAW Facility. The functional layout of the process cells in X-333 is shown in Figure 3.1-6. Although all of the enrichment cascade equipment in X-333 is X-33-size equipment, the horsepower-ratings on the compressor motors vary. For cascade optimization, the higher horsepower compressor motors are in the middle units on the east end of the building and the lower horsepower motors are in the end units at the west end of the building.

An Evacuation Booster Station (EBS), located on the cell floor approximately in the center of the building, is used in the preparation of cells and piping for maintenance (Section 3.1.1.4.1). The LAW Facility is located in the west end of X-333. The LAW Facility is described in Section 3.2.2. Two interbuilding booster stations (A-booster and B-booster) are located in X-333. They are used to maintain the flow continuity between the terminal stages in this building and the initial stages in X-330. The booster stations are described in Section 3.1.1.4.2.

A PG mover station, which may be used for cell servicing, is located on the cell floor between Units 4 and 5. The configuration of the PG mover station is similar to that of the EBS. However, unlike the EBS, light gases cannot be pumped by the PG mover station. The X-333 F/S Systems, located in Units X-33-2 through X-33-7 are described Section 3.1.3.

Area Control Room (ACR) 1, located on the operating floor near the center of the building, is the main control facility for X-333. This section of the cascade is referred to as Area 1. In addition to cell controls and instruments, the ACR is equipped with controls and instrumentation for the EBS, the LAW Stations, the PG mover station, and for auxiliary equipment, such as the diesel-powered backup generators. See Section 3.1.1.10.2 for a description of the instrumentation in the ACR.

Administrative offices, a kitchen, and restroom facilities are located in rooms adjacent to the control room. The basement below the ACR provides access to instrument cable tunnels that lead to X-300, Plant Control Facility (PCF), via the X-330 tunnel and to X-533B, Switch House.

Communications systems in the ACR are described in Section 3.1.1.10.2.10.

Local Control Centers (LCCs) for each enrichment cascade cell are located on the operating floor just below the equipment on the cell floor (Section 3.1.1.10.1).

The X-333 Cold Recovery System, which includes the surge drum room, a holding drum room, a refrigeration system, and a cold trap room, is located on the operating floor between Units X-33-3 and X-33-6 (Section 3.1.4). The X-333 Seal-Exhaust Station is located adjacent to ACR 1 (Section 3.1.1.6.1). A Coolant Drain, Recovery, and Transfer Station, which serves the cell cooling systems, is located on the ground floor just south of the ACR (Section 3.1.1.6.7).

The building also houses multiple electrical substations and distribution panels on the operating floor that supply power to the building's compressor motors and auxiliary systems (Section 3.1.1.8). Other

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Two coolant drain stations are available—one located at Unit X-31-2, and the other at Unit X-29-3 (Section 3.1.1.6.7). The Interim Purge Facility is located on the ground floor at the east end of Unit X-29-5 (Section 3.1.4.2).

The building also houses multiple electrical substations and distribution panels on the operating floor that supply power to the building's compressor motors and auxiliary systems (Section 3.1.1.8). Three of the five backup diesel generators originally in this building have been removed. The units that were removed are 2-1, 2-2, and 2-3. Other major equipment on the operating floor includes the air compressors, which are a part of the Plant Air System, and a nitrogen plant, which is part of the Plant Nitrogen System, located on the ground floor in the southeast corner of the building (Sections 3.1.1.6.6 and 3.1.1.6.5). The building maintenance shop area is located approximately in the center of the building on the operating floor.

A ventilation system provides the building with effective protection of equipment and with suitable ambient conditions for working personnel. Process heat from the cell floor is used to heat the operating floor during cold weather (Section 3.1.1.7).

A truck alley and a railroad spur track extend along the west side of X-330 for delivery and pickup of process equipment. The cell floor extends over the truck alley and has hatches located under each crane bay. Heavy process equipment and motors are lifted to the cell floor for installation or storage of spares.

The X-330 Building enrichment equipment is currently either in a shutdown or in a "cold standby" condition. The equipment may be restarted for treatment and removal of deposits and/or to begin enrichment operations again. Cells have been evacuated of UF_6, a UF_6 negative obtained, and a dry gas buffer applied at slightly above atmospheric pressure. The shutdown cells are isolated from the RCW system; the cold standby cells are isolated from the RCW system (condensers drained). The R-114 coolant is either stored in the cell coolant system, in the coolant storage tanks or is stored in railcars. The seal exhaust system remains operational to the extent required to support standby requirements and cell treatment operations. The X-330 Cold Recovery facility remains operational to support cell treatment for recovery of deposits and to support processing of vent gases from the X-340 complex. Some equipment (e.g. drums) are used for UF_6 feed repackaging work. Cells in shutdown or cold standby are isolated from the unit lube oil system and the oil is drained from the cell. The unit lube oil system remains operable.

Cell maintenance is performed to maintain the cells in a shutdown or "cold standby" condition, to prepare cells for chemical treatment for deposit removal, and to remove equipment for decontamination. Cell treatments, including inverse recycle treatments, are performed to recover deposits. The cell treatment gases are routed to one of the Cold Recovery facilities for recovery of UF_6, or are routed to the X-326 Building for processing in the isotopic/purge cascade cells. Any UF_6 recovered will be withdrawn at ERP or PW or by side withdrawal. The building is equipped with electric heaters, described in SAR Section 3.1.1.7, to assure that the High Pressure Fire Water System (HPFWS) remains above freezing and in service. The TSRs governing the X-330 Building cascade operations do not require the HPFWS to be operable when cells are shutdown and with the lube oil drained to the storage tanks. The CAAS remains operable and the TSRs remain in effect. The TSRs for the building enrichment equipment operation remain in effect for the applicable operating mode. Any cells with deposits are controlled as required by the TSRs and NCSAs.

Administrative offices, a kitchen, and restroom facilities are located in rooms adjacent to the control room. The basement below the ACR provides access to an instrument cable tunnel that leads to X-300. Security barriers control ingress in certain tunnels. Communications systems in the ACRs are described in Section 3.1.1.10.2.10.

LCCs for each enrichment cascade cell are located on the operating floor just below the equipment on the cell floor (Section 3.1.1.10.1).

A surge-drum room is located on the east side of the building at the end of Unit X-25-3 (Section 3.1.1.5). Two coolant drain and recovery stations serve the cell Coolant Systems. See Section 3.1.1.6.7 for a description of the Coolant Storage and Transfer Systems.

The Freon degrader, which is used to facilitate purging of Freon coolant contaminants from the light-contaminant upflow, is located near Cell X-25-7-16 (Section 3.1.2). The Product Withdrawal facility is located at the southwest corner of the building (Section 3.2.3). The alumina traps and air jets for the purge cascades are located at the south end of the building (Section 3.1.2). The maintenance shop is located in the center of the building between Units X-25-2 and X-25-3 on the operating floor. This process building also houses multiple electrical substations and distribution panels on the operating floor that supply power to the building's compressor motors and auxiliary systems. Other major equipment on the operating floor includes a diesel-powered backup air compressor, part of the Plant Air System, located in the northeast corner of the building (Section 3.1.1.6.6), and the building ventilation supply fans (Section 3.1.1.7).

A truck alley and a railroad spur track extend along the west side of X-326 for delivery and pickup of process equipment. The cell floor extends over the truck alley and has hatches located under each crane bay. Heavy process equipment and motors are lifted to the cell floor for installation or storage of spares.

The X-326 cascade equipment in Unit X-25-7 and selected cells in Unit 27-1 is in cold standby but may be operated as needed to support the deposit recovery operations, the UF_6 material transfer/repackaging, and the venting operations from the X-340 complex. The remaining X-326 Building enrichment equipment is currently in either a "shutdown" or "cold standby" condition. The equipment may be restarted for treatment and removal of deposits and/or to begin enrichment operations again. Shutdown and cold standby cells have been evacuated of UF_6, a UF_6 negative obtained, and a dry gas buffer applied at slightly above atmospheric pressure. The shutdown cells are isolated from the RCW system and the lube oil has been drained from the system to the storage tanks (or has been removed) and the R-114 coolant has been removed. The cold standby cells are isolated from the RCW system and the R-114 coolant is either stored in the cell coolant system, in the coolant storage tanks or is stored in railcars. The cold standby cells are isolated from the unit lube oil system and the lube oil is drained from the cells. The unit lube oil system is operable. The seal exhaust system remains operational to support standby requirements and cell treatment operations. The ERP and PW withdrawal facilities are in cold standby but may be operated to support cell treatment for recovery of deposits and to support processing of vent gases from the X-340 complex.

Cell maintenance is performed to maintain the cells in a shutdown or "cold standby" condition, to prepare cells for chemical treatment for deposit removal, and to remove equipment for decontamination. Cell treatments, including inverse recycle treatments, may be performed to recover deposits. Any cell treatment gases generated are routed to one of the Cold Recovery facilities for recovery of UF_6, or are processed in the isotopic/purge cascade cells. Any UF_6 recovered will be withdrawn at ERP or PW or by side withdrawal. The building is equipped with electric heaters, described in SAR Section 3.1.1.7, to assure that the High Pressure Fire Water System (HPFWS) remains above freezing and in service. The TSRs governing the X-326 Building cascade operations do not require the HPFWS to be operable when cells are shutdown and with the lube oil drained to the storage tanks. The CAAS remains operable and the TSRs remain in effect. Any cells with deposits are controlled as required by the TSRs and NCSAs. The TSRs for the building enrichment equipment operation remain in effect for the applicable operating mode.

3.1.1.2 Major Cascade Equipment

The containment function of the UF_6 primary system, including PG piping ≥2 inches in diameter, expansion joints, PG coolers, and associated valves and equipment containing UF_6, is important to safety as described in Section 3.8. The process system consists of an assembly of piping, vessels, compressors, valves, and auxiliary systems designed to circulate PG (primarily UF_6) for separating the uranium isotopes. The motor-driven compressors represent the only major dynamic equipment in the cascade. The compressor drive motors are outside the insulated enclosures. The maximum operating pressures for the cascade system are 25 psia (for uprated cells) and 14.45 psia (for non-uprated cells). Piping and equipment are designed to criteria that assure they meet or exceed the operating conditions they are expected to encounter.

Welds in the UF_6 primary system (converters, compressors, expansion joints, piping, and valves) have been pressure tested. All systems have been vacuum leak tested, and they meet the leakrate criteria specified in plant procedures.

3.1.1.2.1 Materials of Construction

The cascade materials of construction have good resistance to attack by the three fluorinating agents used in cascade operations—UF_6, fluorine (F_2), and chlorine trifluoride (ClF_3). Nickel plated steel, Monel, and some other alloys with a high nickel content have proven to be the most satisfactory materials,

3.2 UF_6 FEED, WITHDRAWAL, SAMPLING, HANDLING, AND CYLINDER STORAGE FACILITIES AND SYSTEMS

The various UF_6 feed, withdrawal, and sampling systems and UF_6 cylinder operations occur in a variety of facilities throughout the gaseous diffusion plant. These facilities and their related processes are identified in the following descriptions.

Facilities are provided for the feeding and withdrawing of UF_6 at various points along the enrichment cascade. The facilities are necessary to obtain material of the desired assays to fill customer orders and to prevent mixing of assays when introducing miscellaneous assays of UF_6 feed material into the cascade. All cascade feeding, whether from the X-342A, Feed, Vaporization & Fluorine Generation Building, the X-343, Feed, Vaporization & Sampling Building, or from any of the various side feed locations, is performed by transferring UF_6 gas from a cylinder through heated line(s) into the appropriate point in the cascade, which contains similar assay material as the material being fed. Regardless of the location of the feeding operation, feed headers are available for distribution of the UF_6 to the appropriate location in the cascade.

Cascade UF_6 withdrawals are also performed at various locations. As with feed operations, there are both fixed and portable withdrawal facilities; however, some withdrawals involve liquid UF_6 transfers. These UF_6 liquid phase withdrawals are performed at three fixed facilities: the Tails Withdrawal Station in X-330, the Low Assay Withdrawal Station in X-333 and the Extended Range Product Station in X-326. These withdrawals involve the compression and condensation of UF_6. Gas phase withdrawals may be performed at the Product Withdrawal facility in the X-326, Process Building, or at any local cell control panel in the isotopic cascade, using portable equipment, and at X-326 line recorder sampling lines in the Area Control Rooms.

Assay control for all enriched products withdrawn from the cascade is verified by samples taken at the withdrawal station and/or the withdrawal point. To ensure that the product material meets the customers' requirements for both assay and purity, additional sampling is required.

Pre-sampling operations, as required, are performed at X-343. The sample/transfer operation is performed at X-344A, UF_6 Sampling Facility. The shipping and receiving activities for large cylinder (2½, 10- and 14-ton cylinders) toll enrichment orders are normally performed at the X-344A facility. Shipping and receiving activities for large cylinder toll normal and Paducah product feed is normally performed at X-343. Shipping and receiving of sample containers is normally performed at X-344A.

A cylinder containing solid UF_6 can be transported along any plant-site street and can typically be found in any of the process buildings; X-344A; X-343; X-342A; X-710, Technical Services Building; X-760, Chemical Engineering Building; X-705, Decontamination Building; in addition to X-745 outside UF_6 cylinder storage.

The uranium enrichment operations at PORTS have been shutdown and the majority of the enrichment cascade equipment placed in a shutdown or "cold standby" condition (See Section 3.1 for more detail).

The uranium feed and withdrawal operations have been drastically curtailed due to the shutdown of enrichment operations. The X-343 and X-344A facilities are primarily utilized for the receipt, sampling, Tc reduction, transfer and shipping of uranium material. Both the X-343 and the X-342A may be used for material transfer and venting to the cascade equipment. The withdrawal facilities at Tails and LAW are also maintained in standby condition. The ERP and PW facilities may be used for side feed and withdrawal operations to support cascade equipment deposit removal activities and X-340 operations (including UF_6 material transfer for repackaging).

USEC has contracted with DOE to process near-normal enriched UF_6 contaminated with Tc-99 above ASTM Specification C-787-90 (Affected Inventory) contained in cylinders that, based on initial inspections, are not compliant with DOT shipping requirements and are designated "Non-Compliant Cylinders." These cylinders are shipped to PORTS under a DOT exemption. USEC has contracted with DOE to remove the UF_6 from the cylinders, process this material for reduction of Tc-99 to acceptable levels and to package the material in ANSI N14.1 compliant cylinders.

Since the enrichment process is in "cold standby," USEC will use existing cascade equipment and processes at the Portsmouth GDP (PORTS) to perform the required activities. Many of these cylinders meet PORTS inspection requirements (based on ANSI N14.1 and USEC-651) and are liquid-transferred and processed in X-344. For the majority of these cylinders, PORTS will use autoclaves in the X-342 and X-343 autoclaves to heat the impaired cylinders using both the normal and "controlled feed" mode of heating, as described in the TSRs, and feed the material to cascade equipment for withdrawal at the ERP Station into 10-ton ANSI N14.1 compliant cylinders.

The autoclaves in X-342 and X-343 that will be utilized for this process had been in service prior to shutdown of the enrichment process. The X-342 and X-343 autoclaves were utilized for providing feed to the cascade and will be used in the same manner for this project activity. However, the autoclaves to be used in X-342 and X-343 in the "Controlled Feed" mode for these cylinders in transferring the material to the cascade equipment are modified. The steam control system (a Non-Safety, NS, system) is modified to employ a new control system utilizing the cylinder surface temperature measurement as the control parameter. The new steam control system will replace one of the existing steam control systems and is designed to provide steam at a rate of approximately 10% of the existing steam control systems. The feed will be transferred using existing transfer lines (e.g., tie-lines) to the cascade equipment. In addition, these autoclaves will be used for heel evacuation and feed of some cylinders using normal heating settings.

The cascade will receive the feed into either drums or directly to operating cascade equipment. The overall feed rate will be approximately 1000 lb/hr (or less); this feed rate is 20% of the feed rate at PORTS GDP rated capacity.

The following sections describe in more detail the operations identified above.

The United States government intends to ship four cylinders of UF_6 to USEC for processing. These cylinders cannot be shown to meet the specifications required by the SAR and TSRs and the contents cannot be verified to meet the SAR requirements nor can the normal receipt verifications be performed as described in the FNMCP.

The methodology for handling these cylinders is as follows:

- Receive cylinders, inspect for obvious defects, weigh cylinders and compare with shipping weights from an Oak Ridge facility
- Perform NDA measurements to identify uranium isotopes and any significant quantities of other isotopes
- Perform initial inspection of cylinders and valves including radiography and ultrasonic thickness testing, as required, to provide information on the structural characteristics of the cylinders
- Perform Engineering Evaluation to determine ability of cylinders to withstand process temperatures and pressures
- Perform gas over solid sampling of the cylinder contents prior to processing
- Set up autoclave for the 30-inch nominal diameter cylinder for sampling and transfer by controlled heating (this process prevents liquefaction of cylinder contents) to a standard (ANSI N14.1) cylinder
- Set up transfer equipment in X-710 for sampling and vapor transfer of small cylinder contents to standard (ANSI N14.1) 5" cylinders
- Transport 5" cylinders to X-344 for transfer to final cylinder
- Sample final cylinder contents for accountability and make available for use as feed to enrichment process
- Clean empty cylinders and return cylinders to U.S. government for disposition

As noted above, the off-specification cylinder contents will be processed for transfer into cylinders meeting the SAR/TSR requirements. The SAR compliant cylinder contents will be measured as required by the FNMCP for uranium materials and will be available for processing in the enrichment process in the same manner as other feed materials. From this point on, the recovered UF_6 will be stored, handled and processed in compliance with the NRC Certificate. The emptied U.S. government cylinders will be cleaned and returned to the U.S. government.

3.2.1 Cascade UF_6 Feed and Sampling Systems

The following facilities/locations perform feed and sampling functions:

- X-343, Feed, Vaporization & Sampling Building,
- X-342A, Feed, Vaporization & Fluorine Generation Building,
- X-344A, UF_6 Sampling Facility, and
- Side Feed at X-326, X-330, & X-333.

3.2.1.1 X-343 Feed Vaporization & Sampling Building

The X-343 facility is the usual receiving point for all inbound uranium hexafluoride (UF_6) natural assay (0.7% ^{235}U) and Paducah product feed material. This feed material is received in large cylinders (10-ton and 14-ton). The X-343 facility is the usual shipping point for the empty cylinders after they are fed to the cascade.

The X-343 building consists of a high bay area, an adjoining west service area (low bay) and an adjacent open crane runway area on both the north and south ends. The building is constructed of braced structural steel with insulated metal siding on the high bay and service areas. The building floors are reinforced concrete slabs on fill and the roofs are insulated steel rib decking with built up roofing. The building structures are important to safety as described in Section 3.8.

The X-343 facility is equipped with seven steam-heated autoclaves. All seven units are designed for feed or vapor-phase sampling operations and are connected to the cascade feed headers. Three of the seven autoclaves have seven-foot diameters and are equipped with cylinder rollers to allow the cylinder valve to be positioned below the UF_6 liquid/gas phase boundary for liquid phase sampling. The remaining four autoclaves have six-foot diameters and are not equipped for cylinder rotation. The six-foot autoclave positions can be used for cylinders to collect sample flushes, residual UF_6 from spent Tc traps, from dumping 5- and 12-inch cylinders or from evacuation for pressure control in the event of a pressure excursion during initial cylinder heating as well as other material that may not be sent to the cascade as discussed below. The autoclaves and related important to safety systems are described in Section 3.2.1.1.1. There are two oil interceptors in the X-343. The first oil interceptor, located in the X-343 basement contains borosilicate-glass raschig rings as a nuclear criticality safety control. The second oil interceptor, located on the first floor of X-343, does not contain raschig rings.

If a cylinder requires liquid phase sampling it is picked up with the overhead crane and placed into a feed and sampling (seven-foot) autoclave. The cylinder is then heated, sampled, weighed, and returned to storage with the overhead crane. The sample container is taken to the X-710, Technical Services Building for chemical and isotopic analyses. The sample flush is either sent to the cascade or to the dump cylinder described in more detail in Section 3.2.1.1.1.

As a general administrative control, cylinders containing liquid UF_6 are moved only by overhead cranes. After a cool down period at ambient temperature, as specified in plant administrative controls, mobile equipment, such as straddle carriers and forklifts, may be used. Criteria for UF_6 cylinder cooling and transport are discussed in Section 3.2.4.5. After analytical results of feed cylinder samples are available, the cylinders may be scheduled for feeding. The cylinders can be fed from any of the seven autoclaves where they are heated, the cylinder contents are vaporized, and transferred to the cascade through a manifold system of three feed headers, metering stations, and cascade feed piping. During the cannot be maintained, the cylinder is valved off and a full preheated cylinder in another autoclave is valved on to maintain the feed rate. The feed plant personnel will then evacuate the residual contents of the cylinder to the cascade through an available feed header. The noncondensible gases are also evacuated to the cascade through an available feed header. This evacuation of residual material is to assure the net weight (heel) is within shipping limits (50 lb UF_6 or less) for "empty" cylinders. Once evacuated, the autoclave cylinder pigtail is purged, evacuated, and disconnected. The emptied cylinder is then placed on a scale, weighed for accountability, and then moved to the X-343 outside storage lot or an adjacent lot east of X-343.

The feed and sample system in the X-343 Building is equipped with dump cylinder and surge volume cylinder capability. These dump/surge volume cylinders are large UF_6 cylinders installed on the cylinder supports of shell open autoclaves. The operation is discussed in more detail below.

The X-343 facility is equipped with cold trap banks to support operation when the cascade is not used. Each cold trap bank is a metal enclosure that provides housing for three refrigeration chambers, the refrigeration equipment for each chamber, and the associated controls. Each refrigeration chamber provides housing for a 12-inch cylinder (cold trap cylinder). The refrigeration chambers are designed to operate in series or individually as needed. The cold trap refrigeration chambers have weighing systems to monitor cold trap cylinder weight and temperature controllers to maintain the temperatures necessary to freeze UF_6 in the cold trap cylinders. Gas concentrations sent to the cold traps are diluted as necessary to prevent the accumulation of explosive gases in the cold trap cylinders. The cold trap operation is discussed in more detail in Section 3.2.1.1.5.

Downstream of the cold traps are chemical traps used to trap UF_6 that might pass through the cold traps. Flow through these chemical traps is maintained by the use of air ejectors. These ejectors exhaust to the vent stack. A continuous/real time vent monitor, located prior to the gases leaving the building, will monitor the evacuation vent line. The continuous portion of the monitor provides integrated release information to demonstrate compliance with OEPA emission limits. The real time portion of the monitor provides operations with an alarm to investigate the evacuation system for chemical trap break through or system off-normal operation.

3.2.1.1.1 Autoclaves

There are seven steam heated autoclaves in the X-343 facility designed to heat UF_6 cylinders containing material enriched to 5 weight percent ^{235}U or less. Five autoclaves can be used to heat cylinders for cascade feeding and/or sampling. Three of the seven are equipped with the roll mechanisms for liquid phase UF_6 sampling.

The X-343 facility contains seven autoclave positions with feed capability. The autoclaves are also used for dumping 5- and 12-inch cylinders. Dumping consists of installing the cylinder in the autoclave. The contents are then heated, liquefied and flashed to a designated dump cylinder. Three of these positions (five, six and seven) have the capability to liquid sample UF_6 cylinders. As a part o the cold trap evacuation process, autoclave positions one, two, three and four have the capability to be used as dump/surge volume cylinder locations when they are not functioning as autoclaves. Autoclave positions one and two (six-foot autoclaves) can be used as autoclaves for preheating and special cylinder burping, and feed to the cascade, but can be converted for use as dump/surge volume cylinder locations when necessary. When not available for use as autoclaves, positions three and four are used as dump/surge cylinder locations only.

The dump cylinder is used to receive residual UF_6 remaining in the autoclave sample loops following sampling operations and residual UF_6 from spent Tc traps. The dump cylinder is also used to evacuate material for dumping 5- and 12-inch cylinders or for pressure control in the event of a pressure excursion during initial cylinder heating. The UF_6 is flashed from the liquid phase, transferred in the vapor phase, and solidified in the dump cylinder. The surge volume cylinder receives the gas impurities from the product cylinders and autoclave sample loops. If the gas composition is such that explosive mixtures (>11 mole percent ClF_3, >10 mole percent R-114) could be produced or liquefaction could occur in the cold traps, the surge volume cylinder contents are diluted with an appropriate gas, e.g., dry air, as necessary. If the surge volume cylinder contents are not sampled to determine dilution, the contents are diluted with at least 50 psia of an appropriate gas. The dump cylinder and surge volume pressures are monitored to verify a dump or transfer of material has occurred and to verify the flow path from the autoclave is closed.

The Autoclave Nuclear Safety Upgrades (NSU) Project results in different system descriptions applying to certain autoclave systems and components depending on whether it pertains to an "upgraded autoclave" or to a "non-upgraded autoclave" (only applies to autoclaves 3 & 4, which are no longer used as autoclaves for heating cylinders). The following discussions indicate which configuration is being described when such clarification is required.

The autoclave heads have penetrations for the following UF_6 piping and utility services:

- UF_6 line,
- Steam inlet,
- Steam control valves pressure tap (upgraded autoclaves only),
- Condensate drain,
- Blowdown exhaust line,
- Shell vent,
- Roll motor buffer air inlet and outlet (seven-foot autoclaves only),
- Electrical power cable (seven-foot autoclaves only),
- Air supply line for back-up safety valve,
- Steam sample tubes (2),
- Internal pressure tap,
- Thermocouple leads,
- Pressure relief line, and
- Vacuum relief line.

The electric motor which drives the cylinder rollers inside a seven-foot feed/sampling autoclave is encased in a buffered enclosure. The buffer is dry air at a pressure greater than or equal to the maximum normal operating pressure of the autoclave and is provided to protect the motor from steam inleakage during normal operation. Figure 3.2-1 shows a diagram of a six-foot feed autoclave; the X-343 seven-foot feed and sample autoclaves are diagrammed in Figure 3.2-2.

(the shell) being moveable on a wheel/rail system. In the closed position, the shell is secured to the head with a locking ring. A seal is maintained between the head and shell with an O-ring located in a machined groove in the sealing face of the head. A single building hydraulic system serves the seven X-343 autoclaves providing motive power for shell travel and locking ring operation. The hydraulic system serves to open the shell sufficiently to allow placement of a UF_6 cylinder into the autoclave.

Cylinder contents are fed to the cascade as a gas with the cylinder valve in the nominal 12 o'clock position. To liquid-phase sample the cylinder in a roller equipped feed/sample autoclave, the cylinder is rolled so the cylinder valve is between the 3 and 9 o'clock positions, within the UF_6 liquid phase.

Cylinder heating is accomplished by pressurizing the autoclave with steam from a nominal 50 psig header. The pressurized steam is supplied through a pressure reduction and regulation system designed to deliver steam at two flow rates. The higher flow rate is required for initial autoclave and cylinder heatup when the system steam condensation rate is high and/or the blowdown exhaust system air eliminators are open. The air eliminators are thermostatically-controlled vent valves, which allow air trapped in the autoclave to be vented during the initial stages of the heating cycle. The air eliminators automatically close when the temperature in the blowdown line reaches the actuation level for the valve. The X-344A air elimination systems are not always needed and can be isolated during heat cycles.

Fill limits for UF_6 cylinders are established to allow adequate room for UF_6 expansion upon heating. The desired void volume is dependent upon whether the cylinder is a heavy wall cylinder, a thin wall cylinder, or whether the internal volume is certified by water weight. Various certified cylinder models are placed in designated heating categories (A, B, and C) to maintain at least a 5% void volume for cylinders containing product and 3% void volume with tails material. Uncertified volume cylinders are categorized to maintain at least a 7% void volume with product and 5% void volume with tails material. The following cylinders based on their accountability weight and void volume calculations can be heated to 235 °F in order to empty them: 48OM cylinders containing PGDP Feed Plant produced, near-normal, enriched material (0.70 – 0.73) with accountability weights less than 25,500 pounds of UF_6. Category C cylinders are damaged or overfilled cylinders which are fed either by controlled feeding with temperature and pressure controls below the UF_6 triple point (maximum cylinder skin temperature of 145°F and maximum cylinder pressure of 20 psia), or by cold feeding – feeding with cylinder at ambient temperature.

A steam regulator controls the internal steam pressure of the non-upgraded autoclaves. The flow through the valve is determined by three forces acting on a metallic diaphragm actuator. Two forces on the bottom of the diaphragm cause the valve to close: a preset spring, and steam pressure fed through tubing from a tap located downstream of the valve. A remotely supplied air pressure (loading pressure) on the top of the diaphragm causes the valve to open. With the loading pressure and spring force held constant, the flow through the valve is modulated by the down stream pressure.

The configuration of the steam regulator system for the upgraded autoclaves in X-343 (except autoclave 1, 2 and 6) is modified as follows. A second steam regulator valve is installed in parallel with the first regulator valve. Also, steam pressure is fed to the bottom of the actuator diaphragms for each valve through tubing that taps directly into the autoclave shell head. The X-343 autoclaves 1, 2, and 6 have been modified for "controlled feeding" operations by replacing one of the existing steam regulator valves with a smaller steam control valve which is controlled using the cylinder wall temperature as the control parameter. Normal heating of cylinders will utilize the remaining steam regulator system. Controlled feeding of cylinders will require isolation of the steam regulator system and use of the steam control system using the cylinder wall temperature as the controlling parameter. The upgraded and non-upgraded configurations for the steam control system in X-343 are shown in Figures 3.2-1 and 3.2-2.

Steam pressure and flow are controlled by changing the loading pressure on the steam regulator valves. The autoclaves use two preset loading pressures for high and low flow steam. A solenoid valve switches either of two loading pressure air supply regulators into the system to apply air pressure to the top of the valve. The switching solenoid is controlled by a temperature recorder that monitors the cylinder wall temperature via two magnetically attached thermocouples. The recorder is equipped with an internal switch set below 212°F to control the autoclave steam pressure. Before the cylinder wall temperature reaches 212°F the steam regulator is switched from the higher loading pressure to the lower loading

3.2.1.1.6 UF_6 Release Detection System

The UF_6 release detection system in X-343 provides audible and visual alarms in the event that a UF_6 release occurs. Detectors are located over the autoclaves, on the Z-Header catwalk, and on the ground floor between the control panels for autoclaves 4 and 5. The detectors are connected to control units that monitor detector status, provide a means to test the detectors, and process output signals from the detectors to produce the appropriate alarm indications. The detection system is important to safety as described in Section 3.8.

The detectors are similar to those used in the Cascade Automatic Data Processing (CADP) UF_6 Release Detection Systems, except that the alarm indicator lamp and the associated circuitry in the detector base have been retained in the feed facility detector systems. See Section 3.1.1.11.2 for a description of the detectors.

The system control units consist of a power supply for converting 120 VAC to nominal 220 VDC for the supervised detector circuit and contacts for alarm circuits, trouble signals, and other control circuits. The control enclosures also contain detector status lamps, control switches, and test switches. The control units are designed for multiple protection zones. This detector system has detection and alarm functions only. Activation of a single detector activates audible and visual alarms at the system control panel.

The 120 VAC power system supplies the detector system from a local distribution panel in X-343. Power is fed from the distribution panel to the detector system control unit. A loss of power to a detector zone circuit would result in a trouble alarm at the control panel. Malfunction of a detector, such as a short, would produce a trouble signal at the control panel. Because the 120 VAC power system provides power to the detector circuits and the alarm circuits in the facility, it is required for the detector system to perform its safety functions.

3.2.1.1.7 Fire Protection

The X-343 facility is of non-combustible construction. The hydraulic oil used for autoclave shell movement and locking ring operation is a combustible material that is present in sufficient quantity to be a potential fire hazard. In the event of a hydraulic oil leak, the oil is contained and/or cleaned up in accordance with plant procedures.

Tractor-trailer rigs with as much as 500 gallons of diesel fuel on board may be present in the facility. This quantity of diesel fuel presents a fire hazard that bounds that associated with the hydraulic oil. The fire protection system as described in Section 3.6.1 is designed to protect against the greater hazard of the diesel fuel.

The fire protection program for this facility is in accordance with Section 5.4.

3.2.1.2 X-342A Feed Vaporization Building

The X-342A facility occupies the east portion of the large X-344A/342A complex and was the former primary location for feed sampling and cascade feed vaporization. Another important function performed in the X-342A facility is the manufacture of fluorine which is described in Section 3.4.7.

The X-342A building is constructed with a high bay crane area and an adjacent single story area with a small plenum chamber room on top. The single story section is attached to the southeast corner of the X-344A building. This section contains various structural in-fill shear walls that add to lateral stiffness. The high bay is located to the south of the single story section. The west end of the high bay section contains a roll-up door for access. The building structures are important to safety as defined in Section 3.8.

The X-342A facility is equipped with two seven-foot diameter feed and sample autoclaves with the same basic design and operation as the three feed and sample autoclaves in X-343.

Two and one-half-ton, 10-ton, and 14-ton cylinders of UF_6 for customer orders may be sampled in the X-342A autoclaves. Then the liquid-filled cylinders are removed from the autoclaves and transferred to an adjacent "cool down" area. When the cylinders have cooled for the specified cooldown period defined in Section 3.2.4.5 to solidify the UF_6, they are moved from the area.

Directly beneath the X-342A autoclaves is a sump that receives autoclave condensate. The sump has two pumps that discharge through an oil interceptor to a storm drain. Since the geometry of both the sump and the interceptor are geometrically unfavorable, they contain borosilicate-glass raschig rings as a nuclear criticality safety control.

If contamination of the sump results from a UF_6 release, the operator can shut off the pumps and close valves to minimize contamination of the drains.

3.2.1.2.1 Autoclaves

Except as noted below, the descriptions of the X-343 feed and sampling autoclaves, their operation, and their safety systems, addressed in Section 3.2.1.1.1, also apply to the X-342A autoclaves.

The configuration of the shell vent lines for the X-342A autoclaves differs from that of the X-343 autoclaves only in that the positions of the manual valves and the automatic containment valve are interchanged. In X-342A the manual valve is upstream (closer to the autoclave) relative to the automatic valve, the reverse of the configuration in X-343. Figure 3.2-3 depicts the X-342A feed and sample autoclaves.

The upgraded autoclaves in X-342A were not modified to include a second steam regulator valve nor have they been provided with a direct steam pressure tap for the steam regulator valve actuators. However, both autoclaves are equipped with steam control systems for "Controlled Feeding" of the same basic design and operation as for autoclaves in X-343 used for "Controlled Feeding". This includes a second, smaller steam regulatory valve in parallel with the existing control valve.

With respect to the X-342A pigtail line isolation system, the hand switches are located at the feed control panel in the high bay area as well as at the exit doors for the facility.

Activation of important to safety systems will produce audible and visual alarms at the autoclave local control panel. X-342A does not have a building control room.

3.2.1.2.2 Scales

Scales are discussed in Section 3.2.4.2

The sample manifold and the UF_6 line are enclosed in electrically heated housings, whereas the pigtails connecting the daughter and sample cylinders are wrapped with electrical heaters to prevent the UF_6 from "freezing out" in the lines. Daughter cylinder pigtails also have wrapped insulation over the heaters. The daughter cylinder rests on a scale while being filled to a specified weight tolerance.

Transfer operations may be conducted using 2 1/2-ton, 10-ton and 14-ton cylinders as parent cylinders. A transfer from any one of these types of cylinders is similar to the operation described above. In addition, technetium cleanup operations on near-normal enrichment material can involve the loading/unloading of full liquid UF_6 cylinders associated with sampling and/or processing of UF_6 through technetium traps.

The autoclaves may also be used for sampling of 12 inch, 2-1/2-ton, 10-ton or 14-ton cylinders without transferring the contents. Sampling is performed in a similar manner as described above except that a small quantity of UF_6 is allowed to flow through the sample manifold to "flush" the system and is then evacuated to the cascade, to the dump cylinders, or to cold traps. Flushing removes any traces of UF_6 deposited in the manifold during the prior operation. After the manifold has been flushed, the sample is taken.

The autoclaves are also used for sample dumping. Sample dumping is accomplished by installing 5-, 8-, or 12-inch cylinders or a rack of sample containers in the autoclave. The cylinders or sample containers are installed in the inverted position to allow draining of liquid UF_6. The contents are then heated, liquefied and transferred to a dump cylinder.

Sample containers may also be installed on the dump rack in the upright position so that they may be vaporized and evacuated directly back to the cascade. Once line clarity is verified, evacuation is begun immediately, which prevents cylinder pressure from ever reaching the maximum allowable value for vaporization of UF_6 during the heating cycle.

The X-344A autoclaves are equipped with a roll/tilt interlock system and a steam interlock system that are configured and operate in a similar manner to that of the corresponding systems associated with the seven-foot autoclaves in X-343 and X-342A. See Section 3.2.1.1.1.1 for a discussion of these systems.

3.2.1.3.1.2 X-344A Autoclave Important to Safety Systems

The following are systems descriptions for autoclave systems and components identified as important to safety systems in Section 3.8.

Audible and visual alarms resulting from activation of important to safety systems are produced at the autoclave local control panel. X-344A does not have a building control room.

3.2.1.3.1.2.1 Autoclave Shell High Pressure Containment Shutdown System

The description of the configuration and operation of the Autoclave Shell High Pressure Containment Shutdown System provided in Section 3.2.1.1.1.2.1 for the X-343 autoclaves also applies to the X-344A autoclaves except as noted below.

Automatic containment valves actuated by this system are present on the following shell head penetrations:

- UF_6 line,
- Steam inlet,
- Condensate drain,
- Blowdown line and pigtail roughing filter,
- Shell vent (autoclaves 1 and 2 only),
- Buffer air inlet and outlet,
- Steam (conductivity) sample tubes (2), and
- Pressure relief/vacuum relief line.

With the exception of those components specified below, all automatic containment valves fail to the closed position on the loss of the plant air system or on loss of electrical signal to the solenoids that control the pneumatic signal to the containment valve actuators. The exceptions to this fail closed configuration are the parent cylinder safety valves located between the cylinder and the pigtail at each autoclave, which will fail as-is. Activation of this system produces audible and visual alarms at the autoclave local control panel.

3.2.1.3.1.2.2 Autoclave Primary Containment System

The autoclave primary containment system includes the autoclave vessel and all penetrations out to and including the required containment valves. The autoclave penetrations and associated containment valves are described in the preceding discussion of the autoclave shell high pressure containment shutdown system. In addition, the autoclave instrument lines and the autoclave pressure relief line up to and including the rupture disc are included in the system.

Penetrations to the autoclave are protected by one of the following methods: (1) two automatic containment valves, (2) one valve that is normally closed and manually operated or the autoclave high pressure relief system configuration, or (3) a closed piping system outside the autoclave (e.g., instrument lines and instruments) whose components are rated for the same pressure as the autoclave.

3.2.1.3.1.2.3 High Condensate Level Shutoff System

The description of the configuration and operation of the High Condensate Level Shutoff System provided in Section 3.2.1.1.1.2.3 for the X-343 autoclaves also applies to the X-344A autoclaves.

3.2.1.3.1.2.4 Pigtail Line Isolation System

The pigtail line isolation system is controlled by a network of manual alarm pushbuttons and relay control wiring located throughout the X-344 complex to initiate containment of all four autoclaves and shut down of building ventilation systems. The system is initiated by operator action in the event of a UF_6 release from a transfer or sample line to close the autoclave containment valves. The system is designed so

Table 3.2-3 Cranes for Handling Liquid UF_6 Cylinders

Location	Type	Capacity	Primary Use
X-326 ERP	Bridge **	20 Tons	Loading/unloading scale carts of liquid UF_6
X-330 Tails	Bridge	(2) 20 Tons	* Loading/unloading scale carts of liquid UF_6
X-333 LAW	Bridge	20 Tons	Loading/unloading scale carts of liquid UF_6
X-342A Feed	Bridge	20 Tons	* Sampling, feeding & weighing of liquid UF_6 cylinders
X-342A Feed	Bridge	18 Tons	* Sampling, feeding & weighing of liquid UF_6 cylinders
X-343 Feed	Bridge **	(2) 20 Tons	* Sampling, feeding & weighing of liquid UF_6 cylinders, and Shipping/Receiving
X-344A North	Bridge **	(3) 20 Tons	* Transferring & weighing of liquid UF_5 cylinders, and Shipping/Receiving
X-344A South	Bridge	(2) 20/17 Tons	* Shipping, receiving, weighing
X-326 PW	Monorail	(2) 500 lb	Product Withdrawals, Weighing

* Multiple crane trolleys bridging a common pair of rails

** Radio-controlled

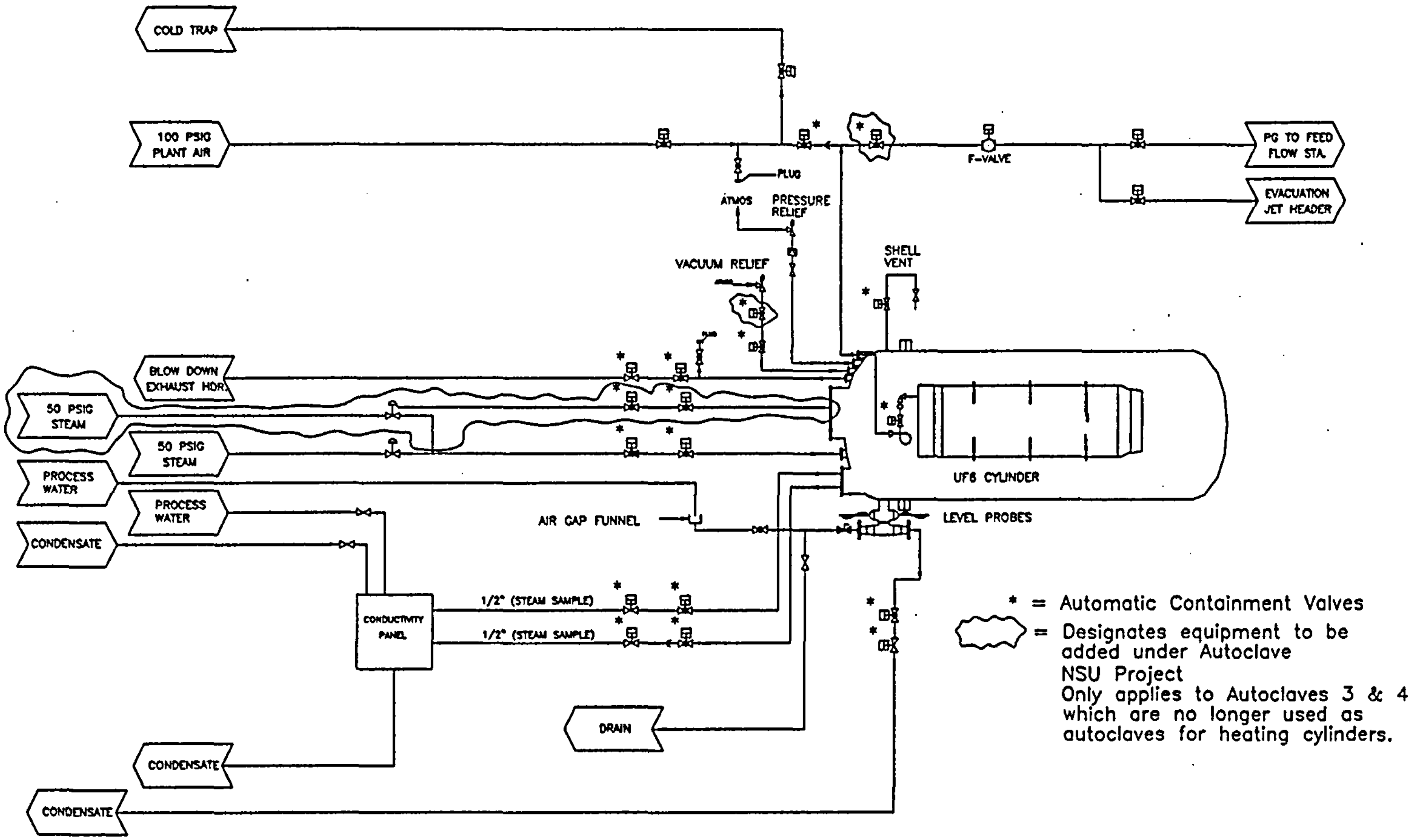
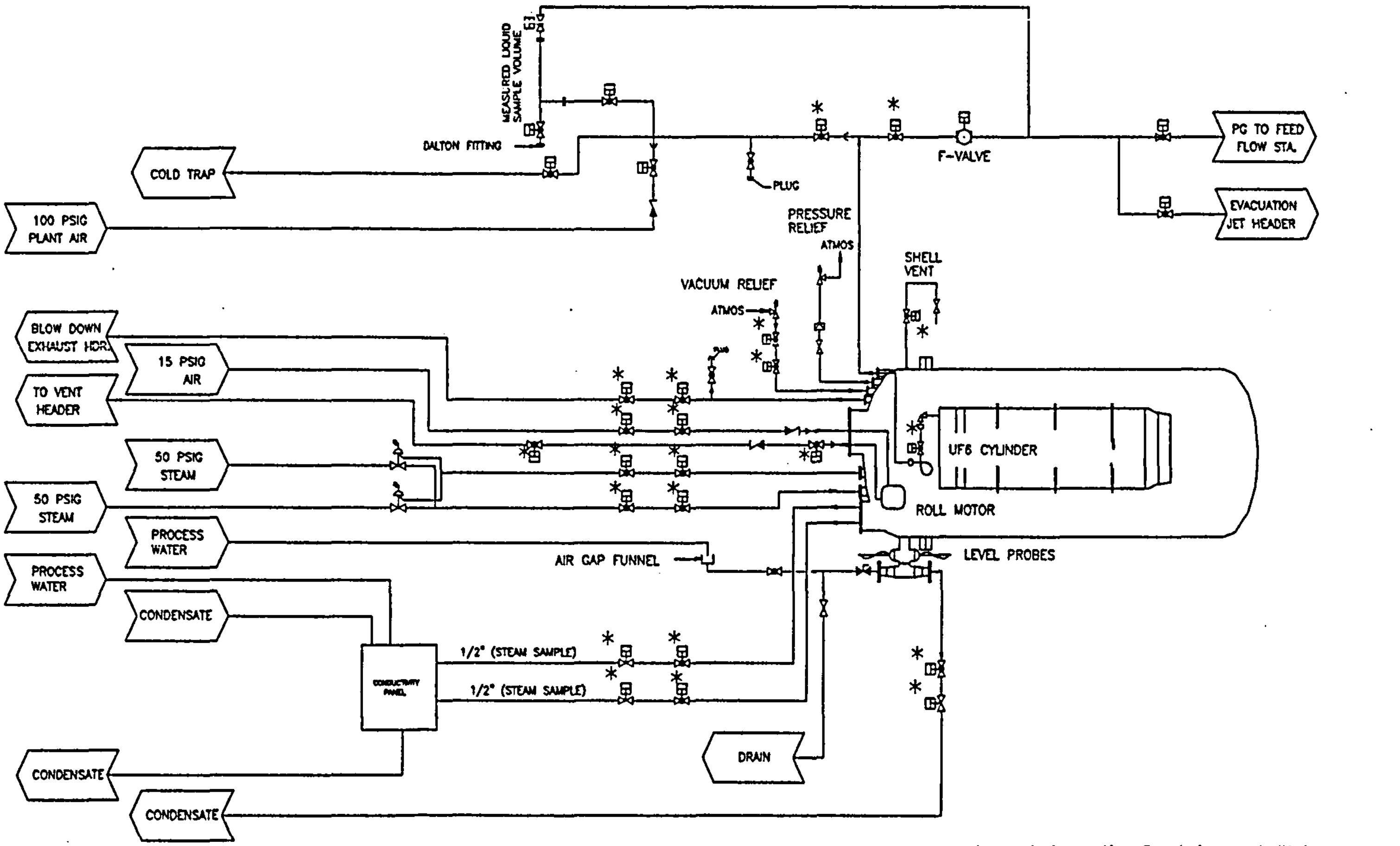


Figure 3.2-1. Diagram of a Six Foot Feed Autoclave, X-343



* = Automatic Containment Valves

NOTE: Autoclave #6 has been modified for controlled feeding.

Figure 3.2-2. Diagram of a Seven Foot Feed and Sample Autoclave. X-343

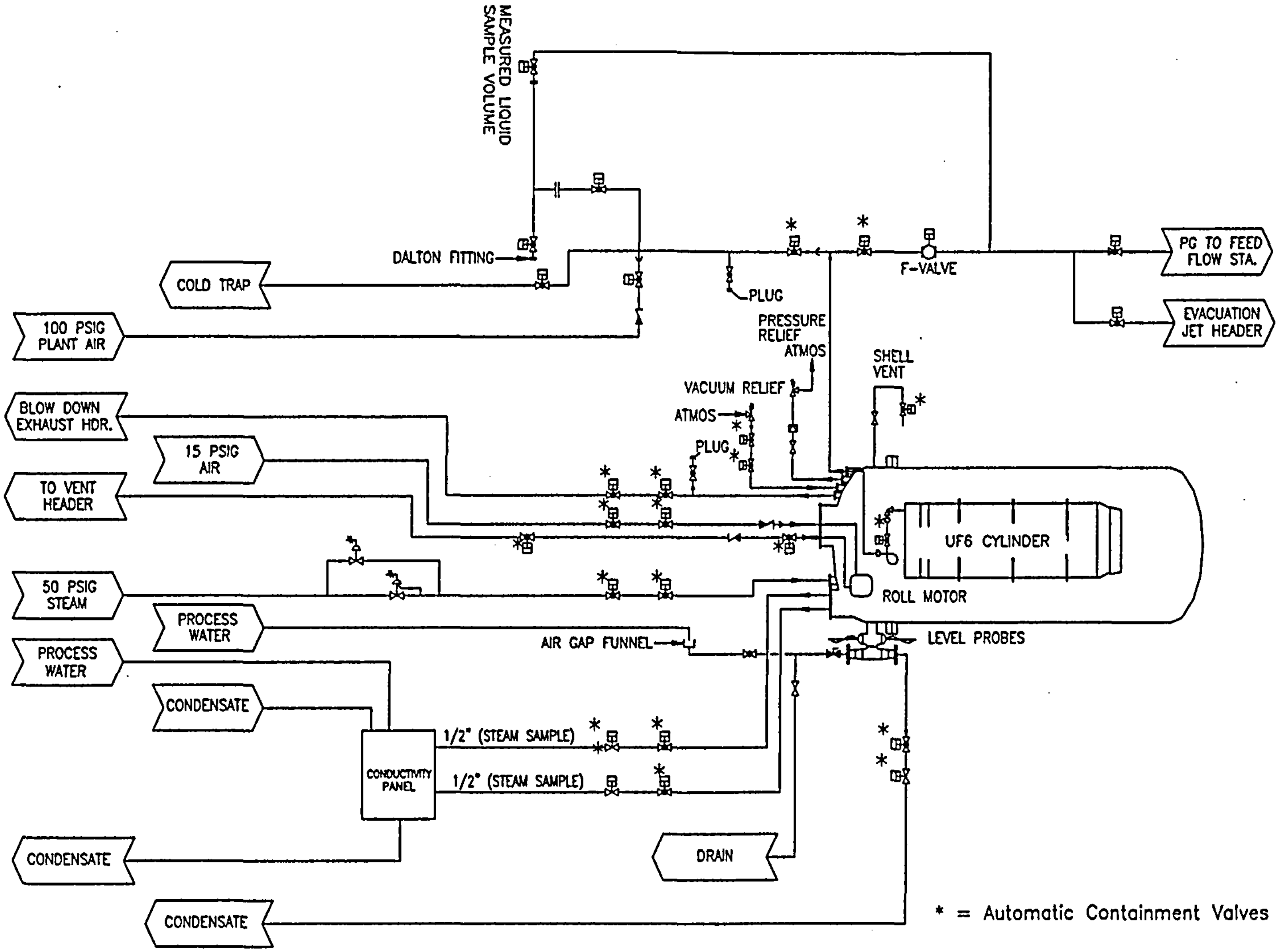


Figure 3.2-3. Diagram of a Seven Foot Feed and Sample Autoclave, X-342A

reserve. Pumps in the X-6644, Fire Water Pump House, can feed water from the tank into the sanitary distribution headers.

The distribution system connects X-611C and X-6644 with the 250,000-gallon X-612, Elevated Water Tank (Figure 3.4-8). The water tank level is maintained by the sanitary water pumps located in X-611C. The water tank is a reservoir which "floats" on the sanitary water loop distribution system, filling when the system demand is below the X-611C sanitary water pump(s) output. The distribution system loop pressure is controlled by the sanitary water pump discharge and storage tank level/pressure relationships.

The distribution system supplies the plant site with sanitary water, and it supplies the sanitary Fire Water System.

3.4.2.2.2.4 Protection Systems (Sanitary and Fire Water Facilities)

A sprinkler system is located in X-611C for fire protection. The filterhouse is also protected by the plant fire protection and evacuation alarm system.

Two of the sanitary water pumps in X-611C are dual powered (electric motors and diesel engines). The diesel engines are used as back-ups in the event of a power failure.

3.4.2.2.2.5 System Controls (Sanitary and Fire Water Facilities)

Controls for feeding carbonic acid into the carbon basin at X-611 are located in X-611D. Controls for feeding chlorine are located in X-611E. Controls for feeding the polyphosphate are located in X-611C.

Each of the filters in X-611C is equipped with a control console which allows filter and backwash cycles to be performed. The clearwell is equipped with instrumentation to indicate water levels.

The sanitary pumps in X-611C can be started and stopped locally, at the filterhouse. The emergency diesels are set to start automatically on loss of normal voltage to the electric motor starters.

3.4.2.2.3 Recirculating Cooling Water System

The function of the RCW System is to supply cooling water to the process buildings and some auxiliary buildings. The heat of compression of the process gas (PG) is transferred through the coolant systems to the cooling water and then to the atmosphere.

In the plant RCW System, there is one subsystem for each process building—the X-626 RCW System, the X-630 RCW System, and the X-633 RCW System—and the X-6000,GCEP Cooling Tower Pump House. Each subsystem consists of a pumphouse, cooling tower system and associated piping.

The RCW System is supplied with water from the Raw and Makeup Water System. Makeup water is fed into the RCW Systems at the pumphouses where it is chemically treated along with RCW that has been returned from the cooling towers. The chemical treatment is accomplished in the pumphouse wetwell from which the water is pumped into the process buildings header systems. A double header system consisting of two banks of pumps and two headers per system provides cooling water to the process equipment. The heated water from the process equipment cooling system is returned via the return headers, return piping and risers to the distribution headers in the cooling towers. A portion of the returned RCW is lost through evaporation when passing through the cooling towers while the remainder accumulates in the cooling tower basins. The cooled water flows from the tower basins, back to the pumphouse well to again be treated and circulated as cooling water.

RCW instruments, at the RCW pumphouses, that monitor the temperature of the RCW supplied to the Evacuation Booster Stations in X-330 and X-333 are nuclear criticality safety components (see Section 5.2, Appendix A)—however, they are not active engineered features (see Section 3.8.10). These instruments consist of temperature indicators that are located in the RCW pump rooms.

Some of the heated water from X-630 is pumped through the RHW System prior to its return to the cooling towers. The RHW System is described in Section 3.4.2.2.4.

3.4.2.2.3.1 Recirculating Cooling Water Pumphouses (X-626-1, X-630-1, X-633-1, X-6000)

The RCW pumphouses act as control centers for the four RCW subsystems. In addition to the recirculating pumps and equipment, chemical feeders, pumps, motors, valves, switchgear, and recorders are located in the pumphouses.

Recirculating Cooling Water Pumps and Motors

The X-626-1, Recirculating Water Pump House, contains six RCW pumps each powered by an electric motor. The X-630-1, Recirculating Water Pump House, contains eight pumps. Each pump is driven by an electric motor. X-633-1 contains 14 RCW pumps, which are powered by electric motors. At X-6000, there are four pumps each driven by an electric motor.

Recirculating Cooling Water Chemical Feed Systems

Each pumphouse is equipped with a chemical feed system. The systems include equipment for the dispensing of biocide, sulfuric acid, mild steel corrosion inhibitor, copper corrosion inhibitor, and a dispersant polymer.

A biocide is used at all four pumphouses for microbiological control.

At X-626-1, X-630-1 and X-633-1, sulfuric acid is fed directly into the pumphouse wet well from a storage tank located outside the pumphouse. The acid storage tanks at X-626-1, X-630-1, and X-633-1 are permanent units with capacities of 5,000, 10,000, and 10,000 gallons, respectively. Acid is dispensed at X-6000 from portable shuttles as needed.

Chemicals for the phosphate-based corrosion control systems are fed from bulk storage tanks or portable shuttles into the pumphouse wetwell. The chemicals used are part of a phosphate-based program.

3.4.2.2.3.2 Cooling Towers

There are eight cooling towers in the RCW System: one at X-626-1, two at X-630-1, four at X-633-1, and one at X-6000. In all of the towers, the heated air is discharged at the top of the tower and the cooled water is collected in a basin located under the tower.

RCW flows from the process heat exchange equipment into the return header, through the risers to the top of the tower, and into the tower distribution system. The water is evenly distributed in the top portion of the cells, and is cooled as it falls through the tower cells. A riser bypass line (except X-626-2 Tower) allows RCW return water to be routed directly into the cooling tower basin. To enhance cooling, a fill material is

Source terms for these release scenarios were calculated. Dispersion analyses were performed to estimate the duration of an unmitigated release necessary to exceed EGs. The resulting release durations from the threshold analysis are summarized in Table 4.2-12.

4.2.6.3.3 Preventive/Mitigative Controls

The PrHA also identified the facility controls (procedural and equipment) that can be used to prevent and/or mitigate the initiating events or minimize the consequences of the resulting accidents. The only safety classification that could be made as a result of the PrHA is AQ. The remaining classifications are based on the results of the accident analysis described in Section 4.3. Detailed technical bases for the safety classifications are presented in Section 3.8. In addition to process-specific controls, programs and plans are identified in the PrHA and play an important role in providing worker safety for many of the events evaluated. These programs and plans are described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.3.4 Accident Selection

Accidents selected for the accident analysis are defined by the set of limiting initiating events determined in the hazard evaluation. The limiting initiating events were selected from the events that exceed the PSOA threshold as indicated in Table 4.2-11. The process for selecting the limiting initiating events is described in Section 4.2.5.3.

Operating modes. A review of operations identified normal operating modes for the various processes that had events exceeding the PSOA threshold. These operating modes, described in the TSRs, are used to address potential operations for the defined processes and to develop the limiting initiating events. The modes are not mutually exclusive; operations within a facility may simultaneously involve more than one mode. For example, when one cell is in the *operating* mode, another cell may be in the *standby* mode.

Hazard states. The analysis of normal operation and initiating events must include evaluation of each mode of operation in combination with the hazard states that may be present during that mode. Hazard states for all hazards were identified as solid, liquid, and gas. Where one hazard state is present with another (e.g., gaseous UF_6 is always present with both liquid and solid UF_6), only one of the hazard states is associated with the analysis, but both conditions are considered in establishing the consequences.

Operating mode-initiating event-hazard state matrix. The consequences of unmitigated initiating events were compared with the PSOA screening thresholds to determine whether an event is carried forward to the PSOA. The comparison of the consequences with the PSOA screening thresholds (Table 4.2-3) is provided in the PrHA reports. The evaluation resulted in the set of initiating events indicated in Table 4.2-11.

Limiting initiating events. The set of the initiating events in Table 4.2-11 that were carried forward to the PSOA were evaluated to determine which of these events place the most demand on an essential mitigative system in each initiating event frequency category. Table 4.2-11 indicates the limiting initiating events that are evaluated in detail in Section 4.3.2. The evaluation resulted in a set of limiting events, denoted by a "Yes" under "Limiting event?" in Table 4.2-11.

Detailed descriptions of the accident scenarios associated with these limiting initiating events are presented in Section 4.3.2. Sections 4.2.6.4 through 4.2.6.8 present an overall summary and characterization of the hazard evaluation results for the facility groupings given in Table 4.2-9.

4.2.6.4 Cascade Facilities Group

The Cascade Facilities Group consists of the process buildings (X-326, X-330, and X-333) and the associated tie lines (X-232C1, C2, C3, C4, and C5). The principal hazards identified for this group are UF_6 and its reaction products, toxic gases (ClF_3 and F_2), light cascade gases (e.g., combinations of coolant, ClF_3, F_2), and miscellaneous waste storage areas. The miscellaneous waste storage areas are addressed in the group for waste storage (Section 4.2.6.7). Because these are complex facilities that contain a significant hazard, the principle hazard evaluation performed for the cascade facilities involved a more detailed analysis method. This hazard evaluation combined an operational review, the What If method, and the PSOA approach to evaluate potential initiating events and consequences. A separate hazard evaluation was performed for the cascade facilities to focus on shutdown scenarios. This hazard evaluation combined a failure modes and effects analysis and event tree sequence analysis to identify potential accident sequences and consequences. The PORTS enrichment operations were shutdown by USEC in 2001. Equipment sufficient to allow for a stand alone enrichment capability of 3 million SWU per year was placed in a "cold standby" condition. This equipment is currently being treated for removal of residual deposits and some equipment removal and decontamination is in progress. The remaining cascade equipment is being treated for deposit removal and/or is being maintained in a "cold shutdown" condition. Decontamination and decommissioning of this equipment is in progress under DOE control. A description of the condition of the enrichment equipment and the activities associated with it is provided in SAR Section 3.1.1.1.5. The remainder of the SAR Section 3.1 provides a description of the enrichment operations certified at the time of the shutdown of the uranium enrichment operations at PORTS.

Some cascade equipment is being used for transfer of DOE Affected Inventory UF_6 from Non-DOT Compliant Cylinders to cylinders meeting ANSI N14.1 requirements. A portion of the cascade equipment placed in cold standby is utilized in transferring Affected Inventory UF_6 from DOE Non-Compliant Cylinders to ANSI N14.1 compliant cylinders. Many of the cylinders meet PORTS inspection requirements and are liquid-transferred and processed in X-344. For the majority of these cylinders, the UF_6 is fed as a gas (using both normal and controlled feeding at the X-342 and X-343 autoclaves) to cascade equipment and routed to the X-326 building (specifically cells in Unit X-27-1) and then sent to the ERP Station for withdrawal as liquid UF_6 into ANSI N14.1 compliant cylinders. After the prescribed cooling period, the full cylinders are transferred by a straddle carrier to the X-344 facility for Tc-99 reduction and transfer into shipping cylinders. The operations to be employed in transferring the UF_6 into ANSI N14.1 compliant cylinders are within those utilized in the feed, material transfer and withdrawal of UF_6 from the cascade during enrichment operations. The amount of material to be fed and withdrawn is a small fraction (approximately 20%) of the operations evaluated at the PORTS plant capacity in the SAR accident analyses. The amount of inventory in the cascade is a very small fraction (less than 1%) of the analyzed plant capacity.

The risk of all accidents described in this accident analysis of the enrichment cascade operations is lower for the "cold standby" condition. The accident scenarios postulating the release of toxic materials have lower probability and lower consequences than stated since the remaining inventory of UF_6 is much less than the analyzed condition and the process pressures of cascade systems containing UF_6 are all below atmospheric pressure. The potential risk of a criticality accident is also lower due to the greatly reduced inventory of uranium and the reduction of the potential sources of moderation associated with the RCW and lube oil systems. The risk from a fire is also lower due to removal of the lube oil from the shutdown process equipment, the shutdown of the compressors and the reduction in energized electrical equipment. While the additional space heaters introduce some potential fire risk, there is little combustible loading associated with the heaters themselves and the overall risk of fire is much lower than is the case for an operating enrichment cascade. The risk of an exothermic reaction or explosion is also greatly reduced due to the reduction in the amount of operating equipment, coolant and oxidant that could be present. The following discussion summarizes the results of these hazard evaluations for UF_6 in these facilities.

4.2.6.4.1 Process Definitions

The enrichment and purge cascades include the cascade auxiliary equipment (e.g., booster systems, surge systems, coolant systems, seal systems, seal exhaust systems, wet air evacuation systems, datum systems) that supports the operation of the cascades. In addition to the cascades, the enrichment and purge cascade facilities also include the following processes that provide support for the operation of the main cascades:

- Freezer/Sublimer (F/S) Process.
- Cold Recovery Process.
- Freon Degrader Process.
- Side Feed Process.
- Toxic Gas Storage and Distribution Process.

The F/S Process consists of F/S vessels and associated support equipment. These vessels are installed in various locations within X-333 to allow excess UF_6 inventory to be rapidly removed from the cascade by freezing it in storage vessels and then returning it to the cascade by sublimation when required. Cascade inventory adjustments may periodically be required to accommodate changes in the available power. F/Ss are strategically located where they can be independently or jointly operated to remove excess UF_6 inventory, to conduct emergency power drops, or to adjust the power load to maximize production.

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should a failure in the primary system occur. In addition to the auxiliary equipment, a large portion of the Enrichment Cascade Process is also operated below atmospheric pressure. These portions of the cascade were not considered to have the potential to exceed the PSOA threshold except where the stage control valve closure event or the B-stream block valve closure event could still cause the pressures to increase above atmospheric pressure. In these cases, the PrHA does not postulate that a catastrophic rupture will occur due to the extended period of time to detect and mitigate the event. However, limited UF_6 releases (see Section 4.3.2.1.4) are possible during the transient due to the pressure increase. The remaining controls identified for the enrichment cascade process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.4.4.2 Purge Cascade

The Purge Cascade Process is similar to the Enrichment Cascade Process (i.e., same type of equipment and initiators) but does not have any significant inventory of hazardous material that could exceed the PSOA threshold except for criticality. Therefore, the analyses were very similar to that for the Enrichment Cascade Process where pressures remain below atmosphere.

4.2.6.4.4.3 Freezer/Sublimers

Table 4.2-11 identifies all of the events associated with the Freezer/Sublimer (F/S) Process that were considered in the hazard analyses. Seven were identified as having the potential to exceed the PSOA threshold, and all seven events were limiting events (Table 4.2-11). The controls identified as being AQ are described in Section 3.8. These controls were identified as playing an important role in minimizing the potential exposure for on-site personnel, but none were identified as being required to protect the off-site public (Section 4.3.2). The only significant energy source associated with this process is the coolant used to heat and cool the UF_6 during operations. During the freeze mode of operation, the primary concern is to prevent overfilling the vessel with UF_6 (overfilling could result in failure of the primary system during a subsequent sublime mode). Expansion of UF_6 from a solid to gas in the sublime mode could result in stress failure of the coolant tubes. This event was evaluated in the hazard analysis and was determined to cause only local effects because the F/S is connected to the A-line during the sublime mode, which is at extremely low pressures. The remaining controls identified for this process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.4.4.4 Cold Recovery

Table 4.2-11 identifies all of the events associated with the Cold Recovery Process that were considered in the hazard analyses. Only two of these events (criticality and evacuation) were identified as having the potential to exceed the PSOA threshold (Table 4.2-11). The controls identified as being AQ are described in Section 3.8. These controls were identified as playing an important role in minimizing the potential exposure for on-site personnel, but none were identified as being required to protect the off-site public (Section 4.3.2). The primary administrative control identified for this process is to limit operating pressures to below atmospheric pressure to minimize releases of UF_6 should a failure in the primary system occur. The remaining controls identified for this process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.4.4.5 Freon Degrader

Table 4.2-11 identifies all of the events associated with the Freon Degrader Process that were considered in the hazard analyses. Only two of these events (i.e., criticality and evacuation) were identified as having the potential to exceed the PSOA threshold (Table 4.2-11). The controls identified as being AQ are described in Section 3.8. These controls were identified as playing an important role in minimizing the potential exposure for on-site personnel, but none were identified as being required to protect the off-site public (Section 4.3.2). The primary administrative control identified for this process is to limit operating pressures below atmospheric pressures to minimize releases of UF_6 should a failure in the primary system occur. The remaining controls identified for this process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.4.4.6 Toxic Gas Distribution

Table 4.2-11 identifies all of the events associated with the Toxic Gas Distribution Process that were considered in the hazard analyses. Only one of these events (evacuation) was identified as having the potential to exceed the PSOA threshold (Table 4.2-11). The controls identified as being AQ are described in Section 3.8. These controls were identified as playing an important role in minimizing the potential exposure for on-site personnel, but none were identified as being required to protect the off-site public (Section 4.3.2). The remaining controls identified for this process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

4.2.6.5 UF_6 Handling and Storage Facilities Group

The UF_6 Handling and Storage Facilities Group consists of the feed vaporization buildings [X-342A (UF_6 portion only), X-343], the toll enrichment services facility (X-344A), the withdrawal facilities (located in X-326, X-330, and X-333), and the cylinder storage yards (X-745B, D, F, and G). The principal hazard identified for this group is UF_6 and its reaction products. Because these are complex facilities that contain a significant hazard, the principle hazard evaluation performed for the liquid UF_6 facilities (i.e., X-342A, X-343, withdrawal, X-344A) involved a more detailed analysis method. This hazard evaluation combined an operational review, the What If method, and the PSOA approach to evaluate potential initiating events and consequences. A separate hazard evaluation was performed for the withdrawal facilities to focus on shutdown scenarios. This hazard evaluation combined a failure modes and effects analysis and event tree sequence analysis to identify potential accident sequences and consequences. The shutdown of uranium enrichment operations has reduced the overall risk associated with these facilities since the cascade feed is greatly reduced and the Tails and LAW withdrawal facilities have been placed in a "cold standby" condition. Also, the amount of product withdrawn from the enrichment cascade at ERP is a fraction of the withdrawal rates initially evaluated. The overall level of cylinder handling and processing activity at the X-344A and X-343 buildings remains bounded by the operations as originally analyzed. The mission of the X-343 has changed to primarily receipt, processing and sampling of cylinders for Tc-reduction with some feeding and venting to the cascade equipment; feed operations in support of the enrichment operations at PORTS have been terminated.

USEC has contracted with DOE to process near-normal enriched UF_6 contaminated with Tc-99 above ASTM Specification C-787-90 (Affected Inventory) contained in cylinders that, based on initial inspections, are not compliant with DOT shipping requirements and are designated "Non-Compliant Cylinders." USEC has contracted with DOE to remove the UF_6 from the cylinders, process this material for reduction of Tc-99 to acceptable levels and to package the material in ANSI N14.1 compliant cylinders.

With the enrichment process in "cold standby", USEC will utilize existing cascade equipment and processes at the Portsmouth GDP (PORTS) to perform the required activities. Many of the cylinders meet PORTS inspection requirements and are liquid-transferred and processed in X-344. For the majority of these cylinders, the UF_6 is fed as a gas using both normal and controlled feeding. PORTS will use autoclaves in the X-342 (Autoclaves 1 and 2) and X-343 (Autoclaves 1, 2, and 6) to heat the impaired cylinders that do not have the ability to withstand a normal heating cycle using the "controlled feed" mode of heating, as described in the TSRs, and feed the material to cascade equipment for withdrawal at the ERP Station into 10-ton cylinders.

The autoclaves in X-342 and X-343 that will be utilized for this process had been in service prior to shutdown of the enrichment process. The X-343 and X-342A were utilized for providing feed to the cascade and will be used in the same manner for this project activity. However, the autoclaves to be used will be operated both in the normal and "Controlled Feed" mode in transferring the material to the cascade equipment. In order to reduce the need for frequent operator adjustment of the steam supply to the autoclaves during controlled feeding, the steam control system (a Non-Safety, NS, system) is modified to employ a new control system utilizing the cylinder surface temperature measurement as the control parameter. The new steam control system will replace one of the existing steam control systems and is designed to provide steam at a rate of approximately 10% of the existing steam control systems. The feed will be transferred using existing transfer lines (e.g., tie-lines) to the cascade equipment. The feed rate will be a small fraction of that utilized during enrichment operations; the rate is about 20% of that analyzed in the accident analyses. Additionally, since any of the Non-Compliant Cylinders that do not have the ability to withstand a normal heating cycle will be processed using the Controlled Feeding Mode of Operation, the potential for an accident affecting plant workers or the offsite public is not increased since any of these cylinders processed in the autoclaves will not contain liquid UF_6. No cylinders containing liquid UF_6 will be handled in the X-342 and X-343 facility above what was previously evaluated in the SAR. The sampling and processing of UF_6 in ANSI N14.1 compliant cylinders, in X-342, X-343 and X-344 for the Tc-99 reduction activity will be within the limitations established for the Tc Cleanup Project and thus are within the previous analyses.

The following discussion summarizes the results of these hazard evaluations for UF_6 in these facilities.

4.2.6.5.1 Process Definitions

The UF_6 Handling and Storage Facilities Group consists of liquid UF_6 handling facilities and large UF_6 cylinder storage and handling operations. These operations consist of equipment such as autoclaves, cranes, UF_6 compression equipment, condensers, piping, and other support equipment.

The X-344A toll enrichment services facility provides systems for the receiving, sampling, transferring, and shipping of cylinders containing UF_6. This facility provides all operations necessary

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for the fulfillment of enrichment service contracts with private industry. Toll product is withdrawn from the enrichment cascade into cylinders. Before the material can be shipped, it must be sampled on a statistical basis and/or transferred into cylinders approved for transport over highways and railways. Special shipping packages are used to protect the full product cylinders during shipment.

The feed and sampling facilities are used to supply UF_6 to the cascade as well as sample, on a statistical basis, the contents for analysis. Both feed facilities have feed and sampling autoclaves and overhead cranes that are used to transfer cylinders to and from the autoclaves.

The withdrawal facilities are used for withdrawing UF_6 from the cascade into cylinders. UF_6 is withdrawn from the cascade using the compressors. After being compressed, the UF_6 passes through the condensers and collects in the accumulators or drains into cylinders at the withdrawal stations. After the cylinders have been filled, a scale cart is used to move the cylinders from the withdrawal stations to a cool down area. Cylinders remain at this facility until the UF_6 inside the cylinders solidifies. The cylinders are allowed to solidify on the scale carts and rail cars, or they are moved by an overhead crane to a cool down area.

The cylinder storage yards are open facilities for storing various sizes of cylinders mostly containing depleted UF_6.

As noted earlier the shutdown of enrichment operations has significantly curtailed the feed operations in the X-342A and X-343 facilities. The withdrawal facilities are essentially shutdown with product withdrawal available at ERP to support UF_6 transfer for repackaging, deposit removal activities and X-340 operations. Limited withdrawals are performed at PW and as side withdrawals by solidifying gaseous UF_6 in small cylinders. These evolutions were screened out from further analysis due to the small amounts of material and sub atmospheric pressures; these conditions are insufficient to cause any significant effects.

4.2.6.5.2 Hazards

The hazardous materials in the UF_6 Handling and Storage Facilities Group were reviewed to determine which needed to be evaluated in the PrHA and PSOA. The results of this review are indicated in Table 4.2-9. All the hazardous materials, except those indicated in the table, were characterized as being standard industrial hazards that are commonly found in industrial facilities. These were screened out from further analysis in the PrHA because the amounts of the material are insufficient to cause any significant local health effects. These hazards are adequately controlled by site administrative programs and plans, and no additional analysis was required.

The energy sources associated with the facility that have the potential for causing releases of the hazardous materials are (1) steam energy used to heat the autoclaves; (2) electrical energy used in heat tracing; (3) chemical energy from the reactivity of the UF_6; (4) potential energy associated with the lifting of cylinders; (5) kinetic energy associated with the various types of vehicles; (6) thermal energy associated with the steam used to heat the equipment enclosures for the compressors, coolers, accumulators, manifolds, and associated piping; (7) kinetic energy associated with the compressors; and (8) chemical energy from the reactivity of oxidant/coolant gas mixtures.

All facilities in this group were categorized as Hazard Category 2 nuclear facilities because they contain quantities of the ^{235}U component of the UF_6 sufficient to exceed the threshold quantity for Hazard Category 2 in Table A.1 of DOE-STD-1027-92.

4.2.6.5.3 Parameters of Concern

The first step of the principle hazard evaluation was to identify potential initiating events associated with the UF_6 Handling and Storage Facilities Group to identify the process parameters that,

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if changed, could result in a release of the hazard that could exceed the screening thresholds for either the PrHA or PSOA. The process parameter changes that could lead to a release of UF_6 are (1) a temperature change in the primary system that exceeds the primary system temperature limits, (2) a pressure change in the primary system that exceeds the primary system pressure limits, (3) a failure in the primary system integrity, and (4) a loss of criticality safety controls.

Based on the groupings described, four process parameters should be addressed for each operating condition to ensure that potential types of events are considered in the hazard analysis. The potential ways of releasing hazardous materials that are caused by things such as energy sources and natural phenomena were evaluated for each operating mode to determine whether they might cause a change in one of the four process parameters. Table 4.2-11 summarizes the different initiating events by parameter. These events were developed by considering operational history, operator input, and systematic evaluations.

The first step of the hazard evaluation associated with the withdrawal shutdown scenarios was to identify the specific scenarios to be evaluated. The scenarios chosen for evaluation included:

- Shutdown of PORTS product withdrawal capability
- Shutdown of X-330 tails withdrawal capability

The evaluation developed failure modes and effects analyses to identify failures that could initiate these scenarios, and then analyzed the bounding initiating events via event trees to identify the range of potential scenario outcomes.

4.2.6.5.4 Summary of Results

As indicated in Table 4.2-11, the events considered for UF_6 Handling and Storage Facilities Group included a wide range of process-related events, external events, shutdown scenarios, and controls for minimizing the potential risks. A brief summary of the hazard analysis is presented below for each process.

4.2.6.5.4.1 Toll Enrichment

Table 4.2-11 identifies all of the events associated with the Toll Transfer and Sampling Process that were considered in the hazard analyses. Fourteen were identified as having the potential to exceed the PSOA threshold, with only one of these (pigtail line failure inside autoclave) not being a limiting event (Table 4.2-11). The controls identified as being AQ are described in Section 3.8. These controls were identified as playing an important role in minimizing the potential exposure to on-site personnel, but none were identified as being required to protect the off-site public (Section 4.3.2). The primary administrative controls identified for this process are associated with preventing a release of liquid UF_6 resulting from a cylinder or primary system failure. These controls are also addressed in the accident analysis. The remaining controls identified for this process are adequately addressed by the programs and plans described in SAR Chapters 5 and 6 and Volume 3 of the Application.

below.

The purge cascades are the primary airborne emission control. Figure 5.1-2 provides a flow diagram of the purge cascades. The purge cascades separate UF_6 continuously from lower molecular weight gases (lights) that have entered the process. The UF_6 is returned to the main cascade, and the "lights" are passed through chemical traps before continuous sampling and venting. Chemical trap efficiencies vary in relation to the concentration of UF_6, flow rate, and trap on-stream time. At very low concentrations (less than 1 ppm UF_6), operational data indicates that efficiencies approach zero (this is the normal concentration). When UF_6 concentrations approach 10 ppm, operational data indicates that efficiencies rise to the 95-99% range.

The cold recovery and wet air evacuation systems are maintenance support systems. Cold recovery systems are used to evacuate gases from cascade cells that must be opened for maintenance. Refrigerated "cold traps" are used to freeze out UF_6, and the noncondensable light gases are passed through chemical traps before continuous sampling and venting. The wet air evacuation systems' are used to evacuate cells that have been opened prior to returning the cell to service. The wet air evacuation systems' exhaust is passed through chemical traps before continuous sampling and venting.

The enrichment cascade is divided into control areas, each of which has a seal exhaust station. The seal exhaust stations collect and vent inleaked air from inside the shaft seals of the cascade compressors. This air passes through chemical traps, vacuum pumps, and mist eliminators before continuous sampling and venting.

The X-343 feed and sampling facility heats cylinders of UF_6 for sampling or for feeding of UF_6 from cylinders to the cascade. Residual UF_6 in the sampling manifold is evacuated back to the cascade, or it is sent to dump/surge volume cylinders, through cold traps, through chemical traps, then vented to atmosphere.

The X-344 sampling and transfer facility heats cylinders of UF_6 for sampling or for transfer of UF_6 between cylinders. There is a suction device that collects any small releases during cylinder disconnections. This exhaust is vented through a filter system before continuous sampling and venting. Residual UF_6 in the sampling manifold is evacuated back to the cascade, or it is sent to a dump cylinder, through cold traps, through chemical traps, then vented to atmosphere.

In addition, there are a number of maintenance and production activities using ventilation systems where the exhaust is vented through filter systems to control airborne emissions. A few of these systems are fixed High-Efficiency Particulate Air (HEPA) filter systems. Any existing (or new) fixed HEPA filter systems needed to ensure compliance with release limits or to control worker radiation exposure satisfy the requirements of ANSI N509, Nuclear Power Plant Air Cleaning Units and Components (with the exceptions and clarifications described in SAR Section 1.18) for design and installation and satisfy the requirements of ANSI N510, Testing of Nuclear Air Treatment Systems (with the exceptions and clarifications described in SAR Section 1.19) for testing. These vents are not routinely monitored due to the small potential radionuclide emissions. A discussion of these unmonitored minor potential sources is provided in the United States Environmental Protection Agency (USEPA) approved Portsmouth Gaseous Diffusion Plant Compliance Plan For National Emission Standards For Hazardous Air Pollutants (August, 1992).

5.1.1.2 Waterborne Effluents

Waterborne Effluent Standards

PORTS maintains and uses liquid effluent treatment systems, as appropriate, to maintain releases of radioactive material in liquid effluents to unrestricted areas below the limits specified in 10 CFR 20.1301 and in accordance with the plant's ALARA policy described in Sections 5.1.1 and 5.3.1.1. Compliance with 10 CFR 20.1301 is demonstrated as required by 10 CFR 20.1302. Section 5.1.3 discusses methods of evaluation and demonstration of compliance.

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Action Levels for Control of Waterborne Effluents

Action levels for control of liquid radionuclide effluents are based on the ALARA philosophy. The action levels described in Table 5.1-3 ensure operational control system deficiencies are documented and acted upon in a responsible manner and in a timeframe to remain well within the regulatory limits. The BEQ used in Table 5.1-3 is the maximum site water effluent expected under normal operating conditions. BEQs are established by Production Support, and the facility manager responsible for the outfall. There is a BEQ at every radiologically monitored USEC-leased outfall, and these BEQs are reviewed annually, at a minimum, by Production Support, the responsible facility manager and the Radiation Protection Committee to ensure the principles described in the plant's ALARA policy are followed. Table 5.1-4 provides a list of current BEQs for each USEC-leased site water outfall discharging to waters of the United States. The responsible facility manager and the Plant Shift Superintendent are jointly responsible for assuring that action levels are acted upon.

Waterborne Effluent Controls

PORTS uses a system of process and administrative controls to prevent the discharge of radionuclides above regulatory limits and to maintain waterborne effluents ALARA.

There are eight USEC-leased site water outfalls at PORTS discharging to waters of the United States. These eight outfalls are monitored to quantify plant radiological waterborne effluents. The locations of these eight outfalls are shown in Figure 5.1-3. Virtually all radiological waterborne discharges from the plant come from decontamination and cleaning activities. The waterborne effluent controls associated with these operations are described below.

Prior to discharge, decontamination and cleaning solutions are processed in the decontamination and recovery facility. Uranium from other sources (e.g., laboratory solutions) is also recovered in the same facility.

Dissolved uranyl nitrate hexahydrate is separated by liquid-liquid extraction followed by calcination to U_3O_8. The remaining wastewater is treated for residuals and other heavy metals by pH adjustment and precipitation, for dissolved technetium by ion exchange, and finally for residual nitrates by biodenitrification. The treated wastewater is discharged to the onsite sewage treatment plant.

Other radiologically contaminated process and cleaning wastewaters are collected, stored, and then treated using microfiltration and pressure filtration technology to remove radionuclides prior to discharge. Effluent discharge goes to the onsite sewage treatment plant. The facility and process description for the X-705 Decontamination Building provided in Chapter 3 furnishes additional information.

Waterborne Effluent Flow Paths

The eight USEC-leased site water outfalls at PORTS discharging to waters of the United States have the following designations:

- Outfall 001 (X-230J-7 East Holding Pond)

Fissile material equipment designs and modifications are reviewed to ensure that favorable geometry and engineered controls are used to advantage. Administrative limits and controls will be implemented to satisfy the double contingency principle for those cases where the preferred design approach cannot be met.

5.2.2.5 Criticality Accident Alarm System Coverage and Nuclear Accident Dosimetry

A CAAS is provided to alert personnel if a criticality accident should occur. The system utilizes a distinctive audible signal to notify personnel in the affected area and initiate evacuation, thereby reducing the total personnel exposure to emitted radiation over the course of the accident.

At PORTS, the CAAS detects neutron dose rate. The system uses clustered detectors. Each cluster contains three scintillation detectors. Activation of any two of the three detectors in a cluster will initiate evacuation alarms. The failure of any major component of the system will result in a notification that indicates the need for corrective maintenance. These instruments are described in Section 3.6.2.

Operations involving fissile material are evaluated for NCS prior to initiation. The need for CAAS coverage is considered during the evaluation process. Coverage is provided unless it is determined that coverage is not required and that finding is documented in the NCSE. For example, areas containing no more than 700 g of ^{235}U, 50 g of ^{235}U in any square meter of floor or ground area, 5 g of ^{235}U in any 10-liter volume, or areas having material that is either packaged and stored in compliance with 10 CFR 71 or specifically exempt according to 10 CFR 71.15, can be shown by evaluation not to require alarm coverage. Areas that do not contain any operations involving uranium enriched to 1 wt. percent or higher ^{235}U and 15 g or more of ^{235}U do not require a NCSE and are not required to have CAAS coverage.

The CAAS provides detection and alarm coverage for postulated criticality events that would produce an absorbed dose in soft tissue of 20 rad of combined neutron and gamma radiation at an unshielded distance of 2 m from the reacting material within 1 minute. The detection criteria are met by setting detectors at 5 millirad per hour above the background radiation rate for the area(s) of coverage.

The location of detectors and setpoints is based on results of dose calculations and detector tests performed at critical experiment facilities. These tests and calculations demonstrate that the CAAS will respond in accordance with the detection requirements specified in 10 CFR 76.89.

Additional details describing the criticality accident alarm system equipment, operation, testing, maintenance, and locations are provided in Section 3.6.2. Reference Section 5.3 for a discussion of the nuclear accident dosimeters.

5.2.2.6 Procedure Requirements

Operations to which NCS pertains shall be governed by written procedures or job task checklists. These procedures or checklists contain the appropriate NCS controls for processing, storing, and handling of fissile material. The NCSA requirements which require employee actions shall be incorporated into the procedure. NCSA requirements are identified by placing a "commitment stamp" in the left hand margin next to the requirement. Identifying these requirements in this way ensures changes to these requirements are not made without review and approval by Criticality Safety. The NCSA requirements are incorporated into the appropriate procedures or job task checklists as required by the NCS evaluation and approval procedure.

New and modified procedures are reviewed by the appropriate safety organizations, including Nuclear Criticality Safety, as specified in the procedure for procedure control. Criticality Safety reviews the procedures to verify that the appropriate NCSA requirements have been incorporated and to verify that the proposed operation complies with NCS program requirements.

The PORC recommends approval of a procedure prior to issuance as specified in SAR Section 6.11.4.5 and TSR Sections 3.9.1, 3.9.2 and 3.10. Reference Section 6.11 for more details related to the procedure development and change control program and Section 6.2 for the PORC description.

5.2.2.7 Posting and Labeling Requirements

NCS limits and controls for areas, equipment, and containers are presented through the use of postings and labels as specified in approved NCSAs and procedures. Postings and labels are proposed, reviewed, and approved during the NCSA review and approval process. These limits and controls are posted on the Nuclear Criticality Safety Requirements signs as required by the plant NCS procedures. Approved NCSAs specify the wording for the postings. Labels are prepared in accordance with the plant NCS procedures and used as required by NCSAs. Limits and controls are printed or written in an appropriate size, and the postings and labels are placed in conspicuous locations determined by the line organization.

5.2.2.8 Change Control

A Configuration Management (CM) Program ensures that any change from an approved plant baseline configuration is managed so as to preclude inadvertent degradation of safety or safeguards. The CM Program, described in detail in Section 6.3, includes organizations and administrative processes to ensure accurate, current design documentation that matches the plant's physical configuration while complying with applicable requirements. The CM Program applies to NCS, both because a change to a system, structure, or component (SSC) controlled by CM may require a NCS approval, and because the documents generated by the NCS Program—NCSAs and NCSEs—become controlled documents, themselves subject to CM control.

Functional and physical characteristics of operations controlled for NCS are described in NCSAs and NCSEs. These components and features which are identified in the NCSAs and NCSEs are analyzed to determine the "boundary" of the system, encompassing those items that are essential to ensure operability. The boundaries are identified on system drawings, and the configuration is verified to be as-built. These components and features are documented in a manual for each facility. Each time a

Non-PORTS contractor (typically construction) personnel receive plant access training and plant-specific safety training by PORTS personnel prior to starting work. The contractor or the contractor-designated Safety and Health Officer has the contractual responsibility for internal contractor employee training. This training, performed by the contractor, is supplemented by PORTS approval of the contractor's Safety and Health Plan. If construction activities interface with chemical systems, appropriate training and guidance will be required. This training and job review is provided by PORTS representatives.

5.6.5 Maintenance and Inspection

Maintenance and inspection programs are summarized below and described in detail in Section 6.4, Section 6.3, and in the QA Program description.

Maintenance and inspection requirements and criteria for chemical systems are developed by Engineering in conjunction with the specific facility maintenance organizations, the manufacturer's recommendations, and the SAR. These chemical safety requirements are based on the TSRs, the SAR accident analysis, and/or the Process Safety Management (PSM) program requirements for a particular chemical system and the manufacturer's recommendations.

5.6.5.1 Calibration and Inspection

Specific calibration and inspection requirements are based on operating characteristics, past operating experience, system operating environments, and manufacturer's recommendations.

Maintenance, including calibration and inspection, of chemical systems that affect the assumptions or conclusions of the accident analysis is implemented in accordance with the TSRs and/or accident analysis conditions for a particular system.

Maintenance of chemical systems is performed in accordance with the facility maintenance programs that include the PSM Mechanical Integrity program requirements for those systems covered under PSM. These facility programs are based upon calibration and inspection requirements from operational experiences and characteristics of the system.

Facility maintenance personnel are responsible for calibrating to the tolerances and inspection criteria identified by the TSRs, the PSM Mechanical Integrity program, and the maintenance work package requirements.

5.6.5.2 Maintenance Work Packages

Maintenance work packages are prepared to provide the necessary technical and safety guidance for maintenance activities as described in Section 6.4. These work packages are applicable to chemical systems and equipment. Supporting maintenance procedures are subject to the requirements of the plant procedure program described in Section 6.11.

5.6.5.3 Preventive Maintenance and Quality Considerations

Manufacturer's recommendations are used as guides for preventive maintenance on specific chemical systems and equipment. If operational experiences or system characteristics indicate a need for a different preventive maintenance schedule, the preventive maintenance baseline can be changed after appropriate review. Equipment installed or maintenance services provided by contractors for chemical systems are tested and inspected by the contractor as required by the contract for that project. Independent inspection and testing is also performed by PORTS personnel.

Independent overview of maintenance activities on chemical system hardware and requirements are addressed by the QA Program and Configuration Management (CM) programs, as applicable. These independent overview programs include:

- Procurement Quality Requirements
- Construction Inspection
- Testing and Pre-operational Inspection
- Pressure Vessel Inspection
- Crane Inspection
- Operational Readiness Review and Pre-Startup Safety Review Programs
- Plant Operations Review Committee (PORC)

The operational readiness review process is conducted in accordance with program implementing procedures utilizing a graded approach. The scope of the readiness review is decided by the readiness review team depending on the issue and system being reviewed and the safety concerns present.

Deficiencies associated with maintenance activities are dispositioned in accordance with the QA Program requirements, and include Problem Reports, when required.

5.6.6 Configuration Management

The CM program is described in Section 6.3 and is applicable to chemical systems as described in the QAP. These systems are specifically identified and the structures, systems and components (SSCs) are classified using a graded approach as described in the QA program. Engineering, as the design authority for the plant, administers the CM Program. The plant CM Program includes an organizational structure and administrative processes and controls to ensure that accurate, current design documentation is maintained that matches the plant physical configuration.

Revision or modification to a chemical system is initiated via an Engineering Service Order that initiates the design process and includes a 10 CFR 76.68 screening. In accordance with 29 CFR 1910.119(I), a pre-startup safety review is performed for new or modified facilities when the change is significant enough to require a change to process safety information. The pre-startup safety review is an independent review to address the readiness of the system hardware, associated hazard controls, personnel (including required training), and procedures. If the change does not require a change to process safety information, a pre-startup safety review will not be performed.

Table 6.9-1. Event notification and reporting criteria applicable to USEC. (continued)

Criteria	Notification/ Reporting Time	Reporting Requirement Reference (10 CFR Section)
M. Material Handling (continued)		
2. External radiation levels exceed the limits of 10 CFR 71.47.	Immediately (within 1 hour)	20.1906(d)(2)
N. Transportation Incidents		
1. Each certificate holder who transports licensed material outside of the confines of its plant or other place of use, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the regulations appropriate to the mode of transport of Department of Transportation (DOT) in 49 CFR 170 through 189.	Earliest Practicable Moment (within 1 hour) 30 day (W)	71.5(a)(1(iv) 71.5(b) [requirement to notify NRC]
a. USEC shall particularly note DOT regulations in the following areas:		
...(iv) Accident reporting-49 CFR 171.15 and 171.16		
49 CFR 171.15 Immediate Notice of Certain Hazardous Materials Incidents		
49 CFR 171.16 Detailed Hazardous Materials Incident Reports		

Table 6.9-1. Event notification and reporting criteria applicable to USEC. (continued)

Criteria	Notification/ Reporting Time	Reporting Requirement Reference (10 CFR Section)
N. Transportation Incidents (continued)		
2. USEC shall notify the NRC of information identified by USEC as having for the regulated activity a significant implication for public health and safety or common defense and security. USEC violates this paragraph only if USEC fails to notify the NRC of information that USEC has identified as having a significant implication for public health and safety or common defense and security. Notification shall be provided to the Administrator of the appropriate Regional Office within **2 working days** of identifying the information. This requirement is not applicable to information already required to be provided to the NRC by other reporting or updating requirements.	2 Working Days	71.7
3. USEC shall report:	30 days	71.95
a. any instance in which there is significant reduction in the effectiveness of any authorized packaging during use; and		
b. details of any defects with safety significance in the packaging after first use; with the means employed to repair the defects and prevent their recurrence.		
c. Instances in which the conditions of approval in the Certificate of Compliance were not observed in making shipment.		