# 2. FACILITY DESCRIPTION

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# 2. FACILITY DESCRIPTION

## 2.1 Introduction

This chapter provides a description of the FDPA, which is housed in the FAST facility (CPP-666). The FDPA is no longer used to process fuel and now is used to store dissolver off-gas (DOG) and cell off-gas (COG) HEPA filters. This safety analysis covers the ongoing filter storage activity and those activities that are planned. These planned activities include routine maintenance and surveillance; sampling; storage, repackaging, and removal of DOG and COG filters; and draining and isolation of cold chemical addition lines and vessels that served the process vessels located within the FDP cell. The description contained herein provides the basis for the hazard analysis presented in Chapter 3.

## 2.2 Requirements

Design criteria for the FDPA were based on the design codes, standards, regulations and DOE orders existing at the time the design was initiated.[1,2,3,4,5,6,7,8,9,10,11,12]

Additional design codes, standards, regulations, and DOE orders that were used in the design and evaluation of the FDPA are referred to where applicable in this chapter.

## 2.3 Facility Overview

The FDPA portion of the FAST facility is located at the INTEC area of the INEEL. It is connected to the FSA portion of the FAST facility. A cutaway view of the FAST facility is shown in Figure 2-1.

The FDPA began operations in 1986, and has a specified design life of 40 years.[13] The original mission of the FDPA was to receive and dissolve irradiated spent Navy nuclear reactor fuel. When the decision to end the fuel-reprocessing mission was made in 1992, FDP operations were terminated. The only operations currently planned for the FDPA portion of the FAST facility are routine maintenance and surveillance; sampling; storage, repackaging, and removal of the contaminated off-gas filters; and draining and isolation of cold chemical addition lines that served the FDP equipment during operation.

## 2.4 Facility Structure

The FDPA and its supporting areas occupy approximately 40,000 $ft^2$ of the CPP-666 building. The FDPA is constructed of reinforced concrete, below grade and also above grade, where radiation shielding or hardening for the design basis earthquake (DBE) or design basis tornado (DBT) was required. The remainder of the abovegrade structure is framed with structural steel, and the exterior walls are constructed of insulated metal siding.

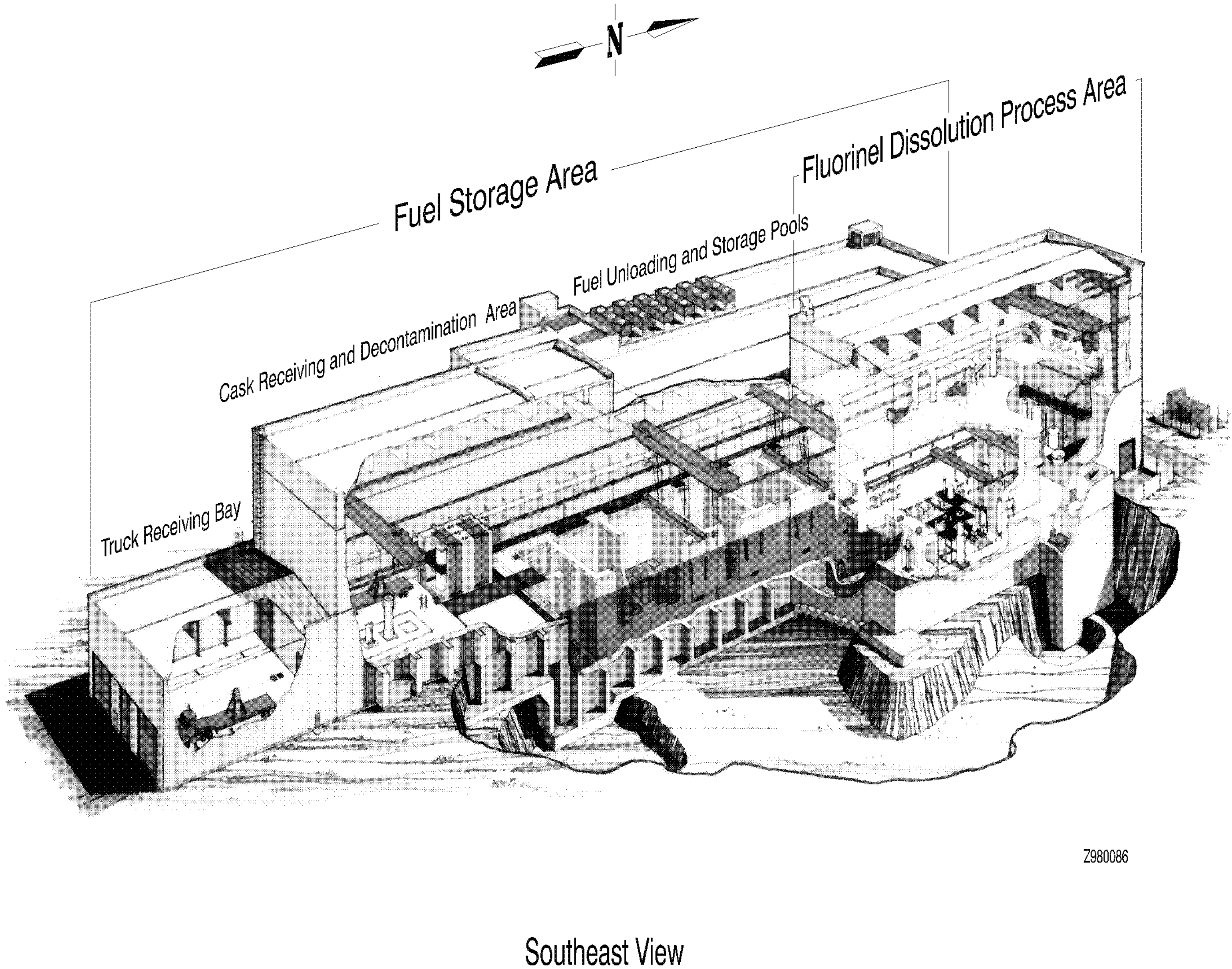


Figure 2-1. Fluorinel Dissolution Process and Fuel Storage Facility (cutaway view).

### 2.4.1 FDPA Description

The FDPA (see Figure 2-1, 2-2, and 2-3) consists of a shielded cell, various access corridors around the main FDP cell, a chemical makeup area (FM), and supporting systems. Descriptions of each of the areas identified below are provided in the following sections:

- FDP Cell
- Cell Maintenance and Loadout Area (+28 ft 0 in. elevation)
- Transmitter Area (+17 ft 0 in. elevation)
- Operating Area (0 ft 0 in. elevation)
- Crane Maintenance Area and Liquid Sample Cell (0 ft 0 in. elevation)
- Fluorinel Makeup Area (0 ft 0 in. elevation)
- Waste Loadout Area (-13 ft 0 in. elevation)
- Service Area (-13 ft 0 in. elevation)
- Access Area (-31 ft 0 in. elevation)

***2.4.1.1 FDP Cell.*** The FDP cell is the main process cell located in the FDPA portion of FAST. The FDP cell nominal dimensions are 20 × 100 × 50 ft deep, with a total interior floor area of 2,000 $ft^2$. The cell is constructed of reinforced ordinary density concrete with 5-ft-thick walls up to the crane rails and a 3-ft-thick floor. The floors and walls up to the crane rail are lined with stainless steel. The entire cell was constructed to withstand a DBE. The cell walls contain 14 shielding windows, each equipped with master slave manipulators, to permit direct viewing of most cell operations. The shielding windows are equivalent in shielding to the 5-ft concrete walls and are removable from the cold side without breaking the confinement seal. The windows are high-density glass blocks with oil-filled gaps between the blocks. Because the facility has been inactive, some of the windows have degraded by loss of some of the oil. The oil provides shielding for neutrons generated in the event of a criticality accident and allows better viewing of in-cell operations. The high-density glass still provides adequate gamma shielding for the radioactive material currently in the FDP cell. Penetrations through the cell walls and the equipment installed in or through the penetrations were designed to ensure adequate shielding, confinement, and contamination control. The penetrations were offset and shadow-shielded to prevent radiation streaming. Penetration seals are not maintained and may have degraded. However, routine surveys are conducted in accordance with the INEEL Radiation Protection Program. All FDP cell vessels and piping have been emptied, flushed, and rinsed to the greatest extent possible. The FDP cell has not been flushed.

The process included three separate dissolution trains composed of three dissolvers (DIS-FC-111, -121, and -131) and three complexers (VES-FC-114, -124, and -134). The complexed product was transferred to a single product transfer vessel (PTV, VES-FC-147,) for transfer to the solvent extraction systems located at CPP-601. Each dissolution train had a separate dissolver off-gas system consisting of a condenser (HE-FC-314, -324, or -334), a scrubber (SCR-FC-116, -126, or -136), scrubber recirculation pumps (P-FC-216, -226, or -236), mist eliminator, heaters (HE-FC-316, -326, -336), flame arrestor, in

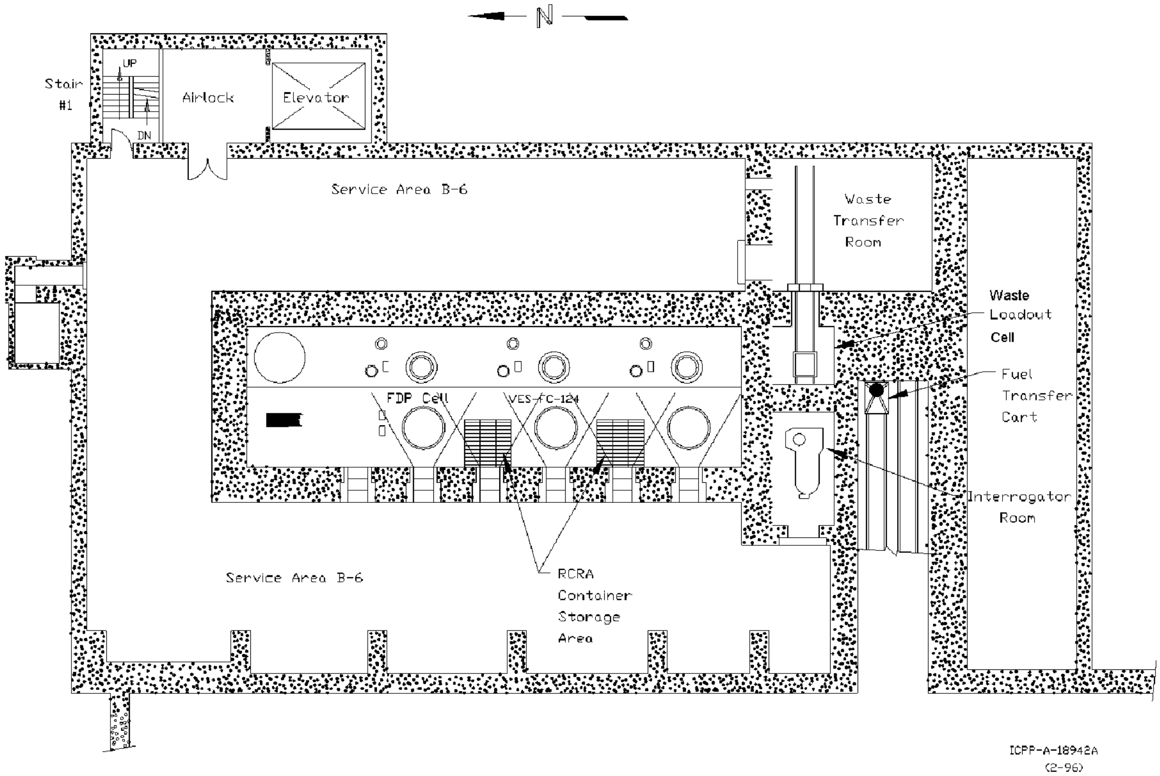


Figure 2-2. The FDPA at the –13-ft 0-in. level.

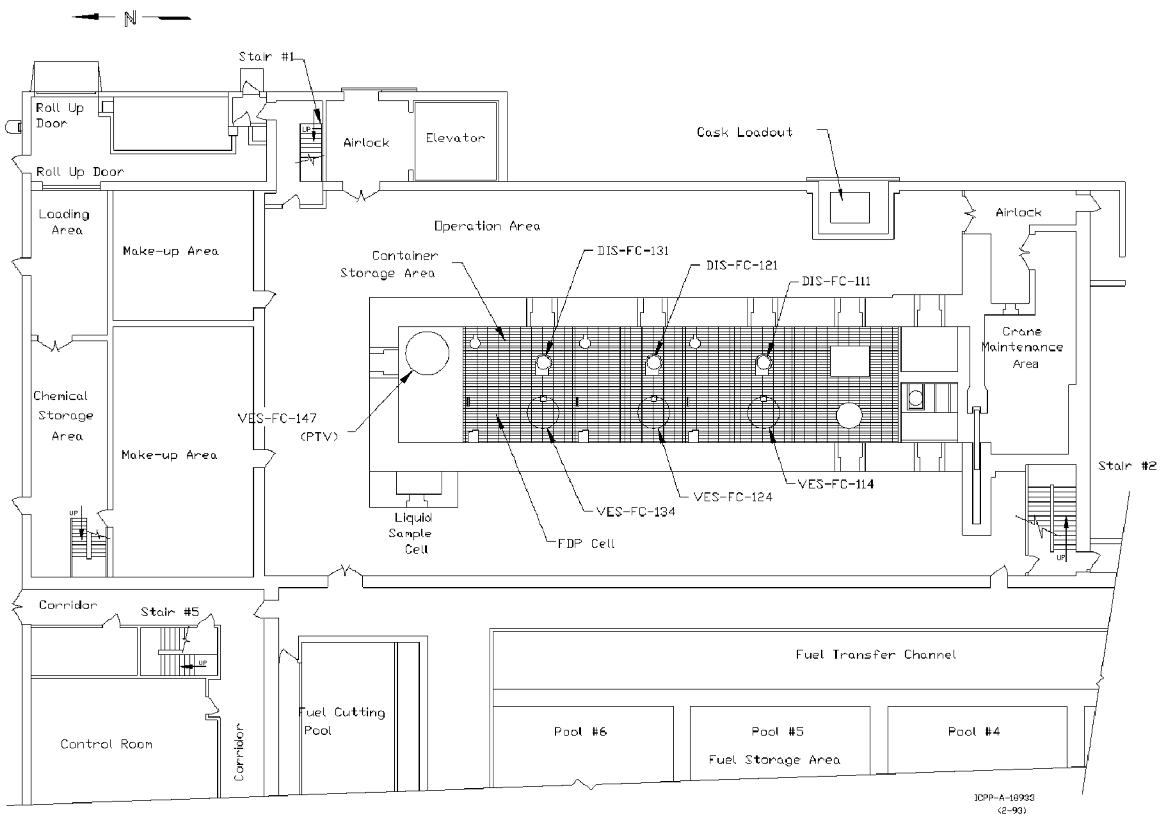


Figure 2-3. The FDPA at the 0-ft 0-in. level.

cell HEPA filters (F-FC-816-1, -2; 826-1, -2; and 836-1, -2), another set of HEPA filters (F-FV-818-1, -2; -828-1, -2; and –838-1, -2) located in the process off-gas Room 206, and dissolver off-gas blowers (BLO-FV-218-1, -2; -228-1, -2; and -238-1, -2) which discharge to the FAST facility heating, ventilating, and air conditioning (HVAC) exhaust system or the Rare Gas Plant located at CPP-604 for Kr recovery.

Liquid waste that accumulated in the FDP cell sump was transferred to the PTV via steam jet (JET-FC-586) or the sump collection vessel (VES-FC-184) via steam jet (JET-FC-584 or -585). Solutions from the sump collection vessel could be transferred back to VES-FC-114 via steam jet (JET-FC-501) or VES-FC-124 via steam jet (JET-FC-502), or directly to CPP-601 via steam jet (JET-FC-508).

The major vessels in the FDP cell could be sampled by means of the liquid sampling stations located in the liquid sampler cell. In addition, solid samples were taken from the PTV via the solids sampler located in the FDP cell. The major vessels have been flushed and rinsed. All FDP cell equipment and piping were labeled. Cell hatches provide access to the cell. Liquid and solid samples were transferred to the Remote Analytical Laboratory via the pneumatic transfer system (PTS).

***2.4.1.2 Cell Maintenance and Loadout Area.*** The cell maintenance and loadout area at the +28 ft 0 in. elevation houses the handling equipment necessary for the FDP cell maintenance and waste loadout tasks and provides equipment access to the FDP cell, crane maintenance area, and FM area. Maintenance access to the freight elevator and equipment access shafts is also provided at this level. The freight elevator was provided for removal of FDP cell ventilation high-efficiency particulate air (HEPA) filters from the access area and for small equipment transfer between the process support areas. Air conditioning units are located in this area, which contain about 200 lb of R-22 refrigerant. In addition, several components of the FM vessel vent system are located in this area, which include the scrubber (SCR-FH-180) and two redundant blowers (BLO-FH-279 and -280).

***2.4.1.3 Transmitter Area.*** The transmitter area is located at the +17 ft 0 in. elevation and is an access area containing the dissolver off-gas sampler system and process transmitter enclosures. The dissolver off-gas sampler system consisted of a glovebox, a hydrogen and oxygen analyzer for each dissolution train, and the associated electronics. The transmitter enclosures provided housing for electronic transmitter instrumentation and containment of contamination. Isolation valves were provided within the instrument lines for calibration and routine maintenance. The cell decontamination spray system located in this area is deactivated and is currently out of service.

***2.4.1.4 Operating Area.*** The operating area is located at the 0-ft 0-in. elevation and surrounds three sides of the FDP cell. Shielded viewing windows were provided for remote viewing, manipulation, and other process control functions. The liquid sample cell is located in the operating area along with the process piping, cold chemical transfer lines to the FDP cell, and control valves. The hydraulic shear system, which contains an estimated 6 gal of hydraulic fluid in the reservoir and lines (that go into the FDP cell), is also located in the operating area. All FDPA emergency exits are located at this elevation.

***2.4.1.5 Crane Maintenance Area.*** The crane maintenance area, located at the 0 ft 0 in. elevation is situated at the southeast end of the FDP cell. The crane maintenance area is isolated from the FDP cell by biparting steel shield doors. The crane maintenance area was used to service the crane and electromechanical manipulator.

***2.4.1.6 Fluorinel Makeup (FM) Area.*** The FM area occupies the north end of the FDPA, adjacent to the operating and transmitter areas (at reference elevations 0 ft 0 in. and +17 ft 0 in. respectively). The

FM area housed the process make up and feed vessels, pumps, valves, piping, samplers, and vessel instrumentation required to make up, store, and transfer the reagents (HF, $HFB_4$, $HNO_3$, $Al(NO_3)_3$, $H_2SO_4$, $CdSO_4$, $Cd(NO_3)_2$, $ZrO(NO_3)_2$, etc.) and decontamination solutions used for the FDP. See Table 2-1 for a list of the major FM area process makeup and feed vessels. The cadmium nitrate bulk storage tank (VES-FM-170) and cadmium sulfate bulk storage tank (VES-FM-179) are located at the 0-ft 0-in. elevation in the northeast room of the FM area. The process heating and cooling system (consisting of VES-FM-101, VES-FM-103, VES-FM-104, with associated piping that contain borated water) and chemical preparation and storage also are located in the FM area.

Table 2-1. FM vessels.

| Description | Vessel Number |
|---|---|
| HF makeup vessel | VES-FM-156 |
| HF feed vessel | VES-FM-166 |
| $HFB_4$ dissolver vessel | VES-FM-154 |
| $HNO_3$ makeup vessel | VES-FM-152 |
| $HNO_3$ feed vessel | VES-FM-162 |
| $Al(NO_3)_3$ makeup vessel | VES-FM-151 |
| $Al(NO_3)_3$ feed vessel | VES-FM-161 |
| $H_2SO_4$ makeup and feed vessel | VES-FM-153 |
| $CdSO_4$ poisoned water makeup vessel | VES-FM-157 |
| $CdSO_4$ poisoned water feed vessel | VES-FM-167 |
| Decontamination solution makeup and feed vessel | VES-FM-158 |
| $ZrO(NO_3)_2$ makeup vessel | VES-FM-173 |
| $ZrO(NO_3)_2$ feed vessel | VES-FM-174 |

The loading and loadout area at the northeast corner of the FM area allowed access for delivery of bulk chemicals, equipment and supplies, and transfer of cadmium solutions and removal of nonradioactive wastes from the FDPA. The major vessels have been flushed and rinsed. The FM area vessel vent system collected the off-gas from the FM area vessels. The major components were the scrubber (SCR-FH-180) and two redundant blowers (BLO-FH-279, -280), which are located in the Cell Maintenance and Loadout Area. The FM area vessel vent system off-gas was discharged into the FAST facility HVAC exhaust system. All FM area vessels and piping were labeled.

***2.4.1.7 Waste Loadout Area.*** The waste loadout area is located adjacent to the southeast end of the FDP cell at the -13 ft 0 in. elevation and includes the waste loadout cell and the waste transfer room. The waste loadout area allows for the remote removal of equipment and contaminated wastes from the FDP cell via the waste transfer cart and the waste transfer box.

Drums or the waste transfer box can be removed from the FDP cell by removing the waste loadout cell hatch cover using the in-cell crane. The 5-ton bridge crane is used to lower the drum or the waste transfer box onto a cable-driven transfer cart in the waste loadout cell below. The waste transfer cart is used to move the drum or the shielded transfer box from the loadout cell, through the waste transfer room door and into the waste transfer room to position the transfer cart directly under the loadout dock shaft. Hand decontamination and wrapping with plastic sheeting can be accomplished in the waste transfer room. The waste container then can be lifted by the 15-ton overhead monorail hoist to the waste loadout dock through the waste room transfer hatch, and then, moved horizontally through the biparting doors and onto a waiting truck. The waste loadout cell hatch and door, the waste transfer room door, the waste transfer cart, and the loadout dock cask position are interlocked to restrict personnel access, thereby preventing direct radiation exposure from drums or the waste transfer box.

***2.4.1.8 Service Area.*** The service area is located at the –13-ft 0-in. elevation and allows access to the neutron interrogator (NI) room, the waste transfer room, and the waste loadout cell. The neutron source has been removed from the FDPA. The service area surrounds three sides of the FDP cell. The cold chemical transfer lines serving the process are located in the service area. The west FDP cell wall is equipped with shielded viewing windows and manipulators for remote maintenance of piping, valves, and equipment (including pumps, motors and lights). This area also contains a locked door to the high-radiation pipe shielded chase area (to restrict personnel access, thereby preventing direct radiation exposure), which contains the process transfer lines used to transfer FDP dissolver product to the CP-601 extraction processes.

***2.4.1.9 Access Area.*** The access area at the –31-ft 0-in. elevation allows access to the following areas and systems; neutron interrogator (NI) tube room, remote handling air filtration cell, FDP cell, and liquid waste collection system.

The NI tube room is located in the southwest corner of the access area at the –31-ft 0-in. elevation. The NI tube room housed a small length of each scan tube which extended from the FDP cell at the 0-ft 0-in. elevation through the NI cubicle at the –13-ft 0-in. elevation. Each scan tube had a drain line and valve for decontamination operations of the tube.

The remote handling, air filtration cell is located in the northwest corner of the access area at the -31-ft 0-in. elevation. The air filtration cell contains two stages of HEPA filtration that filters the FDP cell ventilation exhaust air before it is exhausted to the FAST final filter system. The cell is designed for remote removal and replacement of the HEPA filters. Changeout operations are aided by four manipulators, a monorail hoist, and by remote viewing capabilities. Remote handling techniques can be used for filter changeout due to the potential for radioactive contamination and to protect personnel from direct gamma radiation.

Personnel access to the FDP cell is provided from the access area via the offset shielded airlock in the northeast portion of the cell, at a reference elevation of -27 ft 6 in.

The liquid waste collection system is located on the west side of the access area at the –31-ft 0-in. elevation. This system was designed to collect and segregate nonradioactive liquid wastes into high-fluoride and low-fluoride wastes. The high-fluoride wastes were collected in the high-fluoride collection vessel (VES-FA-141). This vessel has been RCRA-closed and is out of service. The low-fluoride wastes were collected in the low-fluoride collection vessel (VES-FA-142). This tank has been RCRA-closed, but remains in service.[14]

***2.4.1.10 FDPA Interfaces.*** The CPP-666 facility has a total foot print area of approximately 120,000 $ft^2$ and houses the FSA, FDPA and its supporting areas. The FDPA accounts for approximately 41,000 $ft^2$ of CPP-666. The following FDPA structures or systems interface or are shared with the FSA:

- FDPA transfer channel ramp–This transfer channel ramp is perpendicular to and intersects the FSA transfer channel opposite Fuel Storage Pool 4. The FDPA transfer channel contains an underwater transfer cart system. The FDP cell is isolated from the FSA by the normal water seal and DOR-FC-965.

- Main control room (now used as the shift operating base)–This room houses the controls for both the FDPA and the FSA.

- Dissolution cell and fuel cutting pool exhaust mechanical equipment room–This room contains HVAC equipment for the FDPA dissolution cell and the fuel cutting pool.

- CPP-666 HVAC system–The HVAC system serves both the FDPA and the FSA facilities. This system includes Room 206, which contains the off-gas blowers for the FDP cell vessels.

- Water treatment and management systems–The FDPA transfer channel is a continuation of the FSA transfer channel and is therefore supported by the water treatment and management systems.

- Wall between the FDPA and the FSA–Structurally, the east wall of the FSA is common to the FDPA and to the FSA. This wall has fire dampers and fire doors between FDPA and FSA.

- Utility distributions, auxiliary systems, and support facilities including electrical power, water, steam, sewer, plant air, plant breathing air (not currently operational), nitrogen generation, cold chemical systems, dissolver off-gas line, and communications and alarms are common to both areas.

### 2.4.2 Facility Structural Design

This section discusses the structural design of the FDPA with respect to withstanding postulated design or evaluation basis natural phenomena and potential operational loads important to the safety analysis. Sections 2.4.2.1 through 2.4.2.6 summarize the FDPA structural design for natural phenomena. The original structural design criteria are presented. The effects of design criteria changes since construction of the FDPA are reviewed, and the results of subsequent re-analysis of the FDP structural design are discussed. The original FDPA design criteria are contained in ENI-103[13] and met the applicable design codes, standards, regulations, and DOE directives at the time.

Natural phenomena hazards (threats) pertinent to the FDPA design are identified in Table 1-1 of Chapter 1.

Equivalent derived loads on structures were limited to dead loads and seismic loads, since no plant upset, emergency, or faulted conditions were specified, and loads from normal operation, such as pipe pressure reaction, are much smaller than seismic loads.

Based on a comparison between the original facility design criteria and the current criteria, the FDPA design criteria are comparable to those for a Performance Category (PC)-4.

***2.4.2.1 Extreme Wind Design.*** The original FDPA design criteria for extreme wind loadings are:

- Normal wind conditions per the Uniform Building Code (UBC)
- 100-yr wind (i.e., 100 mph)
- DBT and associated tornado generated missiles.

Table 1-1 presents the current design criteria for extreme wind loadings at the INEEL. The current extreme wind design criteria for a PC-3 facility are an 84-mph wind and associated wind-generated missiles. The original FDPA design criteria for extreme winds are more stringent than current PC-3 design criteria.

***2.4.2.2 Volcanic Design.*** Volcanic hazards include lava flow, ground deformation (fissures, uplift, subsidence), volcanic earthquakes, and ash flows or airborne ash deposits. The most recent and closest volcanic eruption occurred 2,100 years ago at Craters of the Moon, 15 mi southwest of the INEEL as described in SAR-100, Chapter 1.[15] The potential for future volcanic activity at the INEEL is extremely unlikely. No design criteria are specified for volcanic hazards in either the original facility design criteria or the present criteria.

***2.4.2.3 Lightning Design.*** The number of lightning strikes occurring at the INEEL is not high.[15] However, due to the lack of natural targets for lightning discharge and the poor conductivity of the lava rock and desert soil, manmade structures are highly susceptible to lightning strikes. The FDPA structure was designed and constructed to meet the requirements of the Lightning Protection Code of the National Fire Protection Association (NFPA).[16]

***2.4.2.4 Flood Design.*** The FDPA was designed for a probable maximum flood (PMF) with a 10,000-yr recurrence interval. The PMF has the potential to result in water level at 4,916.6 ft above mean sea level, assuming a 35,000-cfs flood crest. The present PMF design criteria are the same as that specified in the original facility design criteria. The following features provide flood protection for FDPA equipment and structures:

Entrances to the FDPA are located above the expected PMF elevation, at elevation 4,917.0 ft or higher.

- The liquid effluent systems contain check valves to prevent backflow through discharge piping during flood conditions. There are also manual isolation valves, which are all currently closed and are only opened during waste transfer.
- In addition to the PMF criteria, the current design criteria also include a 25-yr (recurrence interval), 6-hr storm that results in 1.4 in. of rainfall. The potential hazard is localized flooding. Protection against localized flooding is provided by the INTEC site drainage system.

***2.4.2.5 Snow Design.*** The FDPA was originally designed for a snow loading of 30 psf, which is also the current design criterion.

***2.4.2.6 Seismic Design.*** The seismic criteria used in the FDPA design (ENI-103) were equivalent to that later defined for a High Hazard facility use category. The facility was otherwise classified as a

Moderate Hazard facility in accordance with the DOE Order 5481.1B ("Safety Analysis and Review System") and DOE-STD-1027-92.[17] The seismic design criterion was 0.24 g at bedrock.

## 2.5 Process Description

FDP Operations included three dissolver trains, off-gas cleanup systems, complexing vessels, solids separation and handling systems, process makeup vessels, pumps, valves, piping, and instrumentation. The dissolvers were equipped with heating/cooling jackets, charging valves, and other necessary fittings. Chemical reagent addition systems and the heating/cooling systems in the FDP were designed to contain soluble neutron poison (cadmium or boron) to ensure criticality safety for the dissolvers and other process equipment. Figure 2-2 shows the FDP cell and associated areas at the -13 ft 0 in. level, and Figure 2-3 shows the 0 ft 0 in. level. A 35-ton crane located at the +28-in. level can be used to transfer equipment in or out of the cell via the cell access and maintenance and loadout area. The floor hatches can be removed by the crane to access the cell.

In-cell dissolver and cell off-gas filters are currently stored in 17 stainless-steel containers, 55-gal carbon-steel drums, and a wooden box. The off-gas filters may be repackaged prior to being transferred out of the FDP cell remotely, by means of cranes and hoists. The cell is equipped with a 7.5-ton bridge crane that travels the full length of the FDP cell. This bridge also has an auxiliary hoist with a capacity of 5.0 ton. An electromechanical in-cell manipulator can also be used to handle wastes. This manipulator has a wrist, shoulder, elbow, and telescoping tube. Also mounted on the trolley is a 2-ton auxiliary hoist.

As noted previously, the FDPA has been shut down and the only planned activities are routine maintenance and surveillance; sampling; storage, repackaging, and removal of the contaminated off-gas filters; and draining of the chemical addition lines and vessels. A total of 147 off-gas filters are stored in the FDP cell. These filters will be repackaged if necessary and removed from the cell. The off-gas filter removal process is described in Section 2.5.1. The chemical feed lines contain unknown amounts of various solutions, as described in Section 2.5.2. A total of approximately 120 drain locations are to be cut to effectively drain all the chemical makeup piping and vessels outside of the cell.[18]

A minimum number of systems remain in service indefinitely for operational reasons. The affected systems provide services such as heating and ventilation, contamination control, fire protection, and basic utilities. This SAR does not mandate operation of these systems, nor does it establish functional requirements or define operational parameters. However, system operability is a best management practice for worker protection in the areas of radiation protection, industrial safety, and fire protection. Most of the process instrumentation, the Data Processing System Enhancement (DPSE), and Plant Protection System (PPS) are no longer in use.

### 2.5.1 Dissolver and Cell Off-gas Filter Removal

A total of 147 contaminated dissolver and cell off-gas filters are to be removed from the FDP cell. These filters are located in containers in the cell and may require repackaging. In 1982, each filter was conservatively estimated to contain approximately 4.4 Ci of radioactivity at the time of replacement based on normal operations.[19] The containers are located on the floor grating of the FDP cell at the –13-ft 0-in. elevation. Removal of off-gas filters requires that some of the grating at the 0-ft 0-in. elevation be removed to provide access so that the containers can be removed from the cell by the existing FDP cell crane or electromechanical manipulator. The containers are lifted to the 0-ft 0-in. elevation where they may be temporarily stored. If necessary, the filters are repackaged to meet subsequent handling requirements. Next, the filter containers are placed in a waste transfer box and lowered to the –13-ft 0-in. elevation where the waste transfer box is placed on a waste transfer cart in the waste transfer room. The cart is then moved through an airlock into the waste transfer room where the waste transfer box is lifted from the waste transfer cart onto a truck. This waste transfer operation can be performed remotely.

***2.5.1.1 Waste Transfer Box.*** The waste transfer box (TD-FC-902) is a top-opening box with an opening approximately 2 ft 8-1/2 in. square by 5 ft 2 in. deep. The box has a lid that is bolted into place prior to a transfer. Radiation shielding consists of 1-5/8 in. of lead sandwiched between 1/4-in. and 1/2-in.-thick stainless-steel plates. The waste transfer box was designed to reduce a 100 rem/h point source to 6.3 mrem/h at contact.

### 2.5.2 Cold Chemical Addition Line and Vessel Draining

Several different techniques may be necessary to drain residual liquids from the vessels and cold chemical addition lines. The draining techniques vary, depending on the individual pipe and valve configuration. The draining techniques may include use of existing drain ports, cutting a section of pipe downstream of a closed valve, using a glove bag and drilling a hole into the pipe to install a drain port, or other breaching methods. The estimated number of locations to be breached to effectively drain all the chemical makeup piping is approximately 120. The chemical feed lines supplied feed solutions of aluminum nitrate, cadmium sulfate, hydrofluoric acid, sulfuric acid, nitric acid, and zirconyl nitrate to the FDP. The chemicals, their concentration, and volumes are provided in Chapter 3. The amounts are estimated, assuming that all of the cold chemical addition lines and headers are full. Draining lines and associated equipment that once contained fissile material (process transfer lines) is not authorized by this SAR.

## 2.6 Confinement Systems

The FDPA includes the following design features or systems for confinement of radioactive materials:

- Building ventilation system
- FDPA structure

The building ventilation system was designed to maintain pressure within the FDPA below atmospheric pressure to ensure that building exhaust was directed through the FAST final HEPA filtration system. Pressures are progressively lower from clean areas (such as offices) to potentially contaminated and likely contaminated areas to direct airflow accordingly. Backflow dampers prevent air from flowing in unintended directions. The backflow dampers also prevent release of unfiltered air during a transient pressure imbalance between the building and the environment. Supply-air HEPA filters in the FDPA also ensure that air, which could conceivably flow backward through the inlet ducts, is filtered prior to release into clean areas. Barriers, airlocks, and seals are used to control undesirable airflow paths between areas via passageways and wall penetrations. Facility confinement barriers are reinforced by systems that detect leakage and provide alarms (e.g., RAMs and CAMs) if airborne contamination is detected.

The FAST ventilation inlet air is filtered and then split into the FSA and the FDP systems. The FSA system is not addressed in this document. The FDP ventilation system is comprised of two separate systems, the process off-gas and the cell off-gas. Since the process is no longer operating, the process off-gas system is not operating. The dissolver off-gas system can be routed to the Rare Gas Plant for recovery of rare gases. The Rare Gas Plant is not in operation. The three FDP dissolver off-gas systems are blind-flanged. The blind flanges are located in the dissolver off-gas blower room (Room 206) of CPP-666.[20] The 3-in. line (DG-AD-125792) that was used to bypass dissolver off-gas to the Rare Gas Plant for the recovery of Kr-85 has been blind-flanged in the north cell of the Rare Gas Plant (CPP-604) (3-DG-AF-105792). If the dissolver off-gas was routed to the Rare Gas Plant, it was released to the environment via the Main Stack (CPP-708).

The cell off-gas system used the same overall philosophy of air flowing from clean areas to contaminated areas. Ventilation flow originated in areas where there was minimal potential for contamination. It was then directed through occupied areas and operating areas and, from there, into secondary confinement areas that contain the primary confinement systems. Both the primary and secondary confinement effluent streams were filtered prior to release to the atmosphere via the facility stack. The outlet of the cell off-gas is recombined with the FSA system, prior to final filtration and release to the atmosphere.

The physical structure of the FDPA provides the final confinement barrier between the FDPA and the environment. The building is designed to withstand a DBT and a DBE and to maintain its integrity during postulated design basis events, as described in Section 2.4.2.

## 2.7 Safety Support Systems

FDPA safety support systems have been identified (1) to support the current mission of storing off-gas filters and (2) to support the facility while in a shut-down condition, awaiting decontamination and decommissioning.

### 2.7.1 Electrical Utility Distribution System

This section describes the electrical power system for the FDPA, including normal power, standby power, and uninterruptible power.

***2.7.1.1 Normal Power.*** Normal (commercial) electric power is supplied to the FDPA via redundant feeds from INTEC Substation 15 (CPP-1782). Power is fed through sectionalizing switches to power control centers (PCC-FT-411 and PCC-FP-413) in CPP-666. The 13,800-V feeds from Substation 15 are transformed to 480 V by XFR-FP-166 and XFR-FT-167, and the PCCs are fed by the 480-V power. The PCCs feed motor control centers (MCCs) in the building.

Each PCC includes a silicone liquid-filled transformer, a high-voltage primary interrupter switch and fuse, and reduced-voltage switchgear. The PCCs were manufactured to National Electrical Manufacturers Association standards. Switchgear is listed in accordance with Underwriters Laboratories standards. PCC rooms have outside access for maintenance convenience and for positive isolation from radioactive contamination. Ventilation for the PCC rooms is designed to keep ambient temperatures below 35°C (95°F). The building structure for PCC rooms and equipment installations is designed to withstand the operating basis earthquake (OBE) without loss of function. Curbs are provided around substations for containment of transformer oil.

If power is lost to one or both of the PCCs, then power can be fed to SMCC-FV-363 and SMCC-FV-364 via SPCC-FV-1172. The feed to this SPCC comes from the right bus of Substation 15.

***2.7.1.2 Standby Power.*** If power is lost to the INTEC area, generators in Substation 60 (CPP-1684) automatically start and supply power to the standby power system loads.

***2.7.1.3 Uninterruptible Power.*** Uninterruptible power is provided from multiple, small uninterruptible power sources connected to selected FDPA loads. The fire protection and alarm panels, the emergency communication system, and the emergency egress and exit lights have continuous, uninterruptible power and have a separate local, dedicated battery backup system.

### 2.7.2 Other Safety Support Systems

FDP also contains radiation monitoring equipment in the form of continuous air monitors (CAMs) and radiation area monitors (RAMs).

Breathing air for use in fresh-air respirators, masks, and bubble suits is provided by portable units as needed. The facility breathing air system is currently not operational.

## 2.8 Auxiliary Systems and Support Facilities

Descriptions of the auxiliary systems and support facilities for the FDPA are presented in the following sections. These include water, steam, plant and instrument air, breathing air, nitrogen, cold chemical systems, communications and alarms, and fire protection.

### 2.8.1 Water

Water used at the INTEC is pumped from the Snake River Plain Aquifer. The INTEC water supply system consists of water supply wells, a water storage tank, CPP-606 treatment and distribution equipment, and the facility distribution system.

Treated water, potable water, and demineralized water are provided to FDPA from CPP-606. No raw water is used, except for firewater, as discussed in Section 2.8.7. Except for the demineralized water, the water to the FDPA is supplied from two different locations in the INTEC distribution systems.

Treated water is raw water that has been passed through a water softener to remove dissolved minerals such as calcium and magnesium. Potable water is chlorinated water. Potable water is supplied from a dedicated well to utility sinks, electric water heaters, and safety shower/eyewash stations. Demineralized water is provided for use as a decontamination solution.

### 2.8.2 Steam

Steam is supplied at 140 psig to the FDPA from the steam generating and distribution facilities. Electrically operated fuel pumps, boiler controls, and water supply pumps are connected to the INTEC standby power system to maintain steam service during interruptions of normal power. At the FDPA, the primary uses of steam are space heating and maintenance. Steam can be used for decontamination. Condensate from header traps and space heaters is transferred to the steam system for reuse but can also be diverted to service waste. Prolonged outages of steam service may result in personnel discomfort and freezing of some firewater lines during extreme winter weather. In extremely cold weather, portable electric or petroleum-fired heaters can be used to heat piping. Building ventilation can safely be reduced during prolonged shut down of the steam supply to limit incoming cold air.

### 2.8.3 Plant Air

Compressed dry air is supplied to CPP-666 from the INTEC plant air system located in CPP-606. The INTEC plant air system is powered by the INTEC normal and standby power system. CPP-666 plant air is received at 100 to 115 psig through two lines from the INTEC plant air distribution system (north and west utility interfaces). In the FDPA, individual pressure reducers are used to supply the pressures for branch line or equipment requirements. Plant air is distributed throughout the operating and maintenance areas to air supply stations. These stations provide air for control valves, control mechanisms, and similar items. Instrument air is filtered and reduced to 20 psig at the point of distribution.

### 2.8.4 Nitrogen

A nitrogen generator (GEN-FL-913) supplies nitrogen to selected shielding windows and instrument probes in the FDPA. This generator is installed in the northwest corner of the -13 ft level of CPP-666 in the FDPA. The generator produces between 100 and 500 scfh of 90 to 99% clean dry nitrogen.

### 2.8.5 Cold Chemical Systems

There are no active cold chemical systems in the FDPA. The cold chemical storage and makeup vessels have been drained but not flushed. These vessels may still contain small quantities of cold chemicals. The cold chemical addition lines contain various types and quantities of reagents. See Chapter 3 for a detailed description of these hazards.

### 2.8.6 Communications and Alarms

Communications within the FDPA are provided by a voice communication system and by emergency alarms, as described in the following sections

***2.8.6.1 Voice Communications.*** Voice communications within the FDPA are provided by a local paging system. The system provides both normal telephone service and telephone paging. Speakers, telephones, and telephone-jack receptacles are located in the FDPA.

***2.8.6.2 Emergency Alarms.*** The INTEC Emergency Communication System provides emergency alarms at the FDPA. These alarms include evacuation; take cover; and fire alarms, signals, and announcements. The speakers for the Emergency Communication System are strategically located in the FDPA to provide complete coverage for normally occupied areas. The location of emergency equipment in the FDPA is shown in the PLN-114, "INEEL Emergency Plan/RCRA Contingency Plan."[21]

### 2.8.7 Fire Protection

The INTEC fire protection system is designed to meet the improved risk standards of DOE Order 420.1A.[22] The FDPA fire protection system is an extension of the INTEC fire detection, alarm, and firewater supply system. No Halon or $CO_2$ fire suppression systems are in use at the FDPA.

The basic fire suppression system for the FDPA consists of sprinklers augmented by hand-operated extinguishers and fire department connection stations. The sprinkler system is a wet-pipe design.

Firewater for the FDPA is supplied by two 750,000-gal storage tanks (dedicated to fire use) via diesel-powered firewater pumps located in CPP-1642 and CPP-1643. A minimum of 2,500 gpm of firewater is available to CPP-666 at 150 psig from these systems. PDD-1082, "Life Safety Overview INTEC Area,"[23] and PDD-1083, "Main Water Distribution System for the INTEC Area,"[24] provide details concerning the INTEC fire water supply systems.

The FDPA design minimizes combustible material and chemical storage within the facility. The only chemicals used at the FDPA are small quantities (janitorial cleaning supplies, etc.).

The fire detection and alarm system for the FDPA is an extension of the INTEC system. If an alarm actuates, a signal is transmitted to the INEEL alarm center indicating that a fire system alarm has been initiated at the FDPA. The INTEC Emergency Communication System is also activated for fire annunciation. Dedicated batteries supply backup power for operation of the fire detection system.

The FDPA fire detection and alarm system complies with NFPA Standard 72,[25] and the sprinkler systems comply with NFPA Standard 13.[26] Provisions also are made for isolating and storing chemicals in accordance with the recommendations of NFPA Standard 49.[27] The underground firewater distribution for the FDPA complies with NFPA Standard 24.[28]

## 2.9 References

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