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June 21, 2012

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit 1  
Facility Operating License No. DPR-2  
NRC Docket No. 50-010

Subject: Defueled Safety Analysis Report Update, Revision 6

Reference: Exelon Generation Company, LLC (EGC) letter, "Defueled  
Safety Analysis Report Update, Revision 5," dated June 21, 2010

In accordance with the requirements of 10 CFR 50.71, "Maintenance of records, making of reports," paragraph (e), Exelon Generation Company, LLC (EGC) is submitting Revision 6 of the Defueled Safety Analysis Report (DSAR) for the Dresden Nuclear Power Station (DNPS), Unit 1.

Attachment 1 contains a summary of the Revision 6 changes to the DSAR. Attachment 2 provides the revised DNPS DSAR. In accordance with 10 CFR 50.71(e)(4), EGC is submitting this notification within 24 months of the previous DSAR submittal referenced above. Accordingly, this notification is due to be submitted no later than June 21, 2012. Changes to the DSAR are indicated by revision bars.

As Manager – Licensing, I certify that the information in this submittal accurately presents changes made since the previous submittals necessary to reflect information and analyses submitted to the NRC or prepared in accordance with NRC requirements.

This letter does not contain any regulatory commitments. Should you have any questions concerning this letter, please contact Amy Hambly at (630) 657-2808.

Respectfully,

David M. Gullott  
Manager – Licensing

Attachment 1: Dresden Nuclear Power Station, Unit 1; Summary of DSAR Changes, Revision 6

Attachment 2: Dresden Nuclear Power Station, Unit 1; Defueled Safety Analysis Report,  
Revision 6

## **ATTACHMENT 1**

### **Dresden Nuclear Power Station, Unit 1 Summary of DSAR Changes, Revision 6**

- **DSAR Change 12-001** revised Section 3.2.2.8.4 to delete reference to fire dampers being operated by Instrument Air to match as built configuration. Additionally, corrected the number of fire dampers separating the Control Room from Support Areas from two to three.
- **DSAR Change 12-002** revised Sections 3.1.12.1 and 3.2.2.3.1 to incorporate changes made under Engineering Change 334472 regarding the Unit 1 Area Radiation Monitoring System.
- **DSAR Change 12-003** revised Section 3.2.2.4.2 to correct the description of Transformer 13.
- **DSAR Change 12-004** revised Section 7 to clarify Conduct of Operation's Roles and Responsibilities. Position Titles were revised to reflect current titles.
- **DSAR Change 12-005** revised various section of the DSAR. The changes were to remove information that was not required to be maintained. Additionally, this change clarified as well as corrected various descriptions throughout the DSAR.

## **ATTACHMENT 2**

**Dresden Nuclear Power Station, Unit 1  
Defueled Safety Analysis Report, Revision 6**

# **Defueled Safety Analysis Report**

## **Dresden Nuclear Power Station Unit 1**

June 2012  
Revision 6

## Defueled Safety Analysis Report (DSAR)

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DRESDEN UNIT 1 – DSAR

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## **1. Introduction and Summary**

### **1.1. Introduction**

The United States Nuclear Regulatory Commission (NRC) approved Revision 3 to the Dresden Unit 1 Decommissioning Program Plan on September 3, 1993. Subsequent revisions to the Decommissioning Program Plan were reviewed and approved based on criteria similar to the criteria of Section 50.59 of Title 10 of the Code of Federal Regulations (10 CFR 50.59). In 1998, the Decommissioning Program Plan (DPP) was revised to the current Defueled Safety Analysis Report (DSAR) format contained herein.

Portions of this document refer to the Dresden Units 2 and 3 Updated Final Safety Analysis Report (UFSAR). Dresden Unit 1 shares the Units 2 and 3 site and surrounding area. Therefore certain information regarding the site characteristics, the local environment, and activities or designs which are applicable to both Dresden Unit 2 and 3, and Dresden Unit 1, are not reiterated in this document. Where appropriate the Unit 2 and 3 UFSAR is referenced herein.

The Nuclear Regulatory Commission approved the transfer of the facility licenses from Commonwealth Edison (ComEd) Company to Exelon Generation Company, LLC (EGC) on January 12, 2001. Reference in the Defueled Safety Analysis Report (DSAR) to ComEd, CECO and Commonwealth Edison have been retained, as appropriate instead of being changed to EGC to properly preserve the historical content. Reference Amendment No. 40 to License No. DPR-2, Docket No. 50-10, dated January 12, 2001.

EGC is decommissioning the Dresden Nuclear Power Station Unit 1 by placing the facility in a safe storage condition (SAFSTOR) until Dresden Units 2 & 3 are ready for decommissioning. The SAFSTOR license DPR-2 Amendment No. 37 for Dresden Unit 1, issued September 3, 1993, has an expiration date of April 10, 2029.

### **1.2. Licensing and Construction History**

Dresden Unit 1 was the first nuclear plant built by private industry. It was a cooperative effort by Commonwealth Edison and a “Nuclear Power Group” (NPG) that included six other electric utilities. General Electric Company designed the plant and offered it at a fixed contract price of \$45 million, \$15 million of which was contributed by NPG. Commonwealth Edison provided the remaining funding, the site, the electrical switchyard and other accessories. Bechtel Corporation was the engineer-constructor. The following list provides a chronology of Dresden Unit 1 licensing and construction history.

Dresden Unit 1 Licensing and Construction Chronology

Date	Activity
March 31, 1955	Preliminary Safety Report submitted to the Atomic Energy Commission (AEC). *
May 04, 1956	Construction Permit issued.
November 28, 1956	Site preparation work begun
June, 1957	Major construction work begun.
June 12, 1957	Final Safety Report submitted to the AEC. *
March, 1959	Reactor pressure vessel shipped.
September 23, 1959	Construction completed.
October 13, 1959	Fuel loading began.
October 15, 1959	First nuclear chain reaction initiated.
November 16, 1959	Operating License issued.
April 15, 1960	First electricity generated.
June 29, 1960	Full power operation begun - 180,000 Kilowatts (net).
August 01, 1960	Official dedication.
October 12, 1960	Commercial operation begun.

\* Predecessor of the Nuclear Regulatory Commission (NRC).

### 1.3. Operating History

Dresden Unit 1 produced power commercially from July 1960 to October 31, 1978, generating approximately 15,800,000 Megawatt-hours of electricity.

Dresden Unit 1 had significant problems associated with control rods and undertook a control rod blade replacement program from November 1960 through March 1961. In April of 1961, criticality testing was conducted with new control blades. On June 2 of 1961, turbine generator operation was resumed. The licensed power of the Unit was increased from 630 MWt to 700 MWt in September of 1962.

The unit had a history of minor steam leaks and erosion in steam piping in the early and mid-1960s. There were also fuel failures during the period of September through December of 1964 and other times which, although not leading to off-gas releases above limits, did cause redistribution of radionuclides from the fuel to other parts of the primary system.

During other outages in the late 1960s, ultrasonic inspections were made on extensive sections of primary piping and welds because of concerns regarding intergranular stress corrosion cracking failures in some of the smaller 304 stainless steel piping.

Several systems in the plant used admiralty brass (Cu-Ni) heat exchange surfaces, including the Main Condenser. Most of these were taken out of service and replaced with stainless steel tubing. In the sixth partial refueling, the condenser was re-tubed from admiralty brass to 304L stainless steel. The use of Cu-Ni surfaces did lead to translocation and deposition of corrosion products throughout the operating systems.

The use of carbon steel in the Secondary Feedwater System may have also contributed to the elevated corrosion radionuclide levels. These foregoing events led to the need to perform a chemical decontamination of the Primary System.

The Unit was taken off-line on October 31, 1978, to backfit it with equipment to meet new federal regulations and to perform a chemical decontamination of major piping systems.

While it was out of service for retrofitting, additional regulations were issued as a result of the March 1979 incident at Three Mile Island. The estimated cost to bring Dresden Unit 1 into compliance with these regulations was more than \$300 million. Commonwealth Edison concluded that the age of the unit and its relatively small size did not warrant the added investment.

In 1984, chemical decontamination of the primary system was performed and 753 curies of Cobalt-60 and 12.4 curies of Cesium-137 were removed. This decontamination was completed and activities began shortly thereafter to prepare the facility for decommissioning.

Dresden Unit 1 Operating and Abnormal Event Chronology

Date	Activity
August 1960	Official dedication.
October 1960	Commercial operation begun.
September 1962	Electrical power stretched to 210,000 kilowatts.
December 1962	Achieved 73% annual capacity factor exceeding Edison's best coal plant.
June 1976	World's first test of chemical cleaning on portion of reactor piping (Task K corrosion Test Loop).
October 1978	Unit shutdown for modification to meet new regulations.
September 1984	Completion of world's first full-scale chemical cleaning of entire primary system.
October 1984	Decision made to decommission unit.
July 1986	NRC issues amendment of License No. DPR-2 to possess-but-not-operate status, Dresden Nuclear Power Station, Unit 1 (Amendment No. 36 to License DPR-2).
July 1992	Unit 1 areas with the exception of the Fuel Storage Building were devitalized (Security Plan Revision No. 42).
September 1993	NRC authorizes decommissioning of Dresden Unit 1 (Amendment No. 37 to License No. DPR-2).
January 1994	Sphere piping is challenged by cold temperature extremes, resulting in pipe breaks.
March 1999	Unit 1 Fuel Building devitalized (Security Plan Revision 59).

## **2. Site Characteristics**

Dresden Unit 1 is located on the Dresden Nuclear Power Station site shared with Dresden Units 2 and 3. The site characteristics of Unit 1 are similar to those associated with Units 2 and 3, as described in the Dresden Units 2 and 3 Updated Final Safety Analysis Reports.

Unit 1 is located in the northeast quadrant of the site with an intake canal extending west from the Kankakee River and a discharge canal extending north to the Illinois River.

Information descriptive of the Dresden Unit 1 site regarding the following topics is available in the Dresden Units 2 and 3 Updated Final Safety Analysis Report:

- Site Location
- Site Ownership
- Exclusion Area
- Access to the Site
- Other Activities on the Site
- Population Distribution
- Uses of Adjacent Lands and Waters
- Other Activities in the Area around the Site with Potential for Effecting Operations
- Meteorology
- Hydrology
- Geology

### **3. Facility Design**

The Dresden Unit 1 Facility Design is now divided into two areas, as all irradiated fuel has been placed in Dry Cask Storage: structures, systems, components important to Unit 1, 2 or 3 operations and balance of Unit 1 structures, systems and components.

#### **3.1. DELETED**

##### **3.1.1 DELETED**

##### **3.1.2 DELETED**

##### **3.1.3 DELETED**

##### **3.1.4 DELETED**

##### **3.1.5 DELETED**

##### **3.1.6 DELETED**

##### **3.1.7 DELETED**

###### **3.1.7.1. DELETED**

###### **3.1.7.2. DELETED**

##### **3.1.8 DELETED**

###### **3.1.8.1. DELETED**

###### **3.1.8.2. DELETED**

##### **3.1.9 DELETED**

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##### **3.1.10 DELETED**



**3.1.10.1. DELETED**

**3.1.10.2. DELETED**

**3.1.11 DELETED.**

**3.1.11.1. DELETED**

**3.1.11.2. DELETED**

**3.1.12 DELETED**

**3.1.12.1. DELETED**

**3.1.12.2. DELETED**

**3.1.12.3. DELETED**

**3.1.13 DELETED**

**3.1.14 DELETED**

### **3.2. Structures, Systems and Components (SSCs) Important to Unit 1, 2 or 3 Operations**

#### **3.2.1 Structures**

##### **3.2.1.1. Control Room**

The west end of the former Unit 1 Control Room has been incorporated into the Station Control Room primarily utilized for operation of Units 2/3. The east end of the former Unit 1 Control Room is now part of the administrative support area for Units 1, 2 and 3. Unit 1 instrumentation and controls that are still needed have been relocated to the Station Control Room. Previous Unit 1 Control Room support areas are now utilized to support operations for Units 1, 2 and 3. Operation and design of the Control Room is described in the Dresden Unit 2/3 UFSAR and associated documents.

##### **3.2.1.2. Chemical Cleaning Building**

Located within the Chemical Cleaning Building, the Radwaste Receiving Tanks are contained within a Category 1 seismic structure. The tanks are contained within a concrete structure designed to contain contaminated liquids which may spill from the tanks during an earthquake. Because the tanks are located within the seismic portion of the facility, they are not considered when calculating the Dresden Technical Requirements Manual (TRM) above grade liquid radwaste storage limit.

##### **3.2.1.3. DELETED**

## **3.2.2 Systems**

### **3.2.2.1. Emergency Lighting**

Because Reactor operations are no longer conducted for Dresden Unit 1, Emergency Lighting for Safe Shutdown is no longer required.

However, the Unit 1 120V AC Power Distribution System continues to provide charging power for nine Unit 2/3 Safe Shutdown emergency lights. Operation and surveillance of these lighting units are described in the Unit 2/3 UFSAR and associated documents.

### **3.2.2.2. Standby Lighting**

The Unit 2/3 UFSAR describes standby lighting utilized for operation of Unit 2/3. On the loss of normal power some of the standby lighting units located in the Unit 2/3 Control Room are powered from the Unit 1 125V DC Electrical Distribution System.

Operation and surveillance of these lighting units are described in the Unit 2/3 UFSAR and associated documents.

### **3.2.2.3. Control Room Monitoring**

Dresden Unit 1 no longer requires continuous Control Room habitability to assure the safe storage of irradiated fuel. However certain alarms and indications of facility conditions remain functional in the Unit 2/3 Control Room. A description of the habitability systems associated with the Unit 2 and 3 Control Room is provided in the Dresden Unit 2/3 UFSAR and associated documents.

Located on Control Room Panels 901-2, and 901-B1 are controls, recorders and annunciators in operation for some Unit 1 system components.

Station procedures describe actions to be taken in response to Control Room annunciator alarms.

**3.2.2.3.1. Control Room Panel: Unit 1**  
**Identification number: 901-2**

Panel 901-2 is located in the Unit 2/3 Control Room and contains the controls and annunciators for the systems and components remaining in service on Unit 1 that were originally located in the Unit 1 Main Control Room. Panel 901-2 has control switches for the Unit 1 Diesel Fire Pump.

Recorders on the 901-2 Panel include the Contaminated Demineralized Waste Storage Tank and Clean Demineralized Water Storage Tank. Meteorological Tower information is recorded on Panel 901-2.

Alarm annunciators on Panel 901-2 include High and Low Level alarms for the Clean and Contaminated Demineralized Water Storage Tanks.

**3.2.2.3.2. Unit 1 Panel**  
**Identification number: 901-B1**

Panel 901-B1 is located in the Unit 2/3 Control Room and provides remote metering and control of Transformer 12, Transformer 13, Bus 11, Bus 12, Bus 14, Bus 15, Bus 16 and Bus 17.

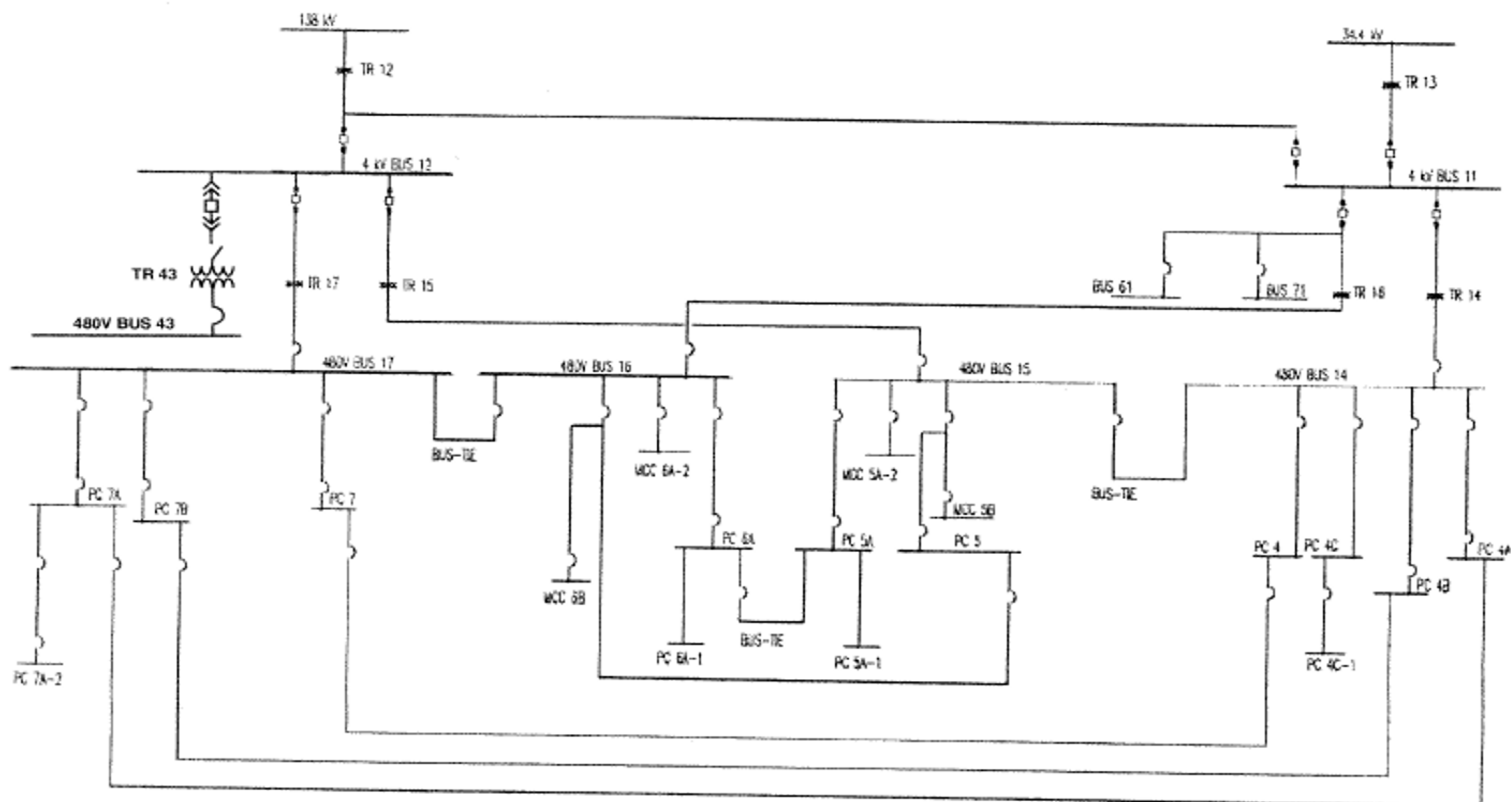
Alarm annunciators on Panel 901-B1 include 125V DC System Trouble, Transformer 12, 13, 14, 15, 16 or 17 Trip Indication and 138KV Bus Differential Relay Trouble.

**3.2.2.3.3. DELETED**

**3.2.2.4. 4KV AC Electrical Distribution System**

The Electrical Distribution System for Dresden Unit 1 is shown in diagram format on Figure 3.3.

Figure 3.3  
Electrical Distribution System



The Unit 1 4KV Power Distribution System is comprised of Transformer 12, Transformer 13, 4KV Bus 11 and 4KV Bus 12. The purpose of the Unit 1 4KV Power Distribution System is to distribute 4KV power to the Unit 1 480V Secondary Unit Substations 14, 15, 16, 17, the Station Blackout Facility and the Unit 2 TB outage Power Bus 43. There are no other loads connected to the Unit 1 4KV Power Distribution System.

#### **3.2.2.4.1. Transformer 12**

The normal source of 4KV power to Unit 1 is Transformer 12. Transformer 12 ratings are 138KV primary voltage, 4.16KV secondary voltage, and 10MVA power output. The primary windings of Transformer 12 are connected to the 138KV Yard via overhead lines. The 138KV Yard is described in the Dresden Unit 2/3 UFSAR and associated documents. The secondary windings of Transformer 12 are connected to Bus 12 through a 2,000 amp bus duct and to Bus 11 through a 1,200 amp bus duct. Transformer 12 is filled with mineral oil to provide electrical insulation and cooling. Local metering of Transformer 12 includes gauges indicating oil level, liquid temperature and gas pressure. Protective functions for Transformer 12 include trip on overcurrent, differential current, ground fault and undervoltage. Operator control switches to remotely open and close circuit breakers on the primary and secondary connections to Transformer 12 are mounted on control panel 901-B1 in the Unit 2/3 Control Room. Visual inspections and oil samples are periodically performed on Transformer 12.

#### **3.2.2.4.2. Transformer 13**

The backup source of 4KV power to Unit 1 is Transformer 13. Transformer 13 ratings are 34.4KV primary voltage, 4.16KV secondary voltage, and 2.5MVA power output. The primary windings of Transformer 13 are connected to the 34.4KV Yard via overhead lines. The 34.4KV Yard is description in the Dresden Unit 2/3 UFSAR and associated documents. The secondary windings of Transformer 13 are connected to Bus 11 through cables. Transformer 13 is filled with mineral oil to provide electrical insulation and cooling. Protective functions for Transformer 13 include trip on overcurrent and ground fault. One operator control switch to remotely open and close the Bus 11 circuit breaker connected to the Transformer 13 secondary circuit breaker 153-1301 is mounted on control panel 901-B1 in the Unit 2/3 Control Room. Visual inspections and oil samples are periodically performed on Transformer 13.

#### **3.2.2.4.3. Bus 11**

The normal source of 4KV power for Bus 11 is Transformer 12. The backup source of 4KV power is Transformer 13. Bus 11 distributes power to the Station Blackout Facility, and 480V secondary unit substations 14 and 16. Metering of Bus 11 includes volts, amps

and watt-hours and are locally mounted at the 4KV switchgear cubicles. Remote metering and 4KV switchgear control for Bus 11 is from Panel 901-B1 in the Unit 2 / 3 Control Room. Protective functions for Bus 11 include overcurrent detection and ground fault detection. One alarm associated with Bus 11 is low bus voltage. This alarm is displayed on an annunciator panel on control panel 901-B1. Periodic visual inspections are performed on Bus 11.

#### **3.2.2.4.4. Bus 12**

The normal source of 4KV power for Bus 12 is Transformer 12. There is no backup source of 4KV power. Bus 12 distributes power to 480V secondary unit substations 15, 17 and to Transformer 43. Metering of Bus 12 includes volts, amps and watt-hours and is locally mounted at the 4KV switchgear cubicles. Remote metering and 4KV switchgear control for Bus 12 is from Panel 901-B1 in the Unit 2 / 3 Control Room. Protective functions for Bus 12 include trip on overcurrent and ground fault. Periodic visual inspections are performed on Bus 12.

#### **3.2.2.5. 480V AC Electrical Distribution System**

The Unit 1 480V power distribution system is comprised of Primary Unit Substations 118 and 119, and Secondary Unit Substations 14, 15, 16, and 17. The primary unit substations feed power to Buses 18 and 19 in the Chemical Cleaning Facility. These buses distribute 480V power to motor control centers and HVAC heating coils. A bus tie circuit breaker can be closed, connecting Buses 18 to 19, to allow maintenance on either primary unit substation without interrupting power to the buses. The secondary unit substations distribute power to 480V motor control centers and 480V panel boards located throughout the Unit 1 facility. Bus tie circuit breakers can be closed, connecting Buses 14 to 15 and 16 to 17, to allow maintenance on either secondary unit substation transformer without interrupting power to the buses. Transformer 43 distributes power to a 480V panel board located on the Unit 2 Turbine Deck (Bus 43).

##### **3.2.2.5.1. Transformers 118 and 119**

Primary Unit Substation Transformers 118 and 119 have ratings of 34.4KV primary voltage, 480V secondary voltage, and 1500 KVA power output. These transformers are filled with silicone oil to provide electrical insulation and cooling. Transformers 118 and 119 are connected to the 34.4KV overhead lines. The secondary windings are connected to Buses 18 and 19 through 3,000 amp bus ducts. Local metering of Transformers 118 and 119 includes gauges indicating oil level, liquid temperature and gas pressure. There is no remote metering or control of Transformers 118 and 119. Periodic visual inspections are performed on Transformers 118 and 119.

#### **3.2.2.5.2. 480V Bus 18**

The normal source of 480V power for Bus 18 is Transformer 118. The backup source of 480V power is Bus 19 through a bus tie circuit breaker. Bus 18 distributes power to 480V motor control centers and electric heating coils for the Chemical Cleaning Facility HVAC system. Metering of Bus 18 includes volts and amps and is located locally at the bus. Protective functions for Bus 18 include trip on overcurrent and ground fault. No alarms are associated with Bus 18. There are no remotely located operator controls for Bus 18. All switchgear breakers can be manually operated at the bus. Periodic visual inspections are performed on Bus 18.

#### **3.2.2.5.3. 480V Bus 19**

The normal source of 480V power for Bus 19 is Transformer 119. The backup source of 480V power is Bus 18 through a bus tie circuit breaker. Bus 19 distributes power to 480V motor control centers and electric heating coils for the Chemical Cleaning Facility HVAC system. Metering of Bus 19 includes volts and amps and is located locally at the bus. Protective functions for Bus 19 include trip on overcurrent and ground fault. No alarms are associated with Bus 19. There are no remotely located operator controls for Bus 19. All switchgear breakers can be manually operated at the bus. Periodic visual inspections are performed on Bus 19.

#### **3.2.2.5.4. Secondary Unit Substations 14, 15, 16, 17 and 43**

Secondary Unit Substation Transformers 14, 15, 16 and 17 have ratings of 4KV primary voltage, 480V secondary voltage, and 750 KVA power output. These transformers are liquid-filled to provide electrical insulation and cooling. Transformers 14 and 16 are connected to Bus 11. The secondary windings are connected to Buses 14 and 16 through copper bus bars. Transformers 15 and 17 are connected to Bus 12. The secondary windings are connected to Buses 15 and 17 through copper bus bars. Local metering of Transformers 14, 15, 16 and 17 includes gauges indicating liquid level, liquid temperature and gas pressure. There is no remote metering of Transformers 14, 15, 16 and 17. Alarms associated with Transformers 14, 15, 16 and 17 monitor the position of the 4KV switchgear breaker feeding the transformer. When the switchgear breaker is open, an alarm is initiated indicating a transformer trip condition. These alarms are displayed on an annunciator panel on control panel 901-B1. Periodic visual inspections are performed on Transformers 14, 15, 16 and 17.

Transformer 43 has a rating of 4KV primary voltage, 480V secondary voltage, and 1000 KVA power output. Transformer 43 is a Vacuum Pressure Impregnated Transformer (VPI) dry-type transformer and is connected to the 4KV Bus 12 with a non-fused load break disconnect switch on the primary side of the transformer. The secondary windings are connected to Bus 43. Local metering of the transformer provides winding



temperature. There is no remote metering or control. Periodic visual inspections are performed on Transformer 43.

#### **3.2.2.5.5. Buses 14, 15, 16, 17 and 43.**

The normal sources of 480V power for Buses 14, 15, 16 and 17 are Transformers 14, 15, 16 and 17 respectively. Each bus can be cross-tied for a backup source of 480V power. Bus 14 can be cross-tied to Bus 15 and Bus 16 can be cross-tied to Bus 17. Buses 14, 15, 16 and 17 distribute power to 480V motor control centers and 480V panel boards. Metering of Buses 14, 15, 16 and 17 include volts and amps. These meters are located on Panel 901-B1 in the Unit 2 / 3 Control Room and locally at the 480V switchgear cubicles. Protective functions for Buses 14, 15, 16 and 17 are integral features of each switchgear breaker and include trip on overcurrent. Alarms associated with Buses 14, 15, 16 and 17 monitor the status of the switchgear breakers feeding motor control centers (with the exception of the switchgear breakers feeding PC 4 and PC 7, Sphere Power Centers). When the switchgear breaker is open, an alarm labeled "Power Center Trip" is initiated. This alarm is displayed on an annunciator panel on control panel 901-B1. Operator controls for Buses 14, 15, 16 and 17 are mounted on control panel 901-B1. Switches are provided to open and close the 480V switchgear breakers. Periodic visual inspections are performed on Buses 14, 15, 16 and 17.

The normal source of 480V Power for Bus 43 is Transformer 43. Bus 43 is a 480V distribution panel located on the Unit 2 Turbine Deck. Metering of Bus 43 includes Volts and Amps and is provided locally at the bus via the main breaker. Protective functions for Bus 43 include trip on overcurrent and ground. No alarms are associated with Bus 43. There are no remotely located operator controls for Bus 43. All distribution panel breakers can be manually operated at the bus. Periodic visual inspections are performed on Bus 43.

#### **3.2.2.5.6. 480V Motor Control Centers**

The normal sources of 480V power for 480V motor control centers located in all areas of Unit 1 except the Chemical Cleaning Facility are Buses 14, 15, 16 and 17. The normal sources of 480V power for 480V motor control centers located in the Chemical Cleaning Facility are Buses 18 and 19. Several motor control centers can be cross-tied to another motor control center for a backup source of 480V power. 480V motor control centers distribute power to various equipment and distribution panels. Metering of 480V motor control centers in the Chemical Cleaning Facility include amps only. These meters are located on the 480V switchgear breaker cubicles. There is no metering of all other 480V motor control centers. Protective functions for 480V motor control centers are integral features of each circuit breaker and include trip on overcurrent. There are no alarms associated with 480V motor control centers. There are no operator controls for 480V motor control centers in the control room. All motor control center breakers can be manually operated at the bus. Periodic visual inspections are performed on 480V motor control centers.

#### **3.2.2.5.7. 480V Panel Boards**

The normal sources of 480V power for 480V panel boards are 480V motor control centers. 480V panel boards distribute power to various equipment. There is no metering of 480V panel boards. Protective functions for 480V panel boards are integral features of each circuit breaker and include trip on overcurrent. There are no alarms associated with 480V panel boards. There are no operator controls for 480V panel boards in the control room. All panel board breakers can be manually operated at the bus. Periodic visual inspections are performed on 480V panel boards.

#### **3.2.2.5.8. 480V Power Center 4B**

Unit 1 480V Power Center 4B supplies electrical loads including a step down transformer which supplies components within the Station 138KV Switchyard. Components within the Station 138KV Switchyard include air compressors that supply the mechanical force to close 138KV line circuit breakers.

#### **3.2.2.6. 120V AC Distribution System**

The Unit 1 120V AC Distribution System is comprised of transformers and distribution panels. The transformers are rated 480V - 208/120V, three phase, and range in power output from 3KVA to 112.5KVA. The power source for the transformers are 480V motor control centers. The distribution panels supply power to the Unit 1 facility for lights, receptacles, small motors, heat trace cables, and other miscellaneous equipment. The Unit 1 120V AC Safety System Power Distribution System is retired. The normal sources of power for 120V distribution panels are distribution transformers, 480V - 208/120V, powered by 480V motor control centers. 120V distribution panels distribute power to various equipment. There is no metering of 120V distribution panels. Protective functions for 120V distribution panels are integral features of each circuit breaker and include trip on overcurrent. There are no alarms associated with 120V distribution panels. There are no operator controls for 120V distribution panels in the Unit 2/3 Control Room. All distribution panel breakers can be manually operated at the panel. Periodic visual inspections are performed on 120V distribution panels.

#### **3.2.2.7. 125V DC Distribution System**

The Unit 1 125V DC Distribution System is comprised of two motor-generator sets, 125V DC batteries and distribution panels. The motor-generator sets provide normal power to 125V DC loads and charging current to the batteries. In the event of a loss of AC power, the batteries will supply power to the 125V DC distribution panels. The purpose of the 125V DC Distribution System is to supply reliable power to critical loads on Unit 2 including the 138KV Switchyard control power and trip power.

#### **3.2.2.7.1. 125V DC Motor-Generator Sets**

The motor-generator sets are rated 480V input, 125V DC output, and power output of 15KW. The power source for the motor-generator sets are 480V motor control centers. One motor-generator set has the capacity to supply 100% of the demand for 125V DC power. The second motor-generator functions as a redundant backup for improved reliability. Normal operation has one motor-generator set running while the other is in standby mode. Metering of the motor-generator sets include an ammeter monitoring the output. Protective functions for the motor-generator sets are provided by the motor control center and 125V DC distribution panel circuit breakers and include trip on overcurrent. There are no alarms associated with the motor-generator sets. A ground detector relay is mounted locally and indicates presence of grounds in the system. There are no operator controls for the motor-generator sets in the control room. A locally mounted rheostat allows manual adjustment of the field excitation. Varying the field excitation varies the voltage output of the generator. Periodic visual inspections are performed on the motor-generator sets.

#### **3.2.2.7.2. 125V DC Batteries**

The 125V DC batteries are sized to provide power to critical loads in the event of loss of AC power. Metering of the 125V DC batteries include an ammeter monitoring the output. Protective functions for the 125V DC batteries are provided by the distribution panel circuit breakers and include trip on overcurrent. An alarm associated with the 125V DC batteries monitors system voltage and trips on undervoltage. This alarm is displayed on an annunciator panel on control panel 901-B1 in the control room. There are no operator controls for the 125V DC batteries. Periodic visual inspections and discharge tests are performed on the 125V DC batteries.

#### **3.2.2.7.3. 125V DC Distribution Panels**

There are four 125V DC distribution panels identified as buses. The normal supplies to Bus 1 and Bus 2 are the motor-generator sets. The backup supply is the battery system. Bus 3 and Bus 4 are powered by Bus 1 and Bus 2 respectively. Metering of the 125V DC distribution panels include a voltmeter monitoring bus voltage. Protective functions for 125V DC distribution panels are integral features of each circuit breaker and include trip on overcurrent. An alarm is initiated when 125V DC circuit breakers are in an abnormal state. This alarm is displayed on an annunciator panel on control panel 901-B1 in the control room. There are no operator controls for 125V DC distribution panels in the control room. All distribution panel breakers can be manually operated at the bus. Periodic visual inspections are performed on 125V DC distribution panels.

### **3.2.2.8. Fire Protection System**

Dresden Unit 1 shares its Fire Protection system and program with Dresden Units 2 and 3. The site Fire Protection system and program are described in the Dresden Units 2/3 UFSAR and associated documents.

#### **3.2.2.8.1. Fire Protection Water Supply System**

Dresden Unit 1 shares a common Fire Protection Water Supply System with Dresden Units 2/3. The description of the Fire Protection Water Supply System applicable to Dresden Units 2/3 is described in the Dresden Units 2/3 UFSAR and associated documents included by reference. The description contained herein describes the function and interfaces for the original Unit 1 portion of the Fire Protection Water Supply System. The Fire Protection Water Supply System supplies fire hydrants, standpipes, hose stations, sprinkler systems and water spray systems located in Dresden Unit 1. The Fire Protection Water Supply System is capable of supplying the anticipated largest single fire flow, including hose stream demands.

The Fire Protection Water Supply System can be supplied from either the Unit 1 Intake Canal or Unit 2/3 Intake Canal. The Unit 2/3 Service Water Pumps and Unit 2/3 Fire Pump take suction from the Unit 2/3 Intake Canal. The Unit 1 Screen Wash Pump and Unit 1 Fire Pump take suction from the Unit 1 Intake Canal. Normal system makeup and pressurization is provided from a connection to the Unit 2/3 Service Water System. The Unit 1 Screenwash system can also be manually started to maintain system pressure. The Unit 2/3 Service Water or Unit 1 Screen Wash Systems can supply small system demands such as system leakage or planned testing. The Unit 1 Fire Pump or Unit 2/3 Fire Pumps are used to supply larger system demands. Either fire pump is capable of supplying the largest single fire flow demand.

The Fire Protection Water Supply System can be utilized to provide makeup to the Unit 2/3 Isolation Condensers.

The Dresden Technical Requirements Manual (TRM) and associated surveillance procedures ensure operability of the Fire Protection Water Supply System.

##### **3.2.2.8.1.1. Fire Mains**

An underground yard Fire Main piping system is provided to supply outside fire hydrants and interior building fire main piping. The yard main is configured in a loop which extends around the Turbine and Reactor Buildings for Units 1, 2 and 3. Feed mains connected to the underground loop supply interior building loops or fire systems. The interior piping loop within the Unit 1 Turbine Building can be fed from multiple feed mains connected to the underground yard main piping. The piping loop within the Unit 1 Turbine Building feeds a majority of the Unit 1 standpipes, hose stations, sprinkler

systems and water spray systems. The piping loop within the Unit 1 Turbine Building is connected to the piping loop within the Unit 2/3 Turbine Building.

Fire hydrants installed on the yard Fire Main loop provide a means for applying effective fire hose lines throughout the plant for use by the fire brigade. Each hydrant outlet is provided with hose threads compatible with those used by the local fire departments in the event of the need for outside assistance. The piping system is provided with valves to facilitate the isolation of portions of the systems for maintenance or repairs without interrupting the supply to remainder of the system. Control valves on the system are administratively controlled.

Fire protection system piping is not designed as a Seismic Category 1 system.

Fire protection system supply piping is maintained pressurized. This system pressure mitigates the effects of water hammer when a fire pump(s) is started. Makeup pressure from the Unit 2/3 Service Water System or Unit 1 Screen Wash System is below the pressure rating of the system piping. Pressure relief valves are installed on the supply connections from the Unit 2/3 or Unit 1 Fire Pump to prevent exceeding the pressure rating of the Fire Protection Water Supply System piping.

Station procedures are provided for the periodic flushing of the piping systems as well as systematic operation and surveillance of valves and hydrants.

#### **3.2.2.8.2. Fire Pump**

Dresden Station maintains two redundant 100% capacity fire pumps, Dresden Unit 1 Fire Pump and Dresden Unit 2/3 Fire Pump.

The Unit 1 Fire Pump is located on the 508'-6" elevation of the Unit 1 Cribhouse. The fire pump draws suction from the Unit 1 Intake Canal. The Unit 1 Intake Canal contains a limitless supply of water from the Kankakee River. A strainer is attached to the base of the fire pump to prevent large diameter foreign material from entering the Fire Protection Water Supply System. To prevent zebra mussel infestation of the Fire Protection Water Supply System chemicals are added to the Unit 1 Intake Canal.

The Unit 1 Fire Pump is a vertical turbine type centrifugal pump. The Unit 1 Fire Pump is powered from a diesel engine driver through a right-angle gear drive.

The Unit 1 Fire Pump is capable of supplying the largest anticipated system demand. During low or shutoff head conditions, a pressure relief valve downstream of the fire pump discharge prevents exceeding the pressure rating of the Fire Protection Water Supply System piping.

Periodic surveillances are performed to ensure operability of the Unit 1 Fire Pump and associated components. The surveillances include an annual capacity test.

#### **3.2.2.8.2.1. Fire Pump Diesel Engine**

The Unit 1 Fire Pump is powered from a diesel engine. The diesel engine is supplied from a diesel fuel day tank located adjacent to the engine. Two sets of starting batteries are located adjacent to the diesel engine. The heat exchanger installed on the diesel engine is supplied with cooling water from a line downstream of the fire pump discharge. The diesel engine intakes air from the Cribhouse. The exhaust line from the engine discharges outside of the Cribhouse. Operation and monitoring of the diesel engine is controlled through a local control panel. The diesel engine will shut down on overspeed. The Unit 1 Cribhouse is a heated structure. Additionally, the diesel engine has a water jacket heater installed to keep the engine warm.

##### **3.2.2.8.2.1.1. Diesel Fuel Supply**

The Fuel Oil System for Unit 1 remains in service to supply the Unit 1 Fire Pump Diesel Day Tank. Fuel to the fire pump is supplied via gravity feed from a diesel day tank with an 8 hour fuel supply. The diesel day tank is equipped with a low level alarm.

##### **3.2.2.8.2.2. Fire Pump Controller**

Operation of the Fire Pump Diesel Engine is controlled from a local controller located adjacent to the engine in the Unit 1 Cribhouse. The controller is powered from the Unit 1 120V AC Electrical Distribution System.

The control panel will send a start signal to the engine on low Fire Protection Water Supply System header pressure or power failure.

The Fire Pump can also be started manually at the Controller or from Control Room Panel 901-2.

The Controller provides indication of the following:

- Low oil pressure.
- High water temperature.
- Low fuel level.
- Overspeed.
- Battery failure.
- Failure to start.

The Controller provides common trouble alarm in the Control Room through the Station Fire Alarm Computer. The Fire Protection Water Supply System pressure is recorded independent of the Unit 1 Fire Pump Controller on the Control Room 923-1 panel.

### **3.2.2.8.3. Fire Suppression Systems**

Fire protection services are provided by a pressurized water system serving most areas throughout the buildings and grounds, and portable extinguishers at strategic locations. The site common Fire Protection Water Supply System is interconnected between Units 1, 2 and 3.

There are no active fire suppression systems within the Sphere. Manual fire protection equipment consists of fire extinguishers that are surveyed on a regular basis.

#### **3.2.2.8.3.1. Hose Stations and Standpipes**

Hose stations and standpipes provide manual fire fighting capability for Unit 1 areas important for Unit 2/3 operations. All hose stations are supplied from the station Fire Protection Water Supply System. Hose stations are equipped with fire hose for use by the station personnel or the Fire Brigade. Standpipes are provided for use by the Station Fire Brigade.

Six Unit 1 hose stations in the Turbine Building and adjacent to Units 2 and 3 are available for fire fighting purposes. The Turbine Building hose stations would be used to prevent a fire from spreading from Unit 1 to Units 2/3.

Station procedures are provided for the periodic surveillance of hose stations and standpipe systems.

#### **3.2.2.8.3.2. Water Spray and Sprinkler Systems**

Two water spray systems in the Unit 1 Turbine Building and one sprinkler system in the Cribhouse provide automatic fire fighting capability for Unit 1 areas important to Unit 2/3 operations. All Unit 1 sprinkler systems are supplied from the station Fire Protection Water Supply System.

The Unit 1 West Auxiliary Bay is located on the ground floor (elevation 517'-6") of the Unit 1 Turbine Building. This area contains a large quantity of electrical cables with combustible insulation. The cables are typically arranged in cable trays located below the ceiling elevation. The water spray systems installed in this area provide coverage for the cable trays. The wet pipe water spray systems will mitigate the consequences of a fire in

the West Auxiliary Bay from affecting the adjacent Unit 2 Turbine Building and Control Room.

The Unit 1 Fire Pump and associated Engine, Batteries, Controller and Diesel Day Tank are located on the 508'-6" elevation of the Unit 1 Cribhouse. A wet pipe sprinkler system is installed at the ceiling elevation of the room containing the Unit 1 Fire Pump and associated equipment. The sprinkler system will mitigate consequences of a fire in the Unit 1 Fire Pump area.

Station procedures are provided for the periodic surveillance of the sprinkler and water spray systems.

#### **3.2.2.8.4. Fire Barriers**

Fire barriers separate the Unit 1 Turbine Building 517'-6" elevation from the adjacent Units 2/3 Turbine Building areas. Fire dampers are provided for areas within the Control Room.

Fire barriers are designed and installed to prevent the spread of fire within the plant. The Control Room and Auxiliary Electric Equipment Room are separated from Unit 1 areas by three-hour fire rated assemblies. Penetrations in these fire barriers have a three-hour fire rating. Structural steel supporting the floor of the Control Room within the Unit 1 Turbine Building has been protected to provide a three-hour fire rating.

Fire dampers are designed and installed to prevent the spread of fire within the plant. There are three fire dampers separating the Control Room from adjacent support rooms.

Fire rated assemblies required for safe shutdown of Units 2/3 or separating safety-related areas of Units 2/3 are administratively controlled through the TRMs and associated surveillance procedures.

The U1 Turbine Building wall adjacent to TR-12 is maintained as a 2-hr. fire barrier for lost control purposes only.

#### **3.2.2.9. Environmental Monitoring**

Environmental monitoring for Dresden Unit 1 is described and controlled through the Off-Site Dose Calculation Manual (ODCM).

##### **3.2.2.9.1. DELETED**



### **3.2.2.9.2. Environmental Monitoring Stations**

Environmental and meteorological monitoring systems are provided at Dresden Station. Environs Monitoring Station Number 2 is powered from the Unit 1 480V AC Electrical Distribution System.

### **3.2.2.9.3. Unit 1 Chimney**

A reinforced concrete Chimney is located north of the Turbine Building. The Chimney, which is approximately 300 feet tall, provides an elevated release path for gaseous effluents.

Discharge through the Chimney originates from the following source:

Unit 1 Gaseous Monitoring System with input from the Fuel Building.

### **3.2.2.9.4. Chimney Effluent Monitoring System**

The Chimney Effluent Monitoring System consists of the Chimney Particulate Air Sampler.

#### **3.2.2.9.4.1. DELETED**

#### **3.2.2.9.4.2. Chimney Air Sampler**

The Chimney Air Sampler provides a means for obtaining particulate and iodine samples from the Chimney. The Chimney Air Sampler consists of a sample line and pump connected to the Chimney. The system is utilized to collect iodine and particulate samples. The backup air sampler is powered from the Unit 1 120V AC Electrical Distribution System.

### **3.2.2.9.5. Gaseous Monitoring System**

The Gaseous Monitoring System was designed to provide a monitor release path for areas having the potential for significant radioactive release. Ventilation exhaust from the Fuel Building Ventilation System is the only remaining source of input into the system.

Two redundant Exhaust Fans are provided for the system (OV1 and OV2). The Exhaust Fans discharge through a ventilation duct into the Chimney. An exhaust fan and control damper provide for a system flowrate of approximately 29,700 cubic feet per minute. System flow is maintained constant by a flow controller that monitors flow and adjusts the position of the system flow control dampers. This assures that the flow rate remains constant. Because of the low volume of exhaust being discharged into the system through the Fuel Building Ventilation System, a majority of the system flow is provided from outside air through the control dampers.

Exhaust fans for the Fuel Building Ventilation System is interlocked to prevent them from being operated independent of the Gaseous Monitoring System Exhaust Fans.

The Gaseous Monitoring System Exhaust Fans are powered from the Unit 2/3 480V AC Electrical Distribution System. The control switches for the fans are located in the Unit 1 Turbine Building South Auxiliary Bay.

The Gaseous Monitoring System is not required to be operational if the Fuel Building Ventilation System is not operating.

#### **3.2.2.9.6. Ventilation System: Chemical Cleaning Building**

Exhausts from the Chemical Cleaning Building ventilation system are discharged through a HEPA filter prior to release through a common Chimney shared with the Interim Radwaste Storage Facility (IRSF) Ventilation System. An effluent monitoring system with sample lines and a pump connected to the Chimney provides for radioactive effluent monitoring of the IRSF ventilation.

#### **3.2.2.10. General Station Emergency Plan Equipment**

The Generating Stations Emergency Plan (GSEP) describes the organization response to emergency conditions which could occur at Dresden Unit 1. The Dresden Annex to the GSEP describes events and conditions that could result in activation of the Emergency Plan at the Station. The extended period since Unit 1 was last operated has resulted in a reduction in possible accidents which could result in an emergency declaration.

Some of the sirens utilized to notify personnel of GSEP conditions are powered from the Unit 1 480V AC or 125V DC Electrical Distribution Systems.

Additional details regarding the Station / Unit response to emergency conditions is described in the GSEP.

#### **3.2.2.11. Unit Service/Instrument Air Systems**

The Unit 1 Service Air Compressor provides the normal supply of air to the Unit 1 Service and Instrument Air Systems. Unit 1 Service Air can be supplied through a normally isolated connection between the Unit 1 and Unit 2 Service Air Systems. When Unit 1 Service Air is cross-tied to Unit 2 Service Air through this connection, a pressure control valve in the line automatically closes when Unit 1 Service Air pressure falls to approximately 74 psig, isolating the systems from each other. This prevents an incident in the Unit 1 air systems from adversely affecting the Unit 2 Service Air system.

### **3.2.3 Components**

#### **3.2.3.1. Clean Demineralizer Tank**

Clean demineralized water is stored in the Unit 1 Clean Demineralized Water Storage Tank, T-105B. The tank supplies clean demineralized water to a number of Unit 1, 2 and 3 functions. The Unit 2/3 Clean Demineralized Water System is described in the Unit 2/3 UFSAR.

The 200,000 gallon capacity tank is located in the yard area south west of the Unit 1 Turbine Building. Space heaters and heat tracing are installed to protect piping connections within a weather-resistant enclosure adjoining the tank. Heaters within the tanks are supplied from the Unit 1 480V AC Electrical Power Distribution System. The tank is constructed of aluminum and is approximately 35 feet in diameter and 30 feet in height. The tank is open to the atmosphere through a vent. Tank level information is provided in the Dresden Units 2/3 Control Room as continuous proportional indication with high and low level alarms. Operating procedures specify actions to be taken in response to the annunciator alarms. The Clean Demineralizer Water Tank is also monitored during operator rounds.

#### **3.2.3.2. Contaminated Demineralizer Tank**

The Contaminated Demineralizer Tank (T-105A) has a capacity of 200,000 gallons and is located in the yard area Southwest of the Unit 1 Turbine Building. Space heaters and heat tracing are installed to protect piping connections within weather resistant enclosures adjoining the tank. Heaters within the tanks are supplied from the Unit 1 480V AC Electrical Power Distribution system. The tank is constructed of aluminum and is approximately 35 feet in diameter and 30 feet in height. The tank is open to the atmosphere through a vent. Tank level information is provided in the Dresden Units 2/3 Control Room as continuous proportional indication with high and low level alarms.

The T-105A tank provides additional storage capability for the Unit 2/3 Contaminated Demineralized Water System. The T-105A tank is connected to the Units 2 and 3 A and B Contaminated Demineralized Water Storage Tanks through a 24 inch diameter line and a cross-tie isolation valve. The Unit 2/3 Contaminated Demineralized Water System is described in the Unit 2/3 UFSAR and associated documents.

The T-105A tank can be credited as a source of water to achieve Unit 2/3 safe shutdown depending on the Unit 2/3 Contaminated Demin Tank water volume. The stored volume of the T-105A tank is administratively controlled by the Dresden Technical Requirements Manual.

### **3.3. Balance of Unit 1 Structures, Systems and Components**

Section 3.3 of the DSAR is provided for completeness only.

Structures, systems and components (SSCs) discussed in this section do not impact nuclear safety, are not required to support the safe storage and handling of irradiated fuel, and have no impact on the capability of Unit 2/3 to generate electricity and supply it to the grid.

#### **3.3.1 Structures**

##### **3.3.1.1. Access Control / Administration Buildings**

Entrance to the plant is via the Main Access Facility (MAF), which is south and slightly west of the Sphere. This is a station structure shared by Units 1, 2 & 3. To the west of the MAF is the Administration Center. This is a station structure shared by Units 1, 2 & 3.

##### **3.3.1.2. Sphere (Reactor Building)**

The Sphere (Reactor Building) is located to the east of the Turbine Building and north of the Fuel Storage Building. The Sphere and associated SSCs are not required to support the permanently shutdown and defueled mode of operation and are not described in the DSAR.

##### **3.3.1.3. Maintenance Shops**

The Maintenance Shops are located west of the Fuel Storage Building. These are station structures shared by Units 1, 2 & 3.

##### **3.3.1.4. Cribhouse**

The Cribhouse is located northwest of the Sphere and Turbine Building. This building houses the Unit 1 Fire Pump, Screenwash Pump and associated components. The Unit 1 Circulating Water and Service Water Pumps housed within the Cribhouse are not required to support the permanently shutdown and defueled mode of operation and are not described in the DSAR.

##### **3.3.1.5. Fuel Building**

The Fuel Building structure and foundations perform the following functions:

- Provides an enclosure to control of radioactive contamination and radioactive gaseous effluents;
- Provides a weather resistant enclosure for housing systems and components including the Fuel Storage Pool and Fuel Transfer Pool;

- Provides structural support for systems and components including the Fuel Building Overhead Crane, and Fuel Grapple Crane and portions of the Cask Handling Crane (CHC) Runway Girders;
- Provides a physical barrier to prevent unauthorized entry.

The Fuel Building is constructed as a single-story structural steel braced-frame with roof trusses on columns, which rest on concrete footings. The Fuel Building has a built-up roof system. Exterior walls consist primarily of reinforced concrete or corrugated cement asbestos siding supported by steel framing. The Fuel Building is not an airtight structure and is not designed to maintain a negative pressure throughout.

The Fuel Building roof was designed for a live load of 25 lbs/ft<sup>2</sup>. A majority of the Fuel Building floor areas were designed for a live load of 600 lbs/ft<sup>2</sup>. The design for all beams and girders includes a concentrated load of 3,000 lbs. in addition to live and dead loads. Lateral design loads are 25 lbs/ft<sup>2</sup> for wind and 3.3% (dead load and 1/2 live load) for seismic. All footings are carried to solid rock with a carrying capacity of 25 tons per ft<sup>2</sup>.

Fuel Building structural steel was designed in accordance with AISC Code 1949. Fuel Building concrete was designed to ACI Code 1951. The Uniform Building Code 1955 was used as a general guide, where applicable.

The Fuel Building structure and foundations were designed to support the following cranes and associated loads:

- 75 ton Fuel Building Overhead Crane (usually called Cyclops crane) with a 10 ton auxiliary hoist.
- 1 ton New Fuel Storage Vault Crane.
- 130 ton Cask Handling Crane (CHC is not supported from the Fuel Building structure, but is partially founded on the Fuel Storage and Transfer Pool walls.)

Administrative procedures preclude using the Fuel Building Cranes below a predetermined temperature limit. The administrative temperature limit is above the nil ductility transition temperature for the structural steel.

Ventilation from the Fuel Building exhausts through the Unit 1 Chimney.

Periodic monitoring of the Fuel Building structural integrity is performed through station procedures.

### **3.3.1.6. Station Blackout Building**

The Unit 1 HPCI Building was under construction at the time of Unit 1 shutdown and was not placed in service. This structure is currently utilized as the Unit 2/3 Station Blackout Building.

## **3.3.2 Systems and Components**

### **3.3.2.1. Turbine Building Crane**

The Turbine Building Crane is not required to support the permanently shutdown and defueled mode of operation and is not described in the DSAR.

### **3.3.2.2. Well Water**

The Unit 1 Well Water System is not required to support the permanently shutdown and defueled mode of operation and is not described in the DSAR.

### **3.3.2.3. Clean Demin**

Unit 1 Clean Demin is not normally in service. It remains available in the Turbine and Fuel Buildings for future decontamination and clean up work.

### **3.3.2.4. Ventilation System: Fuel Building**

The Unit 1 Fuel Building Ventilation System is designed and installed to reduce the potential for unmonitored release of radioactive contamination. The Unit 1 Fuel Building is not designed or constructed to maintain a negative pressure throughout. However, the ventilation system is configured with an exhaust flow rate that exceeds the supply fan flow rate.

Controls and indication for the ventilation system are mounted on a local panel within the Fuel Building. Fuel Building HVAC fans are powered from the 480V AC Electrical Distribution System.

#### **3.3.2.4.1. Supply Fan: Fuel Building**

Outside makeup air for the Fuel Building is provided through the Supply Fan, K-129. The Supply Fan takes suction from an opening in the south wall of the Fuel Building. A motor operated damper opens when the system is operated and closes when the system is shut down.

The Supply Fan is powered from a variable speed motor. The Supply Fan flow rate is approximately 1,500 cubic feet per minute lower than the K-160 Exhaust Fan flow rate. This flow rate differential is established through ventilation system controls which monitor both the Exhaust Fan and Supply Fan flow rates and adjust the Supply Fan motor

speed accordingly. The Supply Fan can not be operated independent of the K-160 Exhaust Fan.

A steam heating coil is installed within the supply ductwork. The steam heating coil is utilized to warm outside air entering the building during cold weather conditions. A temperature sensor located downstream of the heating coil is interlocked with the Supply Fan. The interlock will prevent operation of the Supply Fan below the low temperature set point to prevent the heating coil from freezing.

#### **3.3.2.4.2. Exhaust Fans: Fuel Building**

One Exhaust Fan (K-160 ) is provided for the Fuel Building.

The K-160 Exhaust Fan provides primary exhaust flow from the Fuel Building. Suction for the Exhaust Fan is provided through a penetration in the ceiling of the Fuel Building. A motor operated damper opens when the system is operated and closes when the system is shut down. The Exhaust Fan is powered by a two-speed electric motor. The Exhaust Fan can produce flow at approximately 4,000 cubic feet per minute (CFM) or 8,000 CFM. The lower flow rate is typically utilized during the winter and the higher flowrate during the summer.

The K-129 Supply Fan is interlocked with the K-160 Exhaust Fan. The interlock prevents the Supply Fan from operating independent of the Exhaust Fan.

The K-160 Exhaust Fan discharges through a common HEPA filter into the Unit 1 Gaseous Monitoring System ductwork which discharges through the Unit 1 Chimney. Interlocks allow the Fuel Building Exhaust Fan to operate only when a Gaseous Monitoring System Exhaust Fan is operating. These Interlocks ensure that exhaust flows from the Fuel Building are discharged through the Unit 1 Chimney.

#### **3.3.2.5. Circulating Water**

The Unit 1 Circulating Water discharge line was isolated from the Illinois River near the Unit 1 Turbine Building penetration. Isolation of the discharge line was accomplished by the installation of a concrete plug poured in place within the discharge line. Installation of the plug was to reduce the risk of flooding the Unit 1 Turbine Building.

#### **3.3.2.6. Radwaste Drains**

The Radwaste Basement, Radwaste Tunnel, Chemical Cleaning Tunnel, Chemical Cleaning Building Sumps and the Sphere Drain Tanks remain in service. The associated drain systems have been modified so that water collected/drained in the sumps and Sphere Drain Tanks is pumped to the Unit 1 Turbine Building Drain Tank instead of their original collection Tanks. From the Unit 1 Turbine Building Drain Tank the water is transferred to Unit 2/3 Radwaste for processing.

### **3.3.2.7. Fuel Building Cranes**

The Fuel Building Overhead Crane, and Cask Handling Crane allow for the handling of heavy loads within the Fuel Building.

#### **3.3.2.7.1. Fuel Building Overhead Crane**

The Fuel Building Overhead Crane is utilized for moving equipment and components, including heavy loads within the Fuel Building.

The Overhead Crane Bridge spans the Fuel Building in the east west direction. The crane rails which span the Fuel Building in the north south direction support the Bridge. The crane rails are supported by the Fuel Building structural steel.

The Fuel Building Crane consists of:

- Trolley.
- Main Hoist.
- Auxiliary Hoist.
- Bridge.

Controls for the hoists, bridge, trolley, air system and power are pendent mounted.

The Trolley carries the crane bridge and all hoisting equipment. The Trolley is powered from a variable speed electric motor. The Trolley has a maximum speed of about 50 feet per minute. The Trolley Brake is released upon application of power to the Trolley Motor. The Trolley carries a set of collectors on each side for picking up power and controlling current from conductors along the bridge beams.

The Main Hoist is powered from a variable speed electric motor. The maximum lifting and lowering capacity of the hoist and associated hook is about 75 tons at 5.16 feet per minute. The Main Hoist Brake is released upon application of power to the Main Hoist Motor.

The Auxiliary Hoist is powered from a variable speed electric motor. The maximum lifting and lowering capacity of the hoist and associated hook is about 10 tons at 25.7 feet per minute. The Auxiliary Hoist Brake is released upon application of power to the Auxiliary Hoist Motor.

The Bridge is powered from a variable speed electric motor. The Bridge has a maximum speed of about 112 feet per minute. The Bridge is equipped with a brake.

The Fuel Building Overhead Crane is powered from the 480V AC Electrical Distribution System. Electrical components within the Fuel Building Overhead Crane transform the 480 V AC power into the appropriate AC or DC power voltage required by individual components.



Administrative procedures preclude using the Fuel Building Overhead Cranes below a predetermined temperature limit. The administrative temperature limit is above the nil ductility transition temperature for the structural steel.

### **3.3.2.7.2. Cask Handling Crane**

The Cask Handling Crane support system is founded on the existing fuel pool walls and new reinforced concrete piers. The crane support system is completely independent of the existing superstructure of the Unit 1 Fuel Building. The crane is a gantry type crane having 2 vertical legs and a horizontal hoist support frame which spans between them. The crane trolley is fixed in the east-west direction. The crane bridge travels north-south on the two rail girders between the Transfer Pool and Cask Work Area.

The crane and its support system have also been designed for seismic loading pursuant to NUREG 0554. The design for the seismic event comparable to the Safe Shutdown Earthquake (SSE) is in accordance with Regulatory Guide 1.60, 1.61, and 1.92 for the ground response spectra curves, structural and equipment damping values, and dynamic analysis of equipment respectively. The seismic spectra used for the analysis are equivalent to those used for the Unit 2/3 SSE. The crane lower block is specifically designed for transferring the Holtec HI-STAR 100 and HI-TRAC 100 casks, and the Transnuclear TN-9 cask. The rated load of the crane is 130 tons.

The crane bridge and hoist motions are controlled from the operating floor of the Unit 1 Fuel Building via a hardwired pendant type controller with a retractable cable reel. Emergency stop pushbuttons are located at either end of the west runway girder. The CHC provides the means for lifting the HI-STAR 100 casks in accordance with NUREG 0612. The CHC lower block (yoke) assembly will engage a HI-STAR 100 cask by the two upper trunnions using two lifting eye hooks which are an integral part of the lower block. The hooks will be pneumatically operated and have mechanical cam locking devices to ensure positive engagement of the cask.

The “eXtra Safety and Monitoring” (X-SAM) system on the CHC is enhanced from typical cranes by the addition of several additional safety features and redundancies. Some examples are:

- Energy Absorbing Impact Limiter
- Emergency Drum Brake System
- Failure Detection System Redundant Upper Limits
- Overload Sensing and Indication
- Dual Reeving (Double Hoist Cable)
- Hydraulic Load Equalization

The features above have been determined by the NRC to meet the requirements of NUREG-0554, Single-Failure-Proof Crane for Nuclear Power Plants, which is a means of

satisfying heavy load lifting requirements of NUREG-0612, Control of Heavy Loads at Nuclear Power Plants.

The crane is powered off of Unit 1 480VAC MCC 6A2. In the event of a control malfunction or loss of power the crane hoist up and down and bridge motion can be manually operated.

**3.3.2.8. DELETED**

**3.3.2.9. DELETED**

**3.3.2.10. DELETED**

**3.3.2.11. DELETED**

**3.3.2.12. DELETED**

**3.3.2.13. DELETED**

**3.3.2.14. DELETED**

## **4. Operations**

### **4.1. Operation Description**

#### **4.1.1 Control Room Area**

The Dresden Unit 1 facility no longer includes a distinct control room area. Instrumentation and Controls, including alarms, which remain functional have been incorporated into the Units 2 and 3 Control Room. The Units 2/3 Technical Specifications provide assurance that this area is appropriately staffed. For additional information see the Dresden Units 2 and 3 Updated Final Safety Analysis Report and Technical Specifications.

#### **4.1.2 Maintenance Activities**

There is no spent fuel stored within the Unit 1 Spent Fuel Pools. Therefore, Maintenance Activities per 10CFR50.65 (Maintenance Rule) are no longer required to support the permanently shutdown and defueled mode of operations, and are not described in the DSAR.

#### **4.1.3 DELETED**

#### **4.1.4 DELETED**

### **4.2. Generation Station Emergency Plan**

The Generating Station Emergency Plan (GSEP) specifies actions to be taken in the event of radiological accidents.

#### **4.2.1 DELETED**

#### **4.2.2 DELETED**

**4.2.2.1. DELETED**

**4.2.2.2. DELETED**

**4.2.2.3. DELETED**

## **5. Radiation Protection**

### **5.1. Liquid Waste Treatment and Retention**

Processing of Unit 1 radwaste is presently being conducted at the Unit 2/3 Radwaste Facility or by Portable Waste Treatment Systems as described in the Dresden Station Process Control Program (PCP).

Unit 1 Radwaste System filters and demineralizers are no longer in operation.

Unit 1 Radwaste Systems are now used only to collect and store potentially contaminated water until it can be treated by the Unit 2/3 Radwaste Systems or by Portable Waste Treatment Systems as described in the Dresden Station Process Control Program (PCP).

### **5.2. Solid Wastes**

Solid wastes generated at Dresden Unit 1 are processed utilizing the procedures and equipment that are associated with Dresden Units 2 and 3. Additional information regarding the way these wastes are handled are described in the Dresden Units 2 and 3 Updated Final Safety Analysis Report.

### **5.3. Process and Effluent Monitoring Systems**

Releases from Dresden Unit 1 are processed utilizing the procedures and equipment that are associated with Dresden Units 2 and 3. Additional information regarding the way releases are processed is described in the Dresden Units 2 and 3 Updated Final Safety Analysis Report.

Gaseous discharge from the Chemical Cleaning Facility is continuously sampled through a particulate filter and iodine cartridge.

#### **5.4. Radiation Protection Program**

Dresden Station has a Site Radiation Protection Program described in the Dresden Unit 2 and 3 Updated Final Safety Analysis Report. The Radiation Protection Program addresses the following subjects:

- Analytical Procedures.
- Calibration and Maintenance.
- Radiation Protection Design Features.
  - Access Control.
- Specifications.
  - Radiological Surveys.
- Equipment, Instrumentation and Facilities.
  - Radiation Protection Facilities.
  - Decontamination and Change Room Facilities.
  - Laboratories.
- Radiation Protection Instrumentation.
  - Portable Instrumentation.
  - Design Basis.
  - Description.
  - Inspection and Testing.
- Personnel Protective Equipment.
- Procedures.
  - Control of Personnel Radiation Exposure.
- Personnel Dosimetry.
  - Personnel Monitoring.
- Radioactive Materials Safety.
  - Policy Considerations.
  - Management Policy.
  - Organizational Structure.
  - Design Considerations.
  - Operational Considerations.
  - Collective Dose Assessment.

## 6. Accident Analysis

In order to demonstrate the safety of Unit 1 in its current and future SAFSTOR states, accident analyses have been performed. These analyses, in part, provide bases for the configuration of systems, components, and structures, and implementation of administrative and procedural controls.

Although spent fuel has been completely removed from storage in the Unit 1 Fuel Storage Pool, accident analysis described below have been retained for future reference. These conservative analyses demonstrate that postulated accidents will not result in off-site dose exposures in excess of 10 CFR 100 or US EPA limits.

### 6.1. Criticality Analysis

In 1987, a criticality analysis was performed to determine the maximum  $K_{eff}$  of the Dresden Unit 1 Fuel Storage Pool created by loss of pool cooling water and mechanical failures.

The criticality analysis is based on 672 fuel assemblies located in the Fuel Storage Pool. Fuel assemblies located in the Fuel Transfer Pool were not specifically considered.

The worst case scenario for the fuel pool water loss accident determined that under optimum moderation the  $K_{eff}$  for the fuel remains below the maximum value of 0.98 allowed by the NRC Standard Review Plan 9.1.1. The worst case condition considered the fuel pool to be completely drained with spent fuel assemblies in the normal storage positions and in some way an optimum moderation water density (such as a water mist) is introduced.

The worst case scenario for the mechanical failure accident determined that under credible upset scenarios the  $K_{eff}$  for the fuel remains below the maximum value of 0.95 allowed by the NRC Standard Review Plan 9.1.2. The worst case condition considered 16 spent fuel assemblies in each storage rack making physical contact without any water space between the assemblies under full pool water conditions.

The following accident conditions were considered in the analysis to bound reasonable credible configurations of fuel assembly rearrangement that could occur in the mechanical failure accident:

- The pool water is completely lost but the fuel assemblies are not affected and maintain their original (normal) configuration in the pool.
- The pool water is not lost, but the fuel assemblies lose their original configuration to form a new irregular configuration.

- The pool water is completely lost, and the spent fuel assemblies lose their original configuration to form a new irregular configuration.

The most limiting mechanical failure condition considered all 16 fuel assemblies in a rack placed in an upright position to form a tight array of 2x8 fuel assemblies with center to center spacing of 4.27 in with a rectangular water cell of 8.0 sq. ft. (24x48 in.).

It is not physically possible to have all the fuel assemblies form tight 26x26 or 4x4 arrays uniformly throughout the pool because physical instability of arrays and obstructions by rack structures and neighboring fuel assemblies during an accident. Therefore they were eliminated from the list of credible accident conditions.

The analysis did not consider any condition in which the fuel assemblies fall on the pool floor because the assemblies are long compared to the structural spacing in the pool. In addition, no fuel assembly-drop or heavy object drop accidents were defined because these types of accidents would cause only localized disturbances and are not bounding.

The calculated maximum  $K_{eff}$  included the effects of fuel channel, dimensional and material tolerances, and pool temperature.

In 1995, the 1987 Criticality Analysis was updated to include the effect of placing a Fuel Rack Basket with 16 fuel assemblies in the northern vacant region of the Fuel Storage Pool. The pool reactivity change due to the presence of the fuel basket was applied to the original analysis for the 672 fuel assemblies located in the Fuel Storage Pool.

The worst case scenario for the fuel pool water loss accident determined that under optimum moderation the  $K_{eff}$  of the fuel remained below the maximum value of 0.98 allowed by the NRC Standard Review Plan 9.1.1.

The worst case scenario for the mechanical failure accident determined that under credible upset scenarios the  $K_{eff}$  of the fuel remained below the maximum value of 0.95 allowed by the NRC Standard Review Plan 9.1.2.

The maximum  $K_{eff}$  for the normal pool and fuel assembly configuration with full pool water was determined to be below the maximum value of 0.90 allowed by Dresden Unit 1 Technical Specifications.

In 1998, the 1995 Criticality Analysis was updated to include the effect of placing two Fuel Rack Baskets with 16 fuel assemblies each in the northern vacant region of the Fuel Storage Pool. The reactivity changes due to the presence of another Fuel Rack Basket was applied to the 1995 analysis for the 672 fuel assemblies in the Fuel Racks and an additional 16 assemblies in a Fuel Rack Basket.

The worst case scenario for the fuel pool water loss accident determined that under optimum moderation the  $K_{eff}$  of the fuel remained below the maximum value of 0.98 allowed by the NRC Standard Review Plan 9.1.1.

The worst case scenario for the mechanical failure accident determined that under credible upset scenarios the  $K_{eff}$  of the fuel remained below the maximum value of 0.95 allowed by the NRC Standard Review Plan 9.1.2.

The maximum  $K_{eff}$  for the normal pool and fuel assembly configuration with full pool water was determined to be below the maximum value of 0.90 allowed by Dresden Unit 1 Technical Specifications.

## **6.2. Source Term Evaluation**

In 1989, radiological consequences of a postulated fuel handling accident in the Fuel Building, resulting in damage to the fuel cladding of 100% of all pins in all 683 fuel assemblies with subsequent release of radioactive material was performed. Three defective fuel pins located in the pool were excluded from the analysis because the Kr-85 gap activity was released at the time the pins became defective. The analysis calculated off-site and on-site accident results. The radiation exposures resulting from this accident represent the upper bounds for any spent fuel accident at Dresden Unit 1.

The accident analysis considers radionuclides remaining in the fuel assemblies. However, the analysis shows that Kr-85 is the only significant fission gas remaining in the spent fuel assemblies. Hence, using the criteria of NRC Regulatory Guide 1.25 the accident analysis is based upon release of the available gap activity, or 30% of total inventory of the Kr-85, to the Fuel Building with a corresponding breach of building integrity and a release to the environment.

For the worst case exposure in the Fuel Building the gap fission product activity is assumed to be immediately released into the building causing the maximum possible dose rates to personnel.

For the worst case exposure outside of the Fuel Building the gap fission product activity is assumed to be released to the environment, at ground level, through a postulated hole in the Fuel Building exterior wall. The release of the fission products to the environment has a duration of two hours.

The analysis shows that the maximum offsite whole body doses at the nearest unrestricted area boundary from an accidental release of Krypton-85 would be significantly less than the 10 CFR 100 whole body dose limit of 25 Rem in 2 hours, and the corresponding skin dose equivalent limit of 150 Rem in 2 hours. The study results also show that the whole body dose to members of the public would be significantly less than the U.S. EPA-Protective Action Guide (PAG) limit of 1 Rem whole body.



### **6.3. Fuel Pool Drain Down Accident Analysis**

In 1994, an analysis was performed to determine the radiological consequences of a Unit 1 Fuel Pool drain down. The analysis is based upon 683 fuel assemblies located in the Fuel Building. In the analysis it is conservatively assumed that all of the assemblies are located in the Fuel Storage Pool. Although three fuel rods are also stored in the pool, their contribution to activity is concluded to be negligible. Resultant fuel assembly temperatures, and onsite and offsite dose rates are calculated.

The analysis determined the fuel assembly temperatures for partial and complete Fuel Storage Pool drain down scenarios. For the analysis the ambient building air temperature was conservatively assumed to be 120°F. Under either condition the peak temperatures inside of the fuel pins was determined to be far below the temperature at which fuel cladding is expected to fail.

Dose rates associated with direct and scattered radiation were calculated assuming the complete loss of fuel pool water. Dose rates inside of the Fuel Building were significant. The dose rate in the Unit 2/3 Control Room, including the effects of concrete shielding, was determined to be significantly less than 10 CFR 50 Appendix A GDC 19 limits. The dose rate at the closest point on the site boundary was determined to be significantly less than 10 CFR 100 limits.

Because the fuel temperature following loss of water coverage is much lower than the vaporization temperature of volatile fission products, no significant additional contamination is expected.

## **7. Conduct of Operations**

### **7.1. Organization Structure**

The Dresden Station Manager ensures high-level management attention is available to commit personnel and resources to properly and safely maintain the plant during the decommissioning phase.

#### **7.1.1 Corporate Decommissioning**

Corporate Decommissioning is responsible for decommissioning project funding activities at Unit 1. Responsibilities include the authority to review and approve budgets and expenditures required to commit personnel and resources to execute decommissioning activities; site installation of spent fuel storage casks; cask loading; and long-term maintenance activities.

In addition, Corporate Decommissioning is responsible for compliance with applicable NRC licenses and governmental regulations related to decommissioning funding requirements and expenditures of decommissioning funds.

#### **7.1.2 Corporate Licensing**

Corporate licensing is responsible for reviewing and approving the Post Shutdown Decommissioning Activities Report revisions, proposed license amendments and revised technical specifications.

#### **7.1.3 Unit 1 Decommissioning Plant Manager**

The Dresden Station Manager has assumed all responsibilities of the Unit 1 Decommissioning Plant Manager and as such has the responsibility for administration of all Unit 1 functions. This responsibility includes site support activities such as the Quality Assurance Program, compliance with appropriate ASME Code requirements, Offsite Dose Calculation Manual, Site Fire Protection Program, the Radioactive Effluent Control Program and Emergency Preparedness.

#### **7.1.4 Onsite and Technical Support Organization**

The Site Organization has been assigned responsibility for implementing SAFSTOR for Dresden Unit 1. They are responsible for functions including Financial and Planning, Regulatory Assurance, Maintenance and Construction, Operations, Engineering and Health Physics. Staffing assigned may vary as required and directed by the Dresden Station Manager.

### **7.2. Decommissioning Procedures**

Dresden Unit 1 procedures provide guidance for administration and maintenance. Dresden Unit 1 uses the following types and categories of procedures to implement decommissioning.

#### **7.2.1 Dresden Station Procedures**

Dresden Unit 1 uses Station and Corporate procedures for processes that are common to the Units (such as Administrative procedures, Fire Protection procedures, Maintenance procedures, Engineering procedures, Safety Evaluation procedures, Operating procedures, Chemistry procedures, Radiation Protection procedures, GSEP procedures, etc.).

#### **7.2.2 Decommissioning Procedures**

Dresden Unit 1 has also implemented decommissioning procedures, specifically applicable to decommissioning activities that differ from Station activities in areas including:

- Administrative Controls of Dresden for Decommissioning Activities.
- Decommissioning Impact Evaluations per 10 CFR 50.82.
- Decommissioning On-Site Review responsibilities and requirements.
- Engineering Activities for SAFSTOR Preparation and Configuration Management.

### **7.2.3 Preparation and Review of Decommissioning Procedures**

Dresden Unit 1 procedures are written, reviewed and authorized in accordance with the requirements of the Quality Assurance Topical Report. The Technical Specifications provide a list of items for which written procedures are required to be prepared, approved and implemented.

## **7.3. Training**

### **7.3.1 Training of Fuel Handlers**

There is no spent fuel stored within the Unit 1 Fuel Building. Therefore, Training of Fuel Handlers for Unit 1 fuel handling activities is no longer required to support the permanently shutdown and defueled mode of operations, and is not described in the DSAR.

### **7.3.2 Training for Plant Staff**

Dresden Station provides training programs that are necessary and prudent for assuring the safety of personnel, preventing the degradation of safety-related systems, structures, and components, and increasing the efficiency of operation through improved human performance.

Training for Dresden Station personnel is developed using a systematic approach to ensure that they receive training appropriate to their positions or tasks at the station. Training is normally divided into three types:

- Initial training is intended to provide training on safety and job skills commensurate with an individual's position;
- Retraining, including continuing training, is intended to refresh and reinforce information received during initial training; and
- Specialized or task-related training is intended to acquaint personnel with information related to complex processes, procedures, and equipment that are not used on a routine basis.

The training needs of non-Dresden Station personnel granted unescorted access to the station are also considered in order to protect them from excessive or unnecessary radiation exposure and to acquaint them with security procedures and various safety concerns. This training is commensurate with the position of the non-Dresden Station personnel.

A detailed description of the training provided to plant staff is provided in the Dresden Units 2 and 3 Updated Final Safety Analysis Report.