DECOMMISSIONING PR GRAM PLAN

for the

DRESDEN NUCLEAR POWER STATION UNIT 1

COMMONWEALTH EDISON COMPANY

December, 1996
Revision 5

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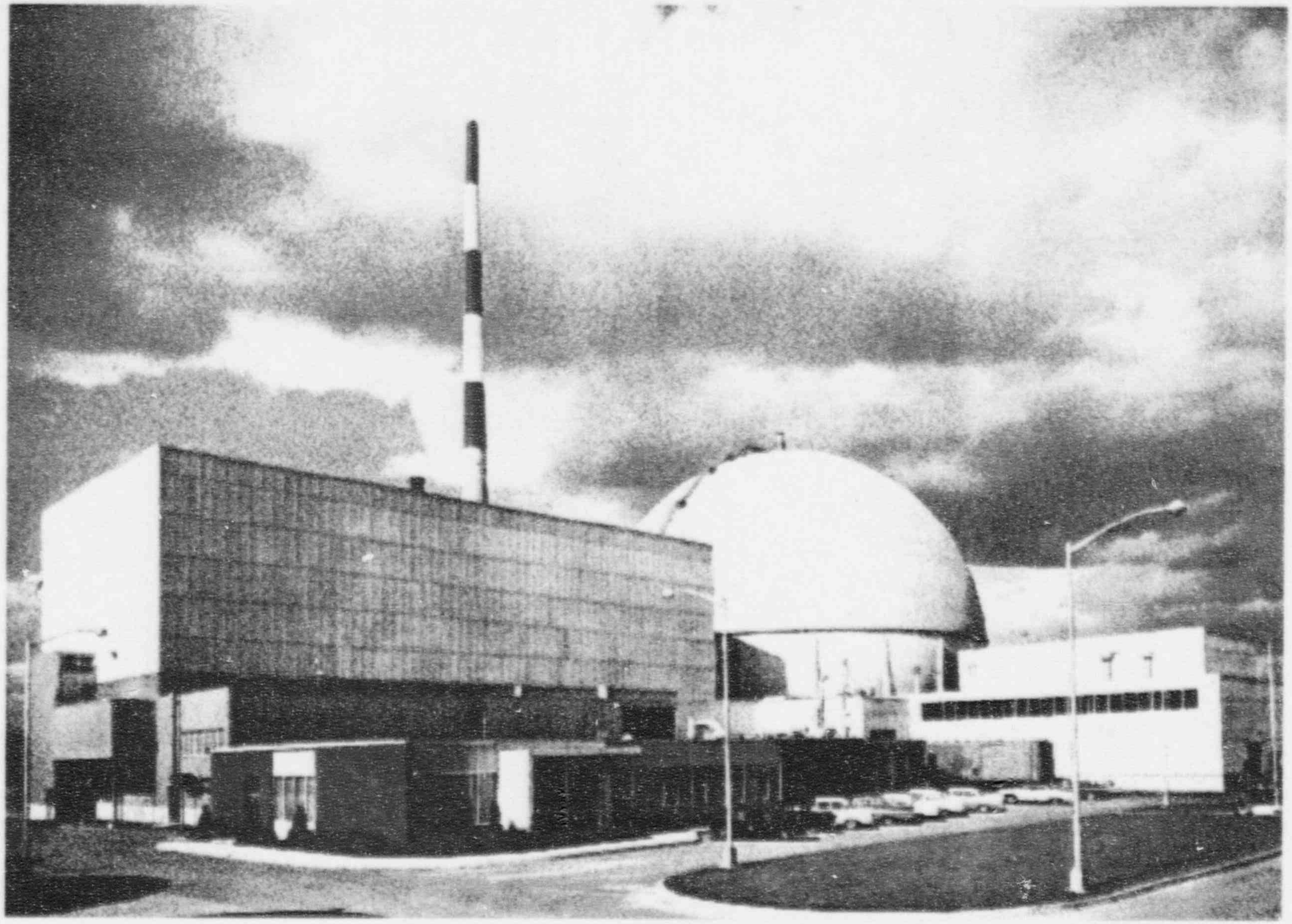
DRESDEN NUCLEAR POWER STATION UNIT 1



INTRODUCTION

This Decommissioning Program Plan for the Dresden Nuclear Power Station Unit 1 describes Commonwealth Edison's plans for the safe storage and eventual dismantlement of Unit 1. This Decommissioning Program Plan discusses both generic and site-specific detailed information relative to the decommissioning project.

The United States Nuclear Regulatory Commission (USNRC) approved Revision 3 to the Dresden Unit 1 Decommissioning Program Plan on September 3, 1993. Revision 4 of the Decommissioning Program Plan was made to clarify the previous narrative to better describe information submitted to the USNRC in the original approval process. Since the Decommissioning Program Plan replaces the Dresden Unit 1 Safety Analysis Report, this clarification was deemed necessary to provide an accurate description of the Dresden Unit 1 decommissioning activities. Revisions to the Decommissioning Program Plan are reviewed and approved based on criteria similar to the criteria of Section 50.59 of Title 10 of the of the Code of Federal Regulations (10 CFR 50.59).

Commonwealth Edison Company 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. If an extended operating life program (License Renewal) for Units 2 & 3 is not initiated, all three Dresden units will be decommissioned by removal of radioactive material and dismantlement beginning as early as 2010. The SAFSTOR license DPR-2 Amendment No. 37 for Dresden Unit 1, issued when Revision 3 of the Decommissioning Program Plan was approved by the USNRC (September 3, 1993), has an expiration date of April 10, 2029.

Placing Unit 1 in safe storage (SAFSTOR) and dismantling at a later date was chosen as the most effective option. The decommissioning alternatives proposed by the Nuclear Regulatory Commission (USNRC) are the following:

DECON - Equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations.

ENTOMB - Radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactivity decays to a level permitting unrestricted release of the property.

SAFSTOR - The nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) until deferred dismantlement is accomplished to levels that permit release for unrestricted use.

The safe storage and decommissioning of Dresden Unit 1 has been divided into five distinct periods. The selection of the periods and the duration of each has been established based on site specific conditions. The following definitions of each period are provided to update terminology and to assist the reader in understanding the evolution of events that will take place at the site between now and approximately 2015 when it is expected that all dismantlement and site restoration activities will be complete, assuming no extended operating life for either Units 2 or 3.

SAFSTOR Operations - Activities following unit shutdown which are needed to prepare for SAFSTOR with fuel in the Spent Fuel/Transfer Pool. This period also involves activities in preparation for SAFSTOR Dormancy including removal of fuel from the Spent Fuel/Transfer Pool.

SAFSTOR Dormancy - The extended period of safe storage without fuel in the Spent Fuel Pool. During this period, fuel will be stored in an approved fuel storage system on-site or at another licensed storage facility until DOE begins accepting fuel.

Preparation for Decontamination and Dismantlement - The activities in preparation for dismantlement including preparation of the final dismantlement plan. These activities will occur in the years near the end of SAFSTOR Dormancy and just prior to initiation of dismantlement operations.

Decommissioning Operations - The actual dismantlement and decontamination of the facilities. When radioactively contaminated materials have been removed, the license may be terminated.

Site Restoration - The demolition of non-radioactive structures and back-filling any excavations remaining after decommissioning operations.

The objectives of the Decommissioning Program Plan and the elements implemented to achieve those objectives are described in the body of this document.

1. FACILITY OPERATION

1.1 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. Table 1.1 provides a chronology of Dresden Unit 1 licensing and construction history. Table 1.2 provides a chronology of Dresden Unit 1 operating and abnormal events history.

TABLE 1.1
DRESDEN UNIT 1 LICENSING AND CONSTRUCTION CHRONOLOGY

Date	Activity
March 31, 1955	Preliminary Safety Report submitted to Atomic Energy Commission. *
May 4, 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 Atomic Energy Commission. *
March, 1959	Reactor pressure vessel shipped.
September 23, 1959	Construction completed.
October 13, 1959	Fuel loading begun.
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 1, 1960	Commercial operation begun.
October 12, 1960	Official dedication.

* Superseded by the Nuclear Regulatory Commission

1.1.1 Operating History

Dresden Unit 1 produced power commercially from July 1960 to October 31, 1978, generating approximately 15,800,000 megawatt-hours of electricity. 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 following the March 1979 incident at Three Mile Island. The estimated cost to bring Dresden Unit 1 into compliance with these new 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.

The 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 in September 1984 and preparations began shortly thereafter to prepare the facility for decommissioning.

1.1.2 Abnormal Events

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 license 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 - perhaps related to the use of saturated steam. There were also fuel failures during the time of September through December of 1964 and other periods 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. This higher rate of fuel failures at Dresden Unit 1 was not typical for the earlier BWR units.

During other outages in the late 1960s, ultrasonic inspections were made on extensive sections of primary piping and welds because of concerns regarding intergranular 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 retubed 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.

TABLE 1.2
DRESDEN UNIT 1 OPERATING AND ABNORMAL
EVENT CHRONOLOGY

Date	Activity
August 1960	Commercial operation begun.
October 1960	Official dedication.
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	USNRC 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	USNRC 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.

1.2 SITE CHARACTERIZATION

Dresden Nuclear Power Station Unit 1 (Dresden 1) is located on a 953-acre site near the confluence of the Des Plaines, Kankakee and Illinois Rivers. The plant shares the site with Units 2 and 3.

1.2.1 Topography

The topography of the site is essentially rolling prairie, with gentle slopes at maximum elevation differences of approximately 25 feet.

1.2.2 Soils and Geology

The Dresden site lies in the Morris Quadrangle, where there is less than 200 feet between the highest and lowest points. The bedrock in this area is almost at the surface, with a shallow covering of sandy loam soil. This bedrock is in the Maquoketa formation of the Upper Ordovician series; the formation is of an upper limestone phase with a lower shale phase.

Underlying the Maquoketa formation is the Galena-Platteville formation of the Middle Ordovician series. It is comprised of a dolomite upper layer and a limestone lower layer; this formation has a slight tilt to the east.

1.2.3 Hydrology

1. Surface Hydrology

The surface drainage is collected by a channel that runs through the center of the site and empties into the Illinois River. There are several marshy areas at the upper ends of the channel, indicating little surface percolation.

The closest river is the Illinois, circling around the north side of the site before proceeding in a southerly direction. The Illinois originates within one half mile of the site's eastern boundary, at the confluence of the Des Plaines and Kankakee rivers.

2. Groundwater Hydrology

There are many shallow wells surrounding the site. The Maquoketa formation yields negligible amounts of water and is tapped by many domestic wells. The lower aquifers, fed from absorption areas in southern/central Wisconsin, exist under artesian conditions and have a general southerly slope. However, the artesian pressure map indicates that the hydraulic gradient actually slopes in a general north-easterly direction due to heavy pumping in the Joliet and Chicago area.

1.2.4 Seismology

Seismology data available (Loyola University) shows that over the last 100 years less than a dozen earthquakes occurred within a radius of 150 miles from Chicago. There is nothing in the geological structure of the area surrounding the site to suggest that this zone would be susceptible to major earthquakes.

1.2.5 Climatology and Meteorology

Average annual wind velocity, derived from three local weather stations, varies from eight to eleven miles per hour from a south/southwest direction. Nominal average annual temperatures range from 38 to 41 degrees minimum and 59 to 61 degrees maximum. Average annual precipitation was 33 to 36 inches with an average snowfall varying from 21 to 34 inches.

1.3 FACILITY CHARACTERIZATION

The Dresden site consists of three boiling water reactors (BWRs). Dresden 1 had a gross output of 210 MWe, while the output of Units 2 and 3 totals approximately 1660 MWe. The description of the general plant, plant structures and systems is included herein.

1.3.1 General Plant Description

Dresden 1 consists of a General Electric (GE) dual-cycle BWR and a GE dual-admission turbine unit with the necessary support and auxiliary systems. The Reactor Vessel, with its hemispherical ends, totals 41 feet in height and 12 feet, 2 inches in diameter.

The Reactor Containment is a sphere, constructed of butt welded steel plates of required curvature. Other main process buildings include the Turbine Building for housing the power extraction system, the Fuel Storage Building for storing and handling fuel, and the Radioactive Waste Facility.

1.3.2 Plant Structures

The layout of the plant structures and components are shown in Figures 1.1 and 1.2. Figure 1.2 depicts the plant layout prior to construction of Units 2 and 3. A brief description of the main plant structures is contained herein.

1. The Sphere (Reactor Building) is located to the east of the Turbine Building and north of the Fuel Storage Building. This building houses the inactive Reactor and support systems. The Fuel Transfer Tube and Fuel Transfer Canal are located in this building.

2. The Turbine Building for Unit 1 is situated west of the Sphere; at the Turbine Building's west end is the common Unit 2/3 Turbine Building (see Figure 1.1). The Turbine Building houses the inoperable Turbine and Generator as well as operable equipment and components for Units 1, 2 and 3.

3. The Fu[illegible] Storage Building is south of the Sphere. The Unit 1 Fuel Storage Pool, Fuel Transfer Pool, Fuel Transfer Tunnel, and New Fuel Vault are located in this building. The original New Fuel Vault is now utilized as an equipment storage area. The Fuel Storage Building is the only remaining vital area for Unit 1

FIGURE 1.1
PLANT STRUCTURES

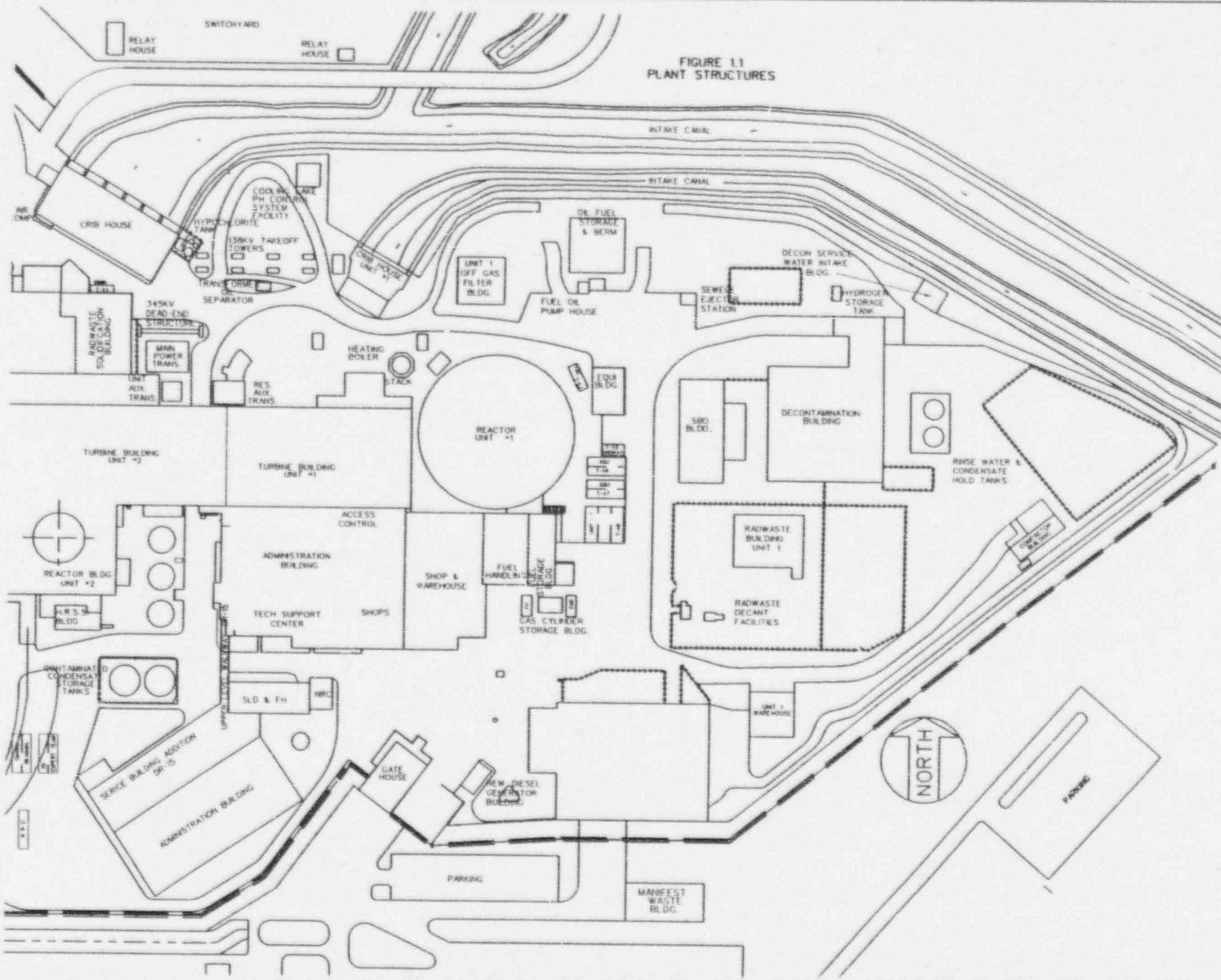
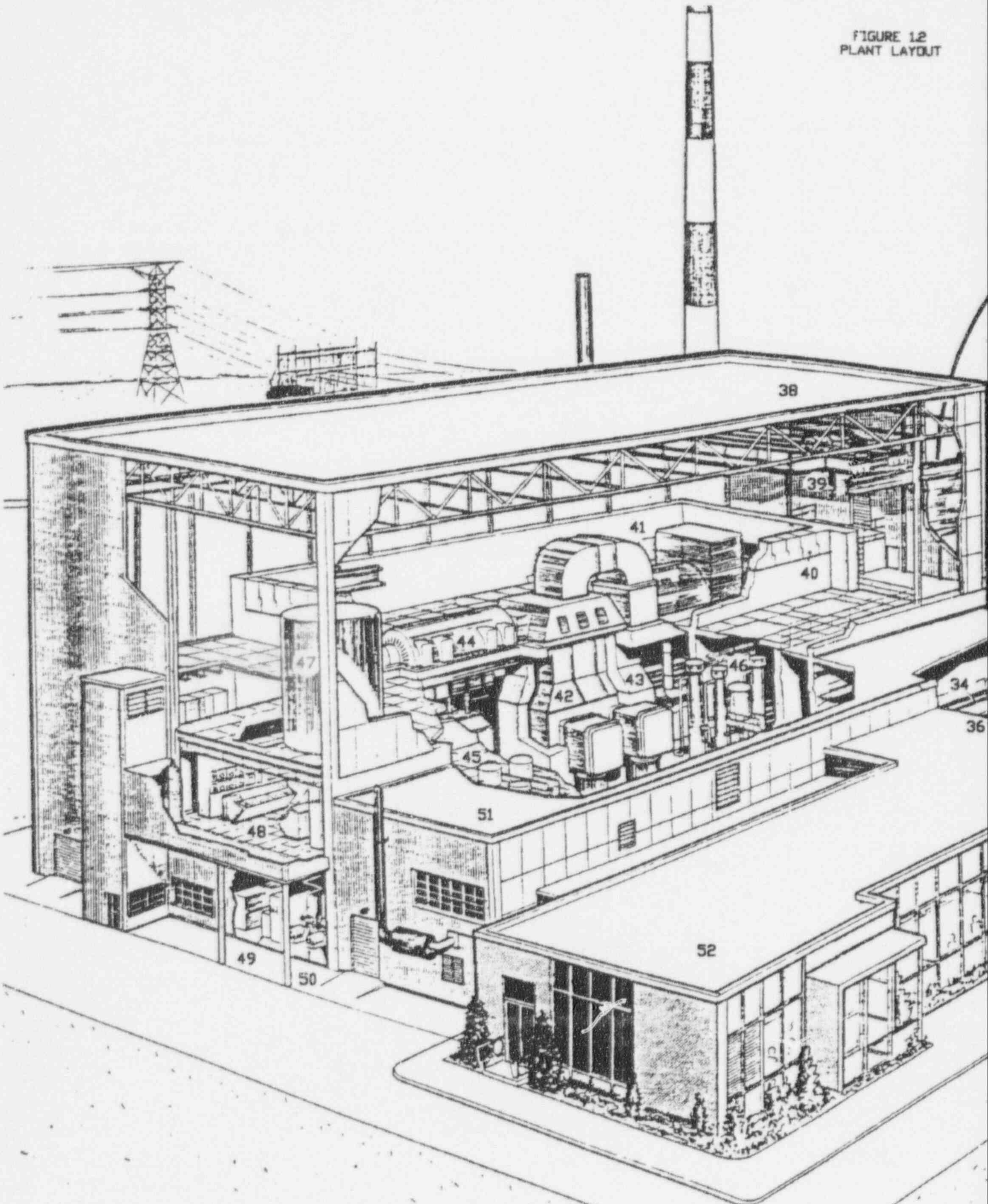
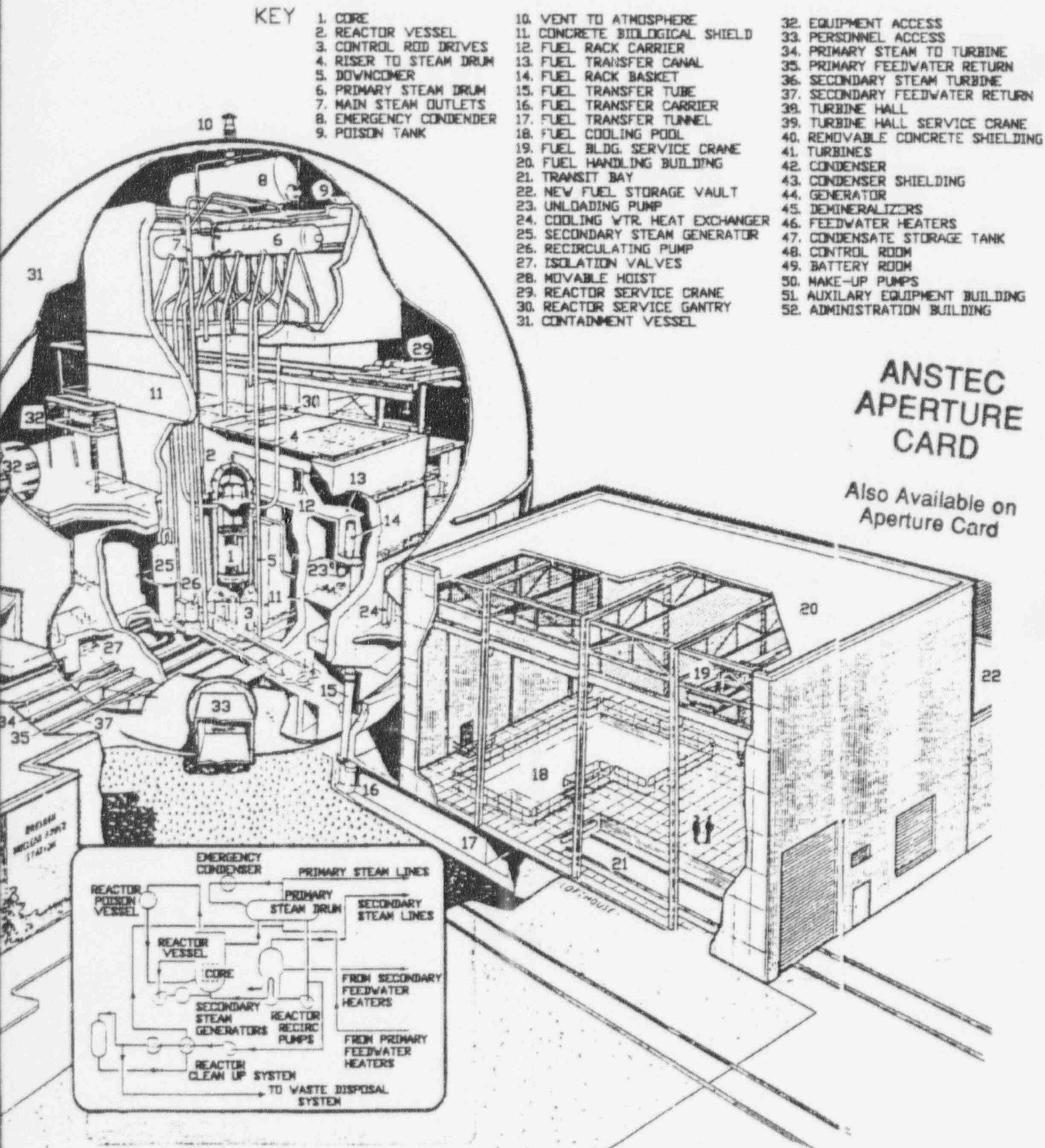


FIGURE 1.2
PLANT LAYOUT





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4. The west end of the Unit 1 Control Room has been incorporated into the Unit 2/3 Control Room. The east end of the Unit 1 Control Room is now part of the administrative support area for Unit 2/3. Unit 1 Control Room instrumentation and controls which are still needed have been relocated to the Unit 2/3 Control Room. Previous Unit 1 Control Room support areas are now utilized as office areas to support operations for Units 1, 2 and 3.

5. The Radwaste Facility is located east of the Fuel Storage Building. The Radwaste Facility is located inside of a fenced area. The Radwaste Facility includes the Radwaste Building, Underground Storage Vaults, and Decant Building. During 1995 and 1996, the Radwaste Tank Farm was dismantled. The types of waste previously processed included spent demineralizer resins and filter media. Processing of Unit 1 radwaste is presently being conducted at the Unit 2/3 Radwaste Facility. The Unit 1 Radwaste System is utilized to collect and temporarily store the limited amount of Unit 1 liquid radwaste. Operations of the Underground Storage Vaults, and Decant Building are no longer conducted. Plans for discontinuing Unit 1 Radwaste operations and early dismantlement of this facility are under evaluation.

6. The HPCI Building was under construction at the time of Unit 1 shutdown and was not placed in service. The structure is due east of the Sphere and north of the Radwaste Building and is no longer a Unit 1 structure. This structure is currently utilized as the Unit 2/3 Station Blackout Building. No Unit 1 operations are being conducted in this facility. This building will be addressed within the decommissioning plans for Unit 2/3 in the future.

7. The Unit 1 Crib House is northwest of the Sphere and north of the Heating Boiler House which adjoins the north side of the Unit 1 Turbine Building. This building houses the Unit 1 Fire Pump which supports the Station Fire Protection Water Supply System addressed in the Dresden Administrative Technical Requirements (DATRs). Also housed within this structure are the Unit 1 Circulating Water and Service Water Pumps, and their associated screen wash and intake equipment.

8. The Off-Gas Building is between the Crib House to the west and the Fuel Oil Storage Tanks to the east. It is directly north of the Sphere. Operations are no longer conducted at this facility, although building support systems are still in operation.

9. Entrance to the plant is via the Gatehouse, which is south and slightly west of the Sphere. This is a Station structure shared by Units 1, 2 and 3.

10. To the west of the Gate House is the Administration Center. This is a Station structure shared by Units 1, 2 and 3.

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

12. The Chemical Cleaning Facility is located to the east of the Unit 1 Sphere and Unit 2/3 Station Blackout Building. This facility houses equipment used during the chemical cleaning of Unit 1 piping systems. A small portion of the equipment located in this facility is still utilized to support Station operations.

13. The Interim Radwaste Storage Facility (IRSF) has been constructed to the northeast of the Chemical Cleaning Facility. Although physically separated, the IRSF and Chemical Cleaning Facilities share structural walls and operating systems. The IRSF is utilized to handle and store Station processed wastes.

2. PROGRAM OBJECTIVES

Dresden Unit 1 is being decommissioned by maintaining the Unit in a Safe Storage (SAFSTOR) mode until Units 2 & 3 are decommissioned and dismantled. At the end of the safe storage period, Unit 1 will be decommissioned by decontamination and dismantlement. The objectives of the decommissioning program are:

1. To maintain Dresden 1 systems and structures needed to support operation of Units 1, 2 and 3.

2. To secure nonessential Unit 1 systems and structures to limit maintenance, prevent deterioration and ensure there will be no potential for release of contained radioactivity.

3. To dispose of radioactive and other wastes including asbestos and PCBs remaining on-site in preparation for the SAFSTOR Dormancy period.

4. To store spent fuel temporarily on-site until an alternative is available.

5. To minimize contaminated areas in Unit 1.

6. To perform radiological monitoring and surveillance program for the SAFSTOR Dormancy period and compare existing conditions with the baseline characterization (Section 5.5.1).

2.1 DECOMMISSIONING ALTERNATIVE DESCRIPTION

The SAFSTOR decommissioning alternative represents the effort required to prepare the facility for protective storage and to provide safety to the public from residual radioactivity remaining at the site. The facility is left essentially intact and structures are maintained in a sound condition. Systems not required to be operational for maintenance/surveillance during the SAFSTOR Dormancy period are being drained, de-energized and secured. Cleaning or removal of loose contamination and/or fixation and sealing of remaining contamination is being performed. Access to contaminated areas are controlled by site radiation protection procedures.

The overall decommissioning process of SAFSTOR followed by delayed dismantlement is organized into five separate periods, including:

Period 1: SAFSTOR Operations
Period 2: SAFSTOR Dormancy
Period 3: Preparation for Decontamination and Dismantlement
Period 4: Decommissioning Operations
Period 5: Site Restoration

2.1.1 Period 1:
<u>SAFSTOR Operations</u>

Period 1 activities in preparation for SAFSTOR Operations have included the activities described herein:

- The Security Plan was revised devitalizing all areas of Unit 1 except for the Fuel Storage Building (Security Plan Revision No. 42).

- The Dresden Unit 1 Operating License was amended to a Possession-Only-License (POL) with revised Technical Specifications (Amendment No. 36). The POL was issued by the USNRC on July 23, 1986.

- The POL was amended to a SAFSTOR License with revised Technical Specifications which authorized decommissioning (Amendment No. 37). The SAFSTOR License was issued by the USNRC on September 3, 1993.

- The Reactor Vessel has been defueled and drained; Reactor Vessel internals remain in place.

The preparations for SAFSTOR Dormancy include the activities described herein:

- Drain, de-energize and secure systems no longer required for SAFSTOR; decontaminate as necessary.

- Remove filter elements and demineralizer resin beds for on-site storage, shipment, or burial.

- Maintain the Spent Fuel Storage Pool and Fuel Transfer Pool, until other alternatives are available for fuel storage.

- Maintain Fuel Pool and Transfer Pool water chemistry, until the fuel is removed.

- Investigate, prepare, and implement long term fuel storage alternatives.

- Maintain Lighting, Fire Protection, HVAC and Alarm systems, as required, for continued use during SAFSTOR Dormancy.

- Maintain structural integrity.

- Minimize contaminated areas of Unit 1.

- Maintain the Environmental and Radiation Monitoring Program.

- Maintain a 24-hour guard force and liaison with local law enforcement agencies.

During SAFSTOR Operations, ComEd will continue the program to monitor the performance or condition of systems, structures, and components (SSCs) associated with the storage, control, and maintenance of spent fuel in a safe condition in a manner that provides reasonable assurance that the SSC's are capable of performing their intended function, as required by 10CFR50.65.

During SAFSTOR Operations, Commonwealth Edison Company may undertake limited decommissioning activities [including disposal and/or removal of systems, components, and structures] that do not (1) foreclose release of the site for possible unrestricted use; (2) result in significant environmental impacts not previously reviewed; (3) result in there no longer being reasonable assurance that adequate funds will be available for decommissioning; or (4) violate terms of the License.

2.1.2 Period 2:
<u>SAFSTOR Dormancy</u>

Activities required during the dormancy period for the SAFSTOR alternative include a 24-hour guard force, maintenance of structural integrity, and an Environmental and Radiation Monitoring Program.

Maintenance activities during SAFSTOR Dormancy are expected to be minimal due to the majority of equipment being layed up and de-energized.

An environmental surveillance program will be carried out during the dormancy period to monitor releases of radioactivity to the environment; any such releases will be identified and quantified. The Environmental Surveillance Program is a modified/abbreviated version of that carried on during normal plant operations. Site environmental monitoring is implemented for Units 1, 2 and 3 in accordance with the Off-Site Dose Calculation Manual (ODCM).

Primary physical security is provided by the Dresden Station Security Force on a 24-hour basis for the duration of the SAFSTOR Dormancy period. Security during this period is primarily conducted to prevent unauthorized entry. Security detection and notification systems will be used during SAFSTOR Dormancy in accordance with the Station's Security Plan.

During SAFSTOR Dormancy, ComEd will continue to implement a program to monitor the performance or condition of systems, structures, and components (SSCs) associated with the storage, control, and maintenance of spent fuel in a safe condition in a manner that provides reasonable assurance that the SSC's are capable of performing their intended function, as required by 10CFR50.65.

During SAFSTOR Dormancy, Commonwealth Edison Company may undertake limited decommissioning activities [including disposal and/or removal of systems, components, and structures] that do not (1) foreclose release of the site for possible unrestricted use; (2) result in significant environmental impacts not previously reviewed; (3) result in there no longer being reasonable assurance that adequate funds will be available for decommissioning; or (4) violate terms of the License.

2.1.3 Period 3:
<u>Preparation for Decontamination and Dismantlement</u>

This work will presumably be performed concurrently or sequentially with the decommissioning of Dresden Units 2 & 3. In general, all reactor dismantlement engineering, planning and site preparations occur during this period. A final dismantlement plan to address activities beginning in Period 4 will be prepared and submitted to the USNRC, in accordance with 10 CFR 50.82 ("Final Rule", Ref. 1). Utility and Decommissioning Operations Contractor (DOC) management staffs will be selected and mobilized on-site. Decommissioning activity specifications and detailed procedures will be prepared for removal of systems, components and structures. The overall decommissioning sequence will be developed. Preparations will include selection of specialty contractors, long-lead tooling and equipment, arrangements for radioactive waste disposal and construction of site temporary facilities for the workforce.

2.1.4 Period 4:
<u>Decommissioning Operations</u>

The decommissioning operations during this period will be directed at removing radioactivity from systems, components and structures. Minimal chemical decontamination will be required since most short-lived radionuclides

will have decayed to levels low enough to permit removal with low occupational exposure. The Reactor Vessel and internals will be packaged, shipped, and buried, possibly in a segmented form. Similarly, the Steam Drum, Steam Generators and associated pumps and piping will be removed for controlled burial. Components and structures with radioactivity levels above USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors", Table 1 (Ref. 2) limits will be removed. The facility will be surveyed to certify the removal of radioactivity, and the License may be terminated. A final dismantlement program report will be prepared and submitted to the USNRC, in accordance with 10 CFR 50.82 ("Final Rule", Ref. 1).

2.1.5 Period 5:
Site Restoration

Following completion of the decommissioning operations, site restoration activities may begin. These involve demolition and removal of remaining structures although it is expected that the Switchyard and other reusable structures may remain. Structure and building foundations will be backfilled. Site areas affected by dismantlement activities will be cleaned up and the plant site will be graded and restored.

2.2 CLEANUP CRITERIA

Cleanup criteria will be established in accordance with appropriate rules and regulations in effect at the time of dismantlement plan submittal.

3. PROGRAM MANAGEMENT AND ADMINISTRATION

Commonwealth Edison has assigned a dedicated Decommissioning Project Team to manage SAFSTOR Operations and prepare for SAFSTOR Dormancy. The team consists of a Unit 1 Decommissioning Plant Manager and an appropriate staff to maintain the Unit in SAFSTOR in compliance with the Decommissioning Program Plan and all applicable Technical Specification requirements.

3.1 PROJECT ORGANIZATION AND RESPONSIBILITIES

The Unit 1 Decommissioning Plant Manager reports directly to the Site Vice President. This ensures high level management attention is available to commit personnel and resources to properly and safely maintain the plant during SAFSTOR. The current organization is shown in Figure 3.1.

3.1.1 Site Vice President

The Site Vice President is responsible for the authorization and approval of the Decommissioning Project. He has the authority to commit personnel and resources to maintain the plant in SAFSTOR. He is responsible for reviewing the Decommissioning Program Plan revisions, proposed Possession-Only License (POL) amendments, and Revised Technical Specifications.

3.1.2 Unit 1 Decommissioning Plant Manager

The Unit 1 Decommissioning Plant Manager has the responsibility to develop the Decommissioning Program Plan revisions and SAFSTOR License amendments with revised Technical Specifications. Related responsibilities include:

- Identifying and coordinating the project team participants.
- Developing a decommissioning plan, schedule, and budget.
- Developing a decommissioning program cost estimate and schedule.
- Preparing for and obtaining Commonwealth Edison approval of Decommissioning Program Plan revisions.
- Meeting with the USNRC and other regulatory agencies to ensure compliance with regulatory requirements.
- Resolving USNRC comments on the Decommissioning Program Plan, Technical Specifications, and POL amendments.

- Ensuring quarterly radiation surveys are performed.

- Ensuring annual status reports are submitted to the USNRC.

- Ensuring appropriate maintenance and surveillance activities.

3.1.3 On-Site Project Team

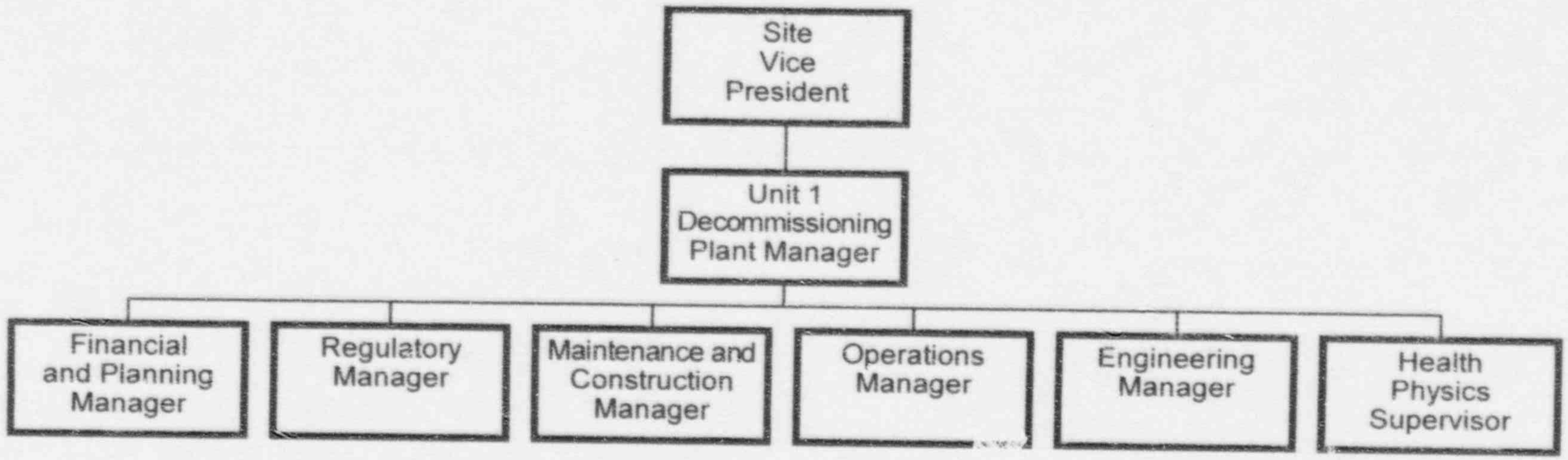
Presently, the dedicated On-Site Decommissioning Project Team consists of a Financial and Planning Manager, Regulatory Manager, Operations Manager, Maintenance and Construction Manager, Engineering Manager, Health Physics Supervisor, and System Engineers. Additional Station support is provided by the Operations Department, Maintenance Department, Training Department, Radiation Protection Department, Site Engineering and Construction, Chemistry Department, Spent Fuel Optimization Program (SFOP) Project Engineer, and other Station departments, as necessary (Figure 3.1). Staffing assigned to the project may vary as required and directed by the Unit 1 Decommissioning Plant Manager.

The On-Site Decommissioning Project Team has responsibility to prepare SAFSTOR License amendments with revised Technical Specifications for submittal to the USNRC. They are also responsible for revisions of the Decommissioning Program Plan, cost estimates, budgets, schedules, and Environmental Report.

This team is responsible for implementing SAFSTOR Operations and preparations for SAFSTOR Dormancy.

FIGURE 3.1

DECOMMISSIONING PROJECT ORGANIZATION



3.2 PROCEDURES

Following NRC approval of License DPR-2 Amendment 39 with revised Technical Specifications information contained in this section will become applicable.

A. Written procedures shall be established, implemented, and maintained covering the activities referenced below:

1. The procedures applicable to the safe storage of irradiated fuel recommended in Appendix A, of Regulatory Guide 1.33, Revision 2, February 1978;

2. Station Security Plan Implementation,

3. Generating Station Emergency Response Plan implementation,

4. PROCESS CONTROL PROGRAM (PCP) implementation,

5. OFFSITE DOSE CALCULATION MANUAL (ODCM) implementation, and

6. Fire Protection Program implementation.

B. Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

3.3 RECORDS

Following NRC approval of License DPR-2 Amendment 39 with revised Technical Specification information contained in this section will become applicable.

Procedures for items identified in Section 3.2.A and any changes to such procedures shall be reviewed and approved by an Operations Manager and the Engineering Manager in the areas of operation, fuel handling, or instrument maintenance, and by the Maintenance and Construction Manager and Engineering Manager in the areas of plant maintenance and plant inspection. Procedures for items identified in Section 3.2.B and any changes to such procedures shall be reviewed and approved by the Radiation Protection Manager. At least one person approving each of the above procedures shall hold a valid Senior Reactor Operator's license*. In addition, these procedures and changes thereto must have authorization by the Station Manager (or designee) before being implemented.

Work and instruction type procedures which implement approved maintenance or modification procedures shall be approved and authorized by the Maintenance and Construction Manager where the written authority has been provided by an Operations Manager. The "Maintenance/Modification Procedure" utilized for safety related work shall be so approved only if procedures referenced in the "Maintenance/Modification Procedure" have been approved as required by 3.2.A. Procedures which do not fall within the requirements of 3.2.A or 3.2.B may be approved by the Department Heads.

Temporary changes to procedures identified in Sections 3.2.A and 3.2.B above may be made provided:

1. The intent of the original procedure is not altered.

2. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's License for Units 2 and 3.

3. The change is documented, reviewed by the Onsite Review and Investigation Function and approved by the Station Manager (or designee) within 14 days of implementation.

* Senior Reactor Operator's License is a Senior Reactor Operator's License for Units 2 and 3.

3.4 PLANT OPERATING RECORDS

Records and/or logs relative in the following items shall be kept in a manner convenient for review and shall be retained for at least five years.

1. Records of standby operations and principal maintenance activities, including inspection and repair, regarding principal items of equipment pertaining to nuclear safety.

2. Records and reports of reportable and safety limit events.

3. Records and periodic checks, inspection and/or calibration performed to verify the Surveillance Requirements required by Technical Specifications are being met. All equipment failing to meet surveillance requirements and corrective action taken shall be recorded.

4. Records of changes made to the equipment or reviews of tests and experiments to comply with 10 CFR 50.59.

5. Records of radioactive shipments.

6. Records of tests pertaining to nuclear safety.

7. Records of changes to operating procedures.

8. Shift Managers Logs.

9. By-product material inventory records and source leak test results.

Records and/or logs relative to the following items shall be recorded in a manner convenient for review and shall be retained for the life of the plant.

1. Substitution or replacement of principal items of equipment pertaining to nuclear safety.

2. Changes made to the plant as it is described in the Safety Analysis Report.

3. Records of spent fuel inventory and assembly histories.

4. Updated, corrected, and as-built drawings of the plant.

5. Records of plant radiation and contamination surveys.

6. Records of off-site environmental monitoring surveys.

7. Records of radiation exposure for all plant personnel, including all contractors and visitors to the plant in accordance with 10 CFR 20.

8. Records of radioactive in liquid and gaseous wastes released to the environment.

9. Records of individual staff members indicating qualifications, experience, training, and retraining.

10. Minutes of meetings and results of reviews performed by the Offsite and Onsite Review and Investigation Functions.

4. PROGRAM SCHEDULE AND COST

Commonwealth Edison Company has provided reasonable assurance to the USNRC that funds will be available to decommission the Company's nuclear generating facilities in compliance with Parts 50.33(k) and 50.75 of Title 10 of the Code of Federal Regulations.

Additionally, Commonwealth Edison Company's funding of decommissioning satisfies the requirements of State of Illinois Public Act 85-1400 signed into law on September 12, 1988, and the qualified nuclear decommissioning fund provisions of Section 468A of the Internal Revenue Code and 10 CFR 50.75.

The overall program and schedule for decommissioning Dresden Unit 1 consists of five periods from a financial perspective starting with SAFSTOR Operations and ending with Site Restoration. The decommissioning program costs were estimated for each period of the program. A summary of the total estimated costs developed for Dresden Unit 1 (Table 4.2) using a generic regional approach is included in this document. A financial plan has been developed to assure decommissioning funds will be available to safely decommission and dismantle Dresden Unit 1, as well as, the other Commonwealth Edison Company nuclear facilities. A brief description of the plan is provided in the paragraphs that follow.

4.1 PROGRAM SCHEDULE

The Dresden Unit 1 Decommissioning Program consists of five periods from a financial perspective: SAFSTOR Operations, SAFSTOR Dormancy, Preparation for Decontamination and Dismantlement, Decommissioning Operations and License Termination, and Site Restoration. SAFSTOR Dormancy is shown as an assumed 10-year period, but actually will depend on the dates of shutdown for Dresden Units 2 and 3. Table 4.1 shows the duration in years and the expected date of completion used in the estimating process for each financial period of the program.

4.2 PROGRAM COSTS

A summary of the Dresden Unit 1 total decommissioning costs is shown in Table 4.2. The costs are in 1993 dollars and include 25% contingency for all periods.

The estimate is based on the assumption that all work activities will be performed by a Decommissioning Operations Contractor (DOC) reporting to Commonwealth Edison's Unit 1 Decommissioning Plant Manager and Team. The costs include all project management, engineering and planning costs, decontamination, equipment and structure removal, packaging, shipping and burial of removed materials. Collateral costs such as equipment rental, health physics supplies, nuclear liability insurance, plant energy, site property taxes and staff relocation costs have also been accounted for and distributed to their respective periods of expenditure.

4.3 FINANCIAL ASSURANCE

Reasonable assurance is provided that funds will be available to decommission Dresden Unit 1 (and the Company's 12 other nuclear generating facilities) in compliance with Parts 50.33(k) and 50.75 of Title 10 of the Code of Federal Regulations.

The method by which the Company provides financial assurance for its responsibilities to decommission Dresden Unit 1 (and the 12 other nuclear generating units) is currently based on an external funding method, which satisfies the requirements of State of Illinois Public Act 85-1400 signed into law on September 12, 1988, the related Order No. 88-0298 of the Illinois Commerce Commission (the "ICC"), the qualified nuclear decommissioning fund provisions of Section 468A of the Internal Revenue Code, and 10 CFR 50.75.

A site specific estimate will be performed for Dresden Unit 1 prior to February 1997 and will be periodically updated (at least once every four years).

TABLE 4.1

ESTIMATED SCHEDULE SUMMARY

Activity	Duration (years)	Expected Date of Completion
Period 1:		
SAFSTOR Operations	15	1999
Period 2:		
SAFSTOR Dormancy	10*	2009
Period 3:		
Preparation for Decontamination and Dismantlement	3	2011
Period 4:		
Decommissioning Operations	2	2012
Period 5:		
Site Restoration	4	2015

* Actual duration will depend on the decommissioning schedule of Dresden Units 2 & 3 and the Department of Energy (DOE) schedule for accepting Unit 1 spent fuel.

TABLE 4.2

ESTIMATED DECOMMISSIONING COSTS

For Dresden Unit 1 Located on an Operational Site

Decommissioning costs are comprised of several components including engineering, labor, materials, specialty contractors, transportation and waste disposal. Decommissioning cost estimates for the Company's Dresden Unit 1 based on a generic regional approach are as follows:

	Total ($ millions)
SAFSTOR Operations	7.6*
SAFSTOR Dormancy	2.0**
Preparation for Decontamination and Dismantlement/Decommissioning Operations	170.1
Site Restoration	12.3
Interim Fuel Storage Facility Costs	23.6
TOTAL	215.6

* This value may change in subsequent estimates as a limited number of activities are evaluated for possible action before moving into SAFSTOR Dormancy.

** This value may change because the budgeted annual maintenance costs were not specifically accounted for as decommissioning funds at the time of the estimate (i.e., The balance of the normal maintenance costs are covered by plant operations until Units 2 & 3 are in decommissioning).

These estimates were made in February 1994 and are stated in 1993 dollars.

5. LICENSING ISSUES

The decommissioning of Dresden 1 requires conformance to current federal and state regulations. The preparations for decommissioning have required modifications to the existing License and assurance that the process will protect public health and safety.

5.1 COMPLIANCE WITH CURRENT REGULATION

The decommissioning of Dresden 1 will be performed in accordance with current regulatory requirements, guidance and standards as prescribed by the United States Nuclear Regulatory Commission (USNRC), United States Department of Transportation (USDOT), United States Environmental Protection Agency (USEPA) and the State of Illinois. A list of applicable regulations is included herein:

Federal Reg.	Guidance
10 CFR 19	Notices, instructions and reports to workers; inspections.
10 CFR 20	Standards for protection against radiation.
10 CFR 30	Rules of general applicability to domestic licensing of source material.
10 CFR 40	Domestic licensing of source material.
10 CFR 50	Domestic licensing of production and utilization facilities.
10 CFR 51	Licensing and regulatory policy and procedures for environmental protection.
10 CFR 60	Disposal of high-level radioactive wastes in geologic repositories.
10 CFR 61	Licensing requirements for land disposal of radioactive waste.
10 CFR 70	Domestic licensing of special nuclear material.
10 CFR 71	Packaging and transportation of radioactive material.
10 CFR 72	License requirements for the independent storage of spent nuclear fuel and high-level radioactive waste.
10 CFR 73	Physical protection of plants and materials.

COMPLIANCE WITH CURRENT REGULATION (Continued)

Federal Reg.	Guidance
10 CFR 140	Financial protection requirement.
10 CFR 150	Exemptions and continued regulatory authority in agreement states under Section 274.
10 CFR 170	Fees and facilities and material licenses and other regulatory services under the Atomic Energy Act of 1954, as amended.
Regulatory Guide 1.86	Termination of operating licenses for nuclear plants.
Final Rule	Decommissioning of Nuclear Power Reactors (Federal Register Vol. 61, No. 146, dated July 29, 1996).
U.S. DOT Regulations 49 CFR 170-190	Hazardous material regulations - DOT.
U.S. Regulations 40 CFR 190	Environmental radiation protection standards for nuclear power operations.

5.2 LICENSE MODIFICATION

As part of the decommissioning of Dresden Unit 1, the operating license was amended to a Possession-Only License (POL) (Amendment No. 36, July 23, 1986). The POL was amended to a SAFSTOR License which authorized decommissioning and extended the License expiration date to April 10, 2029 (Amendment No. 37, September 3, 1993). The original Unit 1 SAFSTOR License is comprised of the documents listed in Table 5.1. Table 5.2 lists docketed decommissioning submittals for License Amendment No. 37.

On October 20, 1995, the NRC approved Amendment No. 38 to the Dresden Unit 1 License with revised Technical Specifications. This Amendment was a result of the application for amendment dated April 24, 1995, as supplemented August 1 and September 14, 1995.

TABLE 5.1

DRESDEN UNIT 1 LICENSE AMENDMENT NO. 37 DOCUMENTS

DATE	DOCUMENT
09/03/93	License No. DPR-2 Amendment No. 37 (SAFSTOR License).
09/03/93	Technical Specifications Amendment No. 37.
09/03/93	Order To Authorize Decommissioning.
09/03/93	Safety Evaluation for Amendment No. 37.
09/03/93	Environmental Assessment.
09/03/93	Notice of Issuance of Environmental Assessment and Finding of No Significant Impact.
03/02/94	Technical Specification Amendment No. 37 Correction.

TABLE 5.2

DOCKETED SUBMITTALS
FOR AMENDMENT NO. 37 TO LICENSE NO. DPR-2

DATE	DOCUMENT
01/07/86	Proposed Non-Operating Status License for Unit 1.
12/22/87	December 1987 Revision of the Decommissioning Program Plan.
04/29/88	Environmental Report, Decommissioning Program Plan Revision No. 2.
09/02/88	Commonwealth Edison Company Letter - Response to Request for Additional Information.
11/21/88	Commonwealth Edison Company Letter - Response to Request for Additional Information.
03/27/89	Commonwealth Edison Company Letter - Response to Request for Additional Information.
04/10/89	Commonwealth Edison Company Letter - Response to Request for Additional Information.
05/16/89	Proposed 40 Year License Extension for Unit 1.
11/01/89	Commonwealth Edison Company Letter - Response to Request for Additional information.
05/18/90	Commonwealth Edison Company Letter - Krypton 85 Monitor.
06/07/91	Commonwealth Edison Company Letter - Status Update of NS-1.
02/07/92	Decommissioning Program Plan Revision No. 3.
10/30/92	Commonwealth Edison Company Letter - Additional Information Regarding the Decommissioning Program Plan.
06/08/93	Commonwealth Edison Company Letter - Technical Specifications.
7/02/93	Commonwealth Edison Company Letter - Fuel Handling.

5.3 ACCIDENT ANALYSES

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.

The only remaining accident scenarios of concern involve the fuel stored in the Unit 1 Fuel Pool and Transfer Pool. The Reactor is defueled and no longer in service.

Because the spent fuel is in racks of the correct geometry (to prevent criticality) and underwater at all times (to provide shielding), criticality will not occur, either during normal or postulated upset conditions. This was demonstrated by a 1987 analysis of potential criticality issues.

Conservative analyses demonstrate that postulated Fuel Pool accidents will not result in off-site dose exposures in excess of 10 CFR 100 or US EPA limits.

In 1994, an analysis was performed to determine the radiological consequences of a Unit 1 Fuel Pool drain down. On-site and off-site dose rates from both direct and sky shine radiation were estimated. The off-site dose rate at the nearest site boundary was less than 2 mrem/hr. This calculation assumed that all 683 fuel assemblies were in the fuel pool and all fuel bundles were uncovered.

In 1989, an analysis provided projections of worst case skin and whole body radiation doses to personnel on-site and at the site boundary due to a spent fuel rupture accident of all 683 fuel assemblies in the Fuel Storage Building with subsequent environmental release. The study showed that the maximum off-site whole body dose from an accidental release of Kr-85 to be below regulatory requirements. Note that no mechanism was identified which could lead to release of significant quantities of Kr-85 or other airborne effluents including tritium.

In 1989, an analysis was performed demonstrating that the worst case airborne tritium concentrations in the Fuel Storage Building would be less than 1% of the 10 CFR 20, Appendix B Table 1 concentrations.

The Generating Station Emergency Plan (GSEP) specifies actions to be taken in the event of radiological accidents. These action levels were reviewed and approved by the USNRC in P.B. Erickson letter to D.L. Farrar dated 4/25/94.

The only systems, structures, and components involving nuclear safety for Unit 1 are the Fuel Storage Pool, Fuel Transfer Pool, Fuel Transfer Tunnel and that portion of the Fuel Transfer Tube which extends into the Fuel Transfer Tunnel. These structures, systems, and components are not shared with Units 2 or 3. Postulated accidents involving these structures, systems, and components will not result in off-site dose rates in excess of 10 CFR 100 requirements.

5.4 REVISED TECHNICAL SPECIFICATIONS

Changes have been made to the Dresden Unit 1 License and Technical Specifications to reflect the decommissioning status of Dresden Unit 1.

5.4.1 Amendment No. 37

The change to a SAFSTOR status entailed several changes to the Dresden Unit 1 License and Technical Specifications. The following is a brief overview of those sections of the specifications that have been changed.

License

- Rewording of Facility Operating License No. DPR-2 to authorize decommissioning of the Unit. The SAFSTOR License, License No. DPR-2, Amendment No. 37 was obtained for Dresden Unit 1 on September 3, 1993.

- Renewal of the License until April 10, 2029.

Technical Specifications

- Deletion of reference to those systems and components that will no longer be used.

- Changes to operating descriptions for those systems remaining in service to protect the health and safety of the public.

- Surveillance frequencies and parameters for systems/components remaining in service.

5.4.2 Amendment No. 38

Amendment No. 38 to the Unit 1 License with revised Technical Specifications was approved by a letter dated 10/20/95, from R.A. Capra to D.L. Farrar. The amendment relocated the requirements for the "Review, Investigative and Audit Functions" and frequencies of the Quality Assurance (QA) program from the administrative controls section of the TS to the appropriate sections of the Quality Assurance Topical Report (QATR). In addition, title changes to reflect the organization of the Nuclear Operations Division were made.

5.5 RESIDUAL RADIOACTIVITY

In August 1982, prior to the Primary System chemical decontamination, Pacific Northwest Laboratory (PNL) conducted a survey at Dresden Unit 1 to estimate the residual radioactivity.

The results of the PNL survey are shown in Table 5.3, Residual Radionuclide Concentration in Corrosion Films; Table 5.4, Residual Radionuclide Inventories in Various Operating Systems; and Table 5.5, Total Residual Radionuclide Inventory.

Concrete core samples and sediment/soil samples were taken as part of the PNL survey conducted in August 1982. The concentrations in the first segment (0-1 cm) of all concrete core samples were above Regulatory Guide 1.86, Table 1 limits. The second segment (1-2 cm) in all cores except the Make-Up Demineralizer Room were also above the recommended limit. Core sample results are shown on Table 5.7.

Several soil samples obtained from the exclusion area around Dresden Unit 1 either approach or exceed the limit of the Draft Environmental Impact Statement on decommissioning of nuclear facilities. The results are shown as Table 5.8.

This estimate did not include: neutron-activated parts of the Pressure Vessel and the Biological Shield, or radioactivity in residues and resins in tanks and pumps, or the spent fuel stored on-site. However, estimates for the neutron-activated components were prepared in 1987 by TLG Engineering Inc., a consultant to Commonwealth Edison Company, using the ORIGEN2 computer code. Table 5.6 shows the Reactor Vessel and internals, and Biological Shield concrete radioactive inventory as of 1988.

5.5.1 Baseline Radiation Survey

A baseline radiation survey was conducted by Commonwealth Edison's health physics personnel in 1992. The surveys show dose rates in mR/hr, smears counted for removable alpha and beta-gamma, surface contamination and air sample results.

5.5.2 Radiation Protection Program

During SAFSTOR, a radiation protection program will be maintained to provide for the health and safety of workers and the general public. The program will provide the necessary monitoring and control of radiological conditions.

5.5.3 Industrial Safety and Hygiene Program

Commonwealth Edison Company has an industrial safety program that will be used during SAFSTOR.

TABLE 5.3

Residual Radionuclide Concentrations in
Corrosion Films from Dresden One, August 1982

Concentrations - pCi/cm^2 (pCi/gm)

SAMPLE	^{54}Mn	^{60}Co	^{65}Zn	^{94}Nb	^{106}Ru	^{108m}Ag	^{110m}Ag	^{125}Sb	^{126}Sn	^{134}Cs	^{137}Cs	^{144}Ce	^{152}Eu	^{154}Eu	^{155}Eu	^{166m}Ho
D-SC-10 Fuel Pool Wall	1,200 ± 100 (250 ± 30)	176,000 ± 1,000 (35,800 ± 100)	1,500 ± 300 (310 ± 60)	<40 (<8)	<700 (<100)	<500 (<100)	<700 (<100)	<200 (<40)	<400 (<90)	10,600 ± 100 (2,160 ± 20)	86,900 ± 200 (17,660 ± 40)	<300 (<60)	<100 (<30)	<200 (<30)	<100 (<20)	<60 (<10)
D-SC-11 Fuel Pool Recirc [illegible]	<70	11,200 ± 200	<20	<21	<400	<300	<400	<100	<20	650 ± 50	7,300 ± 100	<200	<80	<80	<60	<30
D-SC-12 Fuel Pool Ladder	1,700 ± 100 (340 ± 30)	200,000 ± 1,000 (41,600 ± 100)	2,800 ± 300 (560 ± 60)	<40 (<7)	<600 (<100)	<400 (<80)	<600 (<100)	500 ± 200 (100 ± 40)	<30 (<7)	6,000 ± 100 (1,210 ± 10)	50,100 ± 200 (10,170 ± 20)	<200 (<50)	<100 (<20)	<100 (<30)	<80 (<20)	<50 (<10)
D-SC-13 Inside Spher Wall	<0.3	120 ± 1	2.7 ± 0.8	<0.1	<2	<1	<2	<0.4	<0.1	<0.3	3.4 ± 0.2	<0.6	<0.3	<0.4	<0.2	<0.1
D-SC-14 Air Vent Duct	<0.2	93 ± 1	1.2 ± 0.4	<0.1	<1	<0.6	<1	<0.2	<0.05	0.43 ± 0.09	5.5 ± 0.1	0.7 ± 0.4	<0.2	0.5 ± 0.2	<0.1	<0.08
D-SC-15 Floor Drain Instr. Room A	34 ± 11 (15 ± 5)	26,400 ± 40 (11,630 ± 20)	390 ± 30 (170 ± 10)	<3 (<1)	[illegible] (<30)	<40 (<20)	<60 (<30)	<20 (<7)	<3 (<1)	990 ± 10 (437 ± 3)	7,600 ± 30 (3,360 ± 30)	<20 (<10)	<10 (<5)	<10 (<6)	<8 (<4)	<5 (<2)
D-SC-16 Fuel Chute	3.6 ± 0.9	790 ± 3	11 ± 2	<0.3	<4	<3	<5	<1	<0.2	3.3 ± 0.4	24 ± 1	4 ± 2	<0.8	<1	<0.5	<0.4
D-SC-17 Fuel Canal	<0.2 (<0.04)	53 ± 1 (10.8 ± 0.2)	1.5 ± 0.5 (0.30 ± 0.10)	<0.1 (<0.01)	<1 (<0.2)	<1 (<0.2)	<1 (<0.2)	<0.4 (<0.08)	<0.08 (<0.02)	5.6 ± 0.2 (1.13 ± 0.04)	39 ± 1 (7.91 ± 0.07)	<0.5 (<0.1)	<0.3 (<0.05)	<0.3 (<0.06)	<0.2 (<0.04)	<0.1 (<0.02)
D-SC-18 Reactor Steam Vent Line	12,000 ± 2,000 (800 ± 100)	$7.90 \times 10^6 \pm 0.01 \times 10^6$ (522,000 ± 1000)	113,000 ± 4,000 (7,500 ± 300)	<500 (<30)	<8,000 (<600)	<5,000 (<300)	<9,000 (<600)	<2,000 (<100)	<400 (<30)	<800 (<50)	5,500 ± 1,000 (360 ± 60)	12,000 ± 3,000 (800 ± 200)	<2,000 (<100)	<2,000 (<100)	<1,000 (<70)	<700 (<50)
D-SC-19 Steam Relief Valve	<0.6	510 ± 2	7 ± 1	<0.2	<3	<2	<3	<0.7	<0.1	<0.3	<4	2 ± 1	<0.5	<0.7	<0.4	<0.3
D-SC-20 Low Pressure Inlet to Turbine	<2	2,270 ± 10	37 ± 4	<0.5	<8	<5	<8	<4	<0.4	<0.7	3.1 ± 0.9	<3	5 ± 1	<2	<1	<0.7
D-SC-21 High Pressure Outlet From Turbine	<0.6	975 ± 2	15 ± 2	<0.2	<3	<2	<3	<0.7	<0.1	<0.3	6.6 ± 0.9	4 ± 1	<0.5	1.7 ± 0.7	<0.4	<0.3
D-SC-22 Steam Line Piping	1 ± 0.5	2,750 ± 10	36 ± 3	<0.3	<5	<3	12 ± 6	<1	<0.2	<0.5	3.0 ± 0.6	<2	2.4 ± 0.9	<1	<0.6	<0.4

TABLE 5.3 (con't)

Residual Radionuclide Concentrations in
Corrosion Films from Dresden One, August 1982

Concentrations - pCi/cm² (pCi/gm)

SAMPLE	^{55}Fe	^{59}Ni	^{63}Ni	^{90}Sr	^{99}Tc	^{129}I
D-SC-12 Fuel Pool Ladder	164,000 ± 10,000 (33,000 ± 2,000)	560 ± 40 (110 ± 10)	6,600 ± 500 (1,330 ± 90)	80 ± 5	45 ± 3 (9.1 ± 0.6)	<0.4 (<0.08)
D-SC-15 Floor Drain Instrument Room A	540 ± 30 (0.32 ± 0.02)	85 ± 5 (0.051 ± 0.003)	1,300 ± 80 (0.77 ± 0.05)	6,200 ± 400	0.93 ± 0.06 (0.0006 ± 0.0001)	0.09 ± 0.02 ($5 \times 10^{-5} \pm 1 \times 10^{-5}$)
D-SC-16 Fuel Transfer Chute	440 ± 30	8.9 ± 0.7	3,700 ± 300	0.062 ± 0.004	0.009 ± 0.002	<0.02
D-SC-18 Reactor Steam Vent Line	2.91×10^6 (192,00 ± 11,000)	26,000 ± 2,000 (1,700 ± 100)	$1.28 \times 10^6 \pm 0.08 \times 10^6$ (85,000 ± 5,000)	690 ± 40	4.5 ± 0.3 (0.30 ± 0.02)	<1 (<0.07)
D-SC-20 Low Pressure Inlet to Turbine	2,200 ± 300	10 ± 1	1,000 ± 100	2.9 ± 0.2	0.05 ± 0.01	<0.01
D-SC-22 Steam Line Piping	2,100 ± 200	10 ± 1	720 ± 90	3.8 ± 0.2	0.05 ± 0.02	0.03 ± 0.01

TABLE 5.3 (con't)

Residual Radionuclide Concentrations in
Corrosion Films from Dresden One, August 1982

Concentrations - pCi/cm^2 (pCi/gm)

SAMPLE	^{237}Np	^{238}Pu	$^{239,240}Pu$	^{241}Am	^{242}Cm	^{244}Cm
D-SC-12 Fuel Pool Ladder	0.034 ± 0.004 (0.007 ± 0.001)	61 ± 2 (12.5 ± 0.5)	24 ± 1 (4.8 ± 0.2)	33 ± 2 (6.7 ± 0.3)	7.2 ± 0.7 (1.5 ± 0.1)	56 ± 3 (11.4 ± 0.7)
D-SC-15 Floor Drain Instrument Room A	<0.003	7.3 ± 0.6	13.0 ± 0.7	20 ± 1	0.28 ± 0.03	1.7 ± 0.1
D-SC-16 Fuel Transfer Chute	0.0008 ± 0.0004	0.16 ± 0.01	0.067 ± 0.003	0.11 ± 0.01	0.020 ± 0.04	0.20 ± 0.01
D-SC-18 Reactor Steam Vent Line	0.27 ± 0.13 (0.018 ± 0.009)	720 ± 30 (47 ± 2)	360 ± 10 (24 ± 1)	550 ± 30 (36 ± 2)	100 ± 10 (6.6 ± 0.6)	840 ± 50 (55 ± 3)
D-SC-20 Low Pressure Inlet to Turbine	0.0004 ± 0.0002	0.42 ± 0.02	0.68 ± 0.03	0.98 ± 0.04	0.015 ± 0.004	0.19 ± 0.01
D-SC-22 Steam Line Piping	0.0006 ± 0.0003	0.21 ± 0.01	0.44 ± 0.02	0.70 ± 0.02	0.009 ± 0.003	0.17 ± 0.01

TABLE 5.3 (con't)

Residual Radionuclide Concentrations in Corrosion Films from Dresden One, August 1982

CONCENTRATIONS pCi/cm^2

SAMPLE DESCRIPTION	SAMPLE #	54_{Mn}	60_{Co}	65_{Zn}	94_{Nb}	106_{Ru}	$108m_{Ag}$	$110m_{Ag}$	126_{Sb}	126_{Sn}	134_{Cs}	137_{Cs}	144_{Ce}	152_{Eu}	154_{Eu}	155_{Eu}	$166m_{Ho}$
Fuel Pool Ladder	D-SC-12	1,700	200,000	2,800	<40	<600	<400	<600	<500	<30	6,000	50,100	<200	<100	<100	<80	<50
Fuel Transfer Chute	D-SC-16	3.7	790	11	<0.3	<4	<3	<5	<1	<0.2	3.3	24	4	<0.8	<1	<0.5	<0.4
Reactor Steam Vent Line	D-SC-18	12,000	7.9×10^6	113,000	<500	<8,000	<5,000	<9,000	<2,000	<400	<800	5,500	12,000	<2,000	<2,000	<1,000	<700
Low Pressure Inlet to Turbine	D-SC-20	<2	2,270	37	<0.5	<8	<5	<8	<4	<0.4	<0.7	3.1	<3	5	<2	<1	<0.7

CONCENTRATIONS pCi/cm^2

SAMPLE DESCRIPTION	SAMPLE #	55_{Fe}	69_{Ni}	63_{Ni}	90_{Sr}	99_{Tc}	129_{I}	238_{Pu}	$239,240_{Pu}$	241_{Am}	242_{Cm}	244_{Cm}
Fuel Pool Ladder	D-SC-12	164,000	560	6,600	80	45	<0.4	61	24	33	7.2	56
Fuel Transfer Chute	D-SC-16	440	8.9	3,700	0.062	0.009	<0.02	0.16	0.067	0.11	0.020	0.20
Reactor Steam Vent Line	D-SC-18	2.9×10^6	26,000	1.3×10^6	690	4.5	<1	720	360	550	100	840
Low Pressure Inlet to Turbine	D-SC-20	2,200	10	1,000	2.9	0.05	<0.01	0.42	0.68	0.98	0.015	0.19

TABLE 5.4

Residual Radionuclide Inventories in Various Operating Systems of Dresden One, August 1982

Inventory in Curies

	AREA (cm^2)	^{54}Mn	^{60}Co	^{65}Zn	^{94}Nb	^{106}Ru	^{108m}Ag	^{110m}Ag	^{125}Sb	^{126}Sn	^{134}Cs	^{137}Cs	^{144}Ce	^{152}Eu	^{154}Eu	^{155}Eu	^{166m}Ho
(18) Condensate	1.34×10^{7}	1.6×10^{-1}	110	1.5	$<7 \times 10^{-3}$	$<1 \times 10^{-1}$	$<7 \times 10^{-7}$	$<1 \times 10^{-1}$	$<3 \times 10^{-2}$	$<5 \times 10^{-3}$	$<1 \times 10^{-2}$	7.4×10^{-2}	1.6×10^{-1}	$<3 \times 10^{-2}$	$<3 \times 10^{-2}$	$<1 \times 10^{-2}$	$<9 \times 10^{-3}$
(18) Feedwater	5.00×10^{7}	6.0×10^{-1}	400	5.7	$<3 \times 10^{-2}$	$<4 \times 10^{-1}$	$<3 \times 10^{-1}$	$<5 \times 10^{-1}$	$<1 \times 10^{-1}$	$<2 \times 10^{-2}$	$<4 \times 10^{-2}$	2.8×10^{-1}	6.0×10^{-1}	$<1 \times 10^{-1}$	$<1 \times 10^{-1}$	$<5 \times 10^{-2}$	$<4 \times 10^{-2}$
(20) Steam	7.38×10^{7}	$< 1 \times 10^{-4}$	1.7×10^{-1}	2.7×10^{-3}	$<4 \times 10^{-5}$	$<6 \times 10^{-4}$	$<4 \times 10^{-4}$	$<6 \times 10^{-4}$	$<3 \times 10^{-4}$	$<3 \times 10^{-6}$	$<5 \times 10^{-5}$	2.3×10^{-4}	$<2 \times 10^{-4}$	3.7×10^{-4}	$<1 \times 10^{-4}$	$<7 \times 10^{-5}$	$<5 \times 10^{-5}$
(18) Unloading Ht Ex.	1.11×10^{6}	1.3×10^{-2}	8.8	1.3×10^{-1}	$<6 \times 10^{-4}$	$<9 \times 10^{-3}$	$<6 \times 10^{-3}$	$<1 \times 10^{-2}$	$<2 \times 10^{-3}$	$<4 \times 10^{-4}$	$<9 \times 10^{-4}$	6.1×10^{-6}	1.3×10^{-2}	$<2 \times 10^{-4}$	$<2 \times 10^{-4}$	$<1 \times 10^{-4}$	$<8 \times 10^{-5}$
(18) Reactor Cleanup	3.25 x 10'	3.9×10^{-2}	26	3.7×10^{-1}	$<2 \times 10^{-3}$	$<3 \times 10^{-2}$	$<2 \times 10^{-2}$	$<3 \times 10^{-2}$	$<7 \times 10^{-3}$	$<7 \times 10^{-3}$	$<3 \times 10^{-3}$	1.8×10^{-2}	3.8×10^{-2}	$<7 \times 10^{-3}$	$<3 \times 10^{-3}$	$<3 \times 10^{-3}$	$<2 \times 10^{-3}$
(18) Radwaste	1.42×10^{7}	1.7×10^{-1}	1.10	1.6	$<7 \times 10^{-3}$	$<1 \times 10^{-1}$	$<7 \times 10^{-2}$	$<1 \times 10^{-1}$	$<3 \times 10^{-2}$	$<6 \times 10^{-3}$	$<1 \times 10^{-2}$.	7.8×10^{-2}	1.7×10^{-1}	$<3 \times 10^{-2}$	$<3 \times 10^{-2}$	$<1 \times 10^{-2}$	$<1 \times 10^{-3}$
(12) Fuel Storage	1.60×10^{7}	1.7×10^{-2}	2.0	2.8×10^{-2}	$<4 \times 10^{-4}$	$<6 \times 10^{-3}$	$<4 \times 10^{-3}$	$<6 \times 10^{-1}$	$<50 \times 10^{-3}$	$<3 \times 10^{-4}$	60×10^{-2}	5.0×10^{-1}	$<2 \times 10^{-3}$	$<1 \times 10^{-3}$	$<1 \times 10^{-3}$	$<8 \times 10^{-4}$	$<5 \times 10^{-4}$
(16) Fuel Transfer	7.55×10^{6}	2.8×10^{-5}	6.0×10^{-3}	8.3×10^{-5}	22×10^{-6}	$<3 \times 10^{-6}$	$<2 \times 10^{-9}$	$<4 \times 10^{-5}$	$<8 \times 10^{-6}$	$<2 \times 10^{-6}$	25×10^{-5}	1.8×10^{-4}	3.0×10^{-5}	$<6 \times 10^{-6}$	$<8 \times 10^{-6}$	$<4 \times 10^{-6}$	$<3 \times 10^{-8}$
TOTAL		1.0	660	9.3					5.0×10^{-3}		0.06	0.96	0.98	3.7×10^{-4}			

	^{56}Fe	^{59}Ni	^{63}Ni	^{90}Sr	^{99}Tc	^{129}I	^{238}Pu	$^{239,240}Pu$	^{241}Am	^{242}Cm	^{244}Cm
(18) Condensate	40	3.5 x 10-1	17	8.9×19^{-3}	6.0×10^{-5}	$<1 \times 10^{-5}$	9.6×10^{-3}	4.8×10^{-3}	7.4×10^{-3}	1.4×10^{-3}	1.1×10^{-2}
(18) Feedwater	150	1.3	65	3.5×10^{-2}	2.3×10^{-4}	$<5 \times 10^{-5}$	3.6×10^{-2}	1.8×10^{-2}	2.8×12^{-2}	5.1×10^{-3}	4.2×10^{-2}
(20) Steam	1.6×10^{-1}	7.4×10^{-4}	7.4×10^{-2}	2.1×10^{-4}	3.7×10^{-6}	$<7 \times 10^{-7}$	3.1×10^{-5}	5.0×10^{-5}	7.2×10^{-5}	1.1×10^{-3}	1.4×10^{-5}
(18) Unloading Ht Ex.	3.3	2.9×10^{-2}	1.4	7.4×10^{-4}	5.0×10^{-6}	$<1 \times 10^{-6}$	8.0×10^{-4}	4.0×10^{-4}	6.1×10^{-4}	1.1×10^{-4}	9.3×10^{-4}
(18) Reactor Cleanup	9.7	8.5×10^{-2}	4.2	2.2×10^{-3}	1.5×10^{-5}	$<3 \times 10^{-6}$	2.3×10^{-3}	1.2×10^{-3}	1.8×10^{-3}	3.3×10^{-4}	2.7×10^{-3}
(18) Radwaste	42	3.7×10^{-1}	18	9.9×10^{-3}	6.4×10^{-5}	$<1 \times 10^{-5}$	1.0×10^{-2}	5.1×10^{-3}	7.8×10^{-3}	1.5×10^{-3}	1.2×10^{-2}
(12) Fuel Storage	1.6	5.6×10^{-3}	6.6×10^{-2}	8.0×10^{-4}	4.5×10^{-4}	$<4 \times 10^{-6}$	6.1×10^{-4}	2.4×10^{-4}	3.3×10^{-4}	7.3×10^{-5}	5.6×10^{-4}
(16) Fuel Transfer	3.3×10^{-3}	6.7×10^{-5}	2.9×10^{-2}	4.7×10^{-7}	6.8×10^{-8}	$<2 \times 10^{-7}$	1.2×10^{-6}	5.1×10^{-7}	8.3×10^{-7}	1.4×10^{-7}	1.5×10^{-6}
TOTAL	250	2.1	110	0.078	8.3×10^{-4}		5.9×10^{-2}	3.0×10^{-2}	4.6×10^{-2}	8.5×10^{-3}	6.92×10^{-2}

TABLE 5.5

Total Residual Radionuclide Inventory at Dresden One
August, 1982(a) and at Shutdown - October, 1978

Radionuclide (b)	Half-life (years)	Inventory (curies)	
		August, 1982	October 31, 1978 (Shutdown)
^{60}Co	5.27	660	1,080
^{55}Fe	2.7	250	650
^{63}Ni	100	110	110
^{65}Zn	0.668	9.3	450
^{59}Ni	75,000	2.1	2.1
^{54}Mn	0.855	1.0	20
^{144}Ce	0.779	0.98	30
^{137}Cs	30.2	0.96	1.0
^{244}Cm	18	0.069	0.08
^{134}Cs	2.06	0.060	0.21
^{238}Pu	87.7	0.059	0.061
^{241}Am	432	0.046	0.046
$^{239-240}Pu$	24,100	0.030	0.030
^{242}Cm	0.446	0.0085	2.9
Total		1,030	2,350

(a) Excluding neutron-activated pressure vessel and internals, biological shield, concrete surfaces, residues, sludges and resins in tanks and sumps, and spent fuel.

(b) Other long-lived radionuclides specifically listed in 10CFR61, (9) e.g., ^{94}Nb, ^{99}Tc, and ^{129}I, were not included in the inventory because of their insignificant concentrations in the residual radioactive corrosion films in the plant piping and equipment.

TABLE 5.6

ISOTOPIC INVENTORY OF NEUTRON ACTIVATED COMPONENTS
(as of January 1, 1988)

Component	Volume of material cubic	Mass of material kilograms	H-3 Ci	C-14 Ci	Ca-41 Ci	Mn-54 Ci	Fe-55 Ci	Co-60 Ci	Ni-59 Ci	Ni63 Ci	Zn-65 Ci	No-94 Ci	NO-93 Ci	Tc-99 Ci	Ag-108m Ci	Ba-133 Ci	Eu-152 Ci	Eu-154 Ci	TOTALS Ci
Thermal Shield	2.069	16,220.0	28.9	26.2	0.0	13.6	27,612.6	50,068.1	7.1	1,104.2	0.0	0.5	5.1	0.8	0.6	2.3	0.0	0.6	78,870.7
In-core guide tubes	0.019	145.1	3.1	2.8	0.0	1.5	2,960.0	5,367.2	0.8	118.4	0.0	0.0	0.5	0.1	0.1	0.2	0.0	0.1	8,454.9
Turning vane assembly	0.260	2,041.0	2.2	2.0	0.0	1.0	2,081.8	3,774.8	0.5	83.3	0.0	0.0	0.4	0.1	0.0	0.2	0.0	0.0	5,948.4
turning vane guide post	0.046	362.9	1.9	1.8	0.0	0.9	1,850.8	3,355.9	0.5	74.0	0.0	0.0	0.3	0.1	0.0	0.2	0.0	0.0	5,286.5
Steam deflector support	0.868	6,804.0	0.7	0.7	0.0	0.3	694.0	1,258.4	0.2	27.8	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	1,982.3
Top grid assembly	0.327	2,563.0	13.7	12.4	0.0	6.4	13,071.3	23,701.3	3.4	522.7	0.0	0.2	2.4	0.4	0.3	1.1	0.0	0.3	37,336.0
Core plate	0.368	2,882.0	30.8	27.9	0.0	14.4	29,396.4	53,302.6	7.6	1,175.6	0.1	0.5	5.4	0.9	0.7	2.4	0.0	0.6	83,965.8
Bottom support grid	0.376	2,951.0	31.5	28.6	0.0	14.8	30,100.2	54,578.7	7.8	1,203.7	0.1	0.5	5.6	0.8	0.7	2.5	0.0	0.6	85,976.1
Bottom core support structure	1.114	8,732.0	83.3	84.5	0.0	43.7	89,056.4	161,498.3	23.0	3,561.8	0.2	1.5	16.5	2.7	2.1	7.3	0.0	1.8	254,403.1
Control rod guide tubes	0.440	3,453.0	15.0	13.6	0.0	7.0	14,323.0	25,971.0	3.7	572.8	0.0	0.2	2.6	0.4	0.3	1.2	0.0	0.3	40,911.3
Diffuser basket	0.486	3,810.0	4.5	4.1	0.0	2.1	4,274.8	7,751.3	1.1	171.0	0.0	0.1	0.8	0.1	0.1	0.4	0.0	0.1	12,210.3
CRD housing support tubes	1.203	9,435.0	2.0	1.8	0.0	0.9	1,824.7	3,490.0	0.5	77.0	0.0	0.0	0.4	0.1	0.0	0.2	0.0	0.0	5,497.7
Internal water seal	0.385	3,016.0	0.1	0.1	0.0	0.1	102.7	186.2	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	293.3
Reactor vessel clad	0.722	5,700.4	0.3	0.3	0.0	0.1	250.2	532.3	1.3	191.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	976.0
Reactor vessel	10.521	82,788.0	1.3	0.1	0.0	0.3	616.4	91.6	0.1	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	732.6
Bioshield steel wall	0.299	2,363.6	0.0	0.0	0.0	0.0	4.7	10.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.4
Bioshield sand	102.584	184,658.0	186.4	0.1	0.0	0.0	17.8	5.7	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	12.7	1.3	224.3
Bioshield concrete	136.802	314,660.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
TOTALS	258.899	652,585.0	416.1	206.8	0.1	107.3	218,348.1	394,943.6	57.5	8,914.2	0.4	3.6	40.2	6.6	5.1	17.9	12.8	5.7	623,086.0

TABLE 5.7

Radionuclide Concentrations* (pCi/cm²) in
Dresden Unit One Concrete Core Segments

Location	Depth Interval (cm)	54_{Mr}	60_{Co}	65_{Zn}	94_{Nb}	106_{Ru}	$106m_{Ag}$	$110m_{As}$	125_{Sb}	126_{Sn}
1 Dow Chemical Spill 529' Elevation	0-1	<50	208,800 ± 100	<200	<20	<300	<300	<300	<80	<20
	1-2	<20	73,300 ± 400	<60	18 ± 7	<100	240 ± 70	<80	<20	<20
2. Secondary Steam Generator Room "B" 529' Elevation	0-1	40 ± 20	33,910 ± 50	<70	<8	<200	<200	<90	<60	<20
	1-2	0.5 ± 0.2	320 ± 1	<0.8	<0.09	4 ± 2	<2	<1	<0.7	< 0.2
3. Hallway in front of Accumulator Room 488' 488' Elevation	0-1	27.8 ± 0.9	7,010 ± 10	<4	<0.4	34 ± 6	<4	<5	1.5 ± 1.2	<0.9
	1-2	< 0.03	7.57 ± 0.09	<0.04	<0.02	<0.3	<0.3	<0.2	<0.2	<0.02
4. Sub-pile Room 488' Elevation	0-1	960 ± 70	276,900 ± 100	<900	<30	<500	<400	<500	<100	<40
	1-2	2.5 ± 0.2	1,000 ± 1	<2	<0.2	3 ± 1	<2	<0.7	<0.6	<0.2
5. Make-up Demineralizer 1-2	0-1	< 0.2	27.3 ± 0.3	<0.4	<0.05	<1	<2	<0.5	<0.5	<0.1
		< 0.02	1.98 ± 0.05	<0.04	<0.01	<0.1	<0.1	<0.04	<0.04	<0.01
6. Condensate Pump Room Pit 1-2	0-1	54 ± 6	19,050 ± 20	<20	<3	<60	<70	<30	<20	<7
		< 0.06	27.1 ± 0.2	<0.2	<0.03	<0.5	<0.4	<0.3	<0.1	<0.04
7. Unloading Heat Exchanger Room 1-2	0-1	310 ± 20	108,200 ± 500	<80	<8	<130	180 ± 90	350 ± 100	<30	<8
	1.1 ± 0.2	240.7 ± 0.5	<0.7	<0.08	<1	<0.7	<0.9	0.4 ± 0.2	<0.06	
8. Radwaste Basement 1-2	0-1	29 ± 8	7,550 ± 20	<30	<3	<70	<90	<40	<30	<8
	<0.05	9.2 ± 0.1	<0.1	<0.02	<1	< 2	<0.2	<0.5	<0.1	
9. Radwaste Basement Drainage Trough	0-1	63 ± 8	20,750 ± 20	<80	<4	<80	<90	<40	<30	<8
	1-2	0.10 ± 0.04	11.1 ± 0.1	<0.02	<0.02	2 ± 1	<1	<0.2	0.6 ± 0.4	<0.3

*To convert to pCig, multiply by 0.45.

TABLE 5.7 (con't)

Radionuclide Concentrations* (pCi/cm^2) in
Dresden Unit One Concrete Core Segments

Location	Interval (cm)	^{134}Cs	^{137}Cs	^{144}Ce	^{152}Eu	^{154}Eu	^{155}Eu	^{166}Ho	^{228}Ac
1 Dow Chemical Spill	0-1	<30	130 ± 30	<260	<50	<40	<70	<30	<300
529' Elevation	1-2	<80	40 ± 10	<80	<7	<10	50 ± 20	<10	<80
2. Secondary Steam	0-1	9,870 ± 30	202,200 ± 600	<300	<14	<13	<50	<11	<90
Generator Room "B" 529' Elevation	1-2	102 ± 0.3	1,644 ± 4	4 ± 2	<0.4	<0.2	<0.4	<0.2	<1
3. Hallway in front of	0-1	75.4 ± 0.8	948 ± 1	35 ± 3	<1.2	6.8 ± 0.9	2.4 ± 0.8	<0.6	<5
Accumulator Room 488' 488' Elevation	1-2	0.72 ± 0.04	18.2 ± 0.1	< 0.2	<0.06	<0.04	<0.05	<0.02	1.4 ± 0.2
4. Sub-pile Room	0-1	39,970 ± 900	197,600 ± 400	800 ± 40	<80	<60	300 ± 100	<40	<400
488' Elevation	1-2	27.6 ± 0.2	1,203 ± 1	1.3 ± 0.7	13.1 ± 0.4	1.7 ± 0.3	<0.4	<0.2	<2
5. Make-up Demineralizer	0-1	8.9 ± 0.1	431.1 ± 0.8	<1	<0.1	<0.1	<0.3	<0.06	<0.9
1-2	1-2	0.11 ± 0.02	1.13 ± 0.03	<0.07	<0.06	<0.04	<0.04	<0.02	0.8 ± 0.1
6. Condensate Pump	0-1	15,100 ± 200	111,800 ± 400	180 ± 70	<40	<4	<20	<4	<30
Room Pit 1-2	1-2	4.00 ± 0.09	44.6 ± 0.2	<0.4	0.11 ± 0.07	<0.06	<0.1	<0.05	<0.3
7. Unloading Heat	0-1	640 ± 10	18,120 ± 20	160 ± 100	48 ± 12	49 ± 13	40 ± 30	<10	<100
Exchanger Room 1-2	1-2	0.7 ± 0.1	11.2 ± 0.1	<0.6	<0.2	<0.1	<0.2	<0.2	<1
8. Radwaste Basement	0-1	1,580 ± 10	40,780 ± 40	110 ± 80	<4	<5	<20	<5	<40
1-2	1-2	18.9 ± 0.1	910 ± 1	<1	0.25 ± 0.08	<0.05	<0.3	<0.03	0.6 ± 0.2
9. Radwaste Basement	0-1	6,870 ± 10	90,500 ± 300	360 ± 80	<5	12 ± 6	<20	<6	<40
Drainage Trough	1-2	18.2 ± 0.1	862 ± 3	<0.9	<0.06	<0.04	<0.2	<0.03	<0.2

*To convert to pCig, multiply by 0.45.

TABLE 5.7 (con't)

Residual Radionuclide Concentrations in Dresden One Concrete Cores

CONCENTRATIONS pCi/cm^{2}*

Concrete Core	^{55}Fe	^{59}Ni	^{63}Ni	^{90}Sr	^{99}Tc	^{129}I	^{237}Np	^{238}Pu	$^{239\ 240}Pu$	^{241}Am	^{242}Cm	^{244}Cm
DCC-1 Chemical Spill	18,000 ± 1,000	2,000 ± 100	920,000 ± 80,000	3.0 ± 0.3	117 ± 7	<0.8	0.036 ± 0.006	15 ± 1	12 ± 1	18 ± 1	0.49 ± 0.15	5.6 ± 0.4
DCC-4 Sub-Pile Room	54,000 ± 3,000	2,300 ± 200	770,000 ± 70,000	2,900 ± 200	2.4 ± 0.2	<0.3	0.026 ± 0.005	48 ± 2	21 ± 1	30 ± 1	5.1 ± 0.5	45 ± 3
DCC7 Unloading Heat Exchanger Room	23,000 ± 1,000	670 ± 60	170,000 ± 20,000	17 ± 1	1.3 ± 0.1	<0.3	0.014 ± 0.004	6.7 ± 0.3	3.6 ± 0.2	6.3 ± 0.3	0.80 ± 0.18	8.2 ± 0.6

*TO CONVERT TO pCi/g MULTIPLY BY 0.45

TABLE 5.8

Radionuclide Concentrations (pCi/g) inSelected Onsite Soils
and Sediments from Dresden Nuclear Station (August 1982)

Location	^{40}K	^{54}Mn	^{60}Co	^{65}Zn	^{106}Ru	^{125}Sb	^{134}Cs	^{137}Cs	^{144}Ce	^{152}Eu	^{154}Eu	^{155}Eu
Equipment Hatch area North Side of Sphere	8.3 ± 0.2	0.02 ± 0.01	1.32 ± 0.02	<0.03	<0.07	<0.03	<0.01	0.49 ± 0.01	<0.04	<0.05	<0.04	<0.04
Equipment Storage Doorway East of Sphere	6.9 ± 0.2	0.05 ± 0.02	6.2 ± 0.1	<0.06	<0.1	<0.06	0.06 ± 0.01	1.93 ± 0.02	<0.07	<0.1	<0.08	<0.1
Refuel Building South of Sphere	7.7 ± 0.2	0.23 ± 0.02	13.8 ± 0.1	<0.06	0.2 ± 0.1	<0.06	0.27 ± 0.01	3.36 ± 0.02	0.17 ± 0.07	<0.09	<0.09	<0.03
Radwaste Area 0-6" In Front of Door	7.4 ± 0.5	0.2 ± 0.1	55.9 ± 0.3	<0.3	<0.8	<0.3	1.71 ± 0.07	96.2 ± 0.3	<0.4	<0.6	<0.4	<0.2
6-12"	8.4 ± 0.5	<0.1	161 ± 1	<0.6	<1	<1	6.3 ± 0.1	260 ± 1	1.5 ± 0.6	<0.9	<0.7	<0.2
Sediments												
Inlet Canal 0-8"	14.4 ± 0.3	2.5 ± 0.9	3.1 ± 0.1	<9	9 ± 4	<0.2	<0.07	1.19 ± 0.02	<7	<0.1	<0.1	<0.1
Outlet Canal 0-8"	10.5 ± 0.3	<0.02	2.79 ± 0.03	<0.05	<1	<0.06	0.02 ± 0.01	2.46 ± 0.02	<0.07	<0.09	<0.07	<0.03

6. DECOMMISSIONING ACTIVITIES

6.1 PERIOD 1: SAFSTOR OPERATIONS

Dresden Unit 1 is currently in the SAFSTOR Operations period.

During SAFSTOR Operations and preparations for SAFSTOR Dormancy, systems no longer required will be secured and isolated, as necessary to prepare the Unit for SAFSTOR Dormancy. The objectives of SAFSTOR Operations is to safely, economically, and at a minimal personnel dose place the facility in a state of dormancy until subsequent decontamination and dismantlement is complete. SAFSTOR Operations activities include the following:

- Drain systems no longer in operation.

- Remove or shield source terms in routinely accessible areas, in accordance with Station ALARA objectives. An example of source term reduction activities was the chemical cleaning of the primary system in September of 1984, which removed 753 curies of Cobalt-60 and 12.4 curies of Cesium-137.

- Sealing connections to prevent leakage from operational systems to inoperable systems.

- De-energizing power supplies, instruments, and controls to systems no longer in operation.

Systems and equipment required for use during SAFSTOR will be operated and maintained as identified in Section 6.1.3.

During SAFSTOR Operations, ComEd will continue to implement a program to monitor the performance or condition of systems, structures, and components (SSCs) associated with the storage, control, and maintenance of spent fuel in a safe condition in a manner that provides reasonable assurance that the SSC's are capable of performing their intended function, as required by 10CFR50.65.

Gaseous radioactive waste handling and monitoring is described in the Technical Specifications. Unit 1 discharges are added to the discharge from Units 2 and 3 for a composite total.

Liquid radioactive wastes are collected and sent to Units 2 and 3 for processing and disposal. Technical Specifications prohibit direct discharge from Unit 1 to the environment.

Unit 1 dry active wastes and other solid wastes are collected and processed with Unit 2 and 3 wastes. If any significant volumes of waste are generated, due to cleanup or minor demolition, these will be tracked separately for accounting purposes in determining decommissioning costs.

Commonwealth Edison Company may undertake limited decommissioning activities [including disposal and/or removal of systems, components, and structures] that do not (1) foreclose release of the site for possible unrestricted use; (2) result in significant environmental impacts not previously reviewed; (3) result in there no longer being reasonable assurance that adequate funds will be available for decommissioning; or (4) violate terms of the License.

6.1.1 Drawings

Unit 1 system drawings include:

Reactor Enclosure Drain Tanks and Fuel Handling Water Treatment System (Drawing M1000, M-1001, M1002)

Radwaste Collector Tank, Filters, and Waste Demineralizer Tank (Drawing M1001)

Turbine Building Floor Drain, Tank, and Laundry Waste Treatment System (Drawing M-1003)

Liquid Waste Storage and Holdup Tanks (Drawing M-1004)

Sludge Handling, Resin Storage and Waste Concentrator (Drawing M-1005)

Radwaste Decant Facility (M-1006, M-1007)

River Water System (M-1008)

Service Water System (Drawing M-1009)

Turbine Building Cooling Water System (Drawing M-1010)

Well Water System (Drawing M-1011)

Fire Systems (Drawing M-1012)

Service Air System (Drawing M-1013)

Instrument Air (Drawing M-1013)

Plant Heating System (Drawing M-1014)

Fuel and Lube Oil System (Drawing M-1015)

Chlorine System (M-1016)

Cleanup and Condensate Demineralizer Systems (Drawing M-1017)

Reactor Enclosure Air Conditioning Water System (Drawing M-1018)

Control Rod Hydraulic System (Drawing M-1019)

Turbine (Drawing M-1020)

Main Steam and Condensate (Drawing M-1021)

Nuclear Steam Supply System (Drawing M-1022)

Gaseous Monitoring System (Drawing M-3010)

Electrical One Line Drawings (12E Series)

6.1.2 SAFSTOR Systems Status Overview

The following is a listing of significant operable Unit 1 systems:

Clean Demineralized Water
Cranes
Domestic Water
Electrical
Fuel Oil
Fire Protection
Heating Ventilating and Air Conditioning (HVAC)
Nuclear Fuel
Radiation Monitoring
Radwaste
Screen Wash
Service and Instrument Air
Well Water

Portions of these systems are no longer in operation. Operable portions of these systems are being separated from inoperable portions, in accordance with the objectives of SAFSTOR. The operating status of the above systems or portions thereof are subject to future change utilizing a process similar to 10 CFR 50.59.

The following is a listing of inoperable systems:

Condensate
Contaminated Demineralized Water
Circulating Water
Lube Oil
Power Extraction
Reactor and Auxiliaries
Reactor Enclosure Cooling Water
Service Water
Steam Supply
Turbine Building Closed Cooling Water (TBCCW)

6.1.3 SAFSTOR Systems Status

The following is a listing of the anticipated operational status of Unit 1 systems during SAFSTOR. The operating status of these systems or portions thereof are subject to future change utilizing a process similar to 10 CFR 50.59.

1. NUCLEAR FUEL SYSTEMS

Fuel Storage

Fuel utilized in previous Unit 1 operations is stored in the Unit 1 Fuel Storage Pool, Unit 1 Fuel Transfer Pool, Unit 2 Fuel Storage Pool, and Unit 3 Fuel Storage Pool. The present distribution of this fuel is 660 fuel assemblies and 1 fuel rod basket in the Unit 1 Fuel Storage Pool, 23 fuel assemblies in the Unit 1 Fuel Transfer Pool, 102 fuel assemblies in the Unit 2 Fuel Storage Pool, and 104 fuel assemblies and 1 fuel rod basket in the Unit 3 Fuel Storage Pool.

Unit 2 and Unit 3 Fuel Storage Pools are controlled by Technical Specifications for these Units.

Technical Specifications for the Unit 1 Fuel Storage Pool require the Fuel Pool water level to be ≥ 18 feet. A low water level condition alarms in the Control Room. The water level is monitored shiftly. Water level and water additions are trended. The Clean Demineralized Water System supplies normal make up water to the Fuel Storage Pool, and Fuel Transfer Pool. In an emergency, makeup water for the Fuel Storage Pool can be provided from the Fire Protection Water System.

Typically, the Unit 1 Fuel Storage Pool water level is maintained at approximately 25 feet. Water levels in the Fuel Storage Pool and Fuel Transfer Pool are normally equalized through an interconnecting pipe located within the Upper Fuel Pool Gate, approximately 13 feet above the top of active fuel.

The gates which separate the Fuel Pool from the Transfer Pool are normally installed (Figure 6.5). Movement of these gates are controlled by procedures. This control reduces the probability of a Transfer Pool, or Transfer Tunnel failure affecting the Fuel Storage Pool water level. A blind flange has been welded to the lower end of the Fuel Transfer Tube eliminating the possibility to drain the Fuel Storage Pool or Fuel Transfer Pool through the Transfer Tube.

Fuel Pool Cooling

In December of 1983, the Dresden 1 Fuel Pool water cooling and filter system was removed from service because of operational problems. An engineering evaluation has been performed which concluded that Fuel Pool cooling is no longer required.

The Fuel Pool Cooling and Filter System will remain inoperable.

Fuel Pool Demineralizer

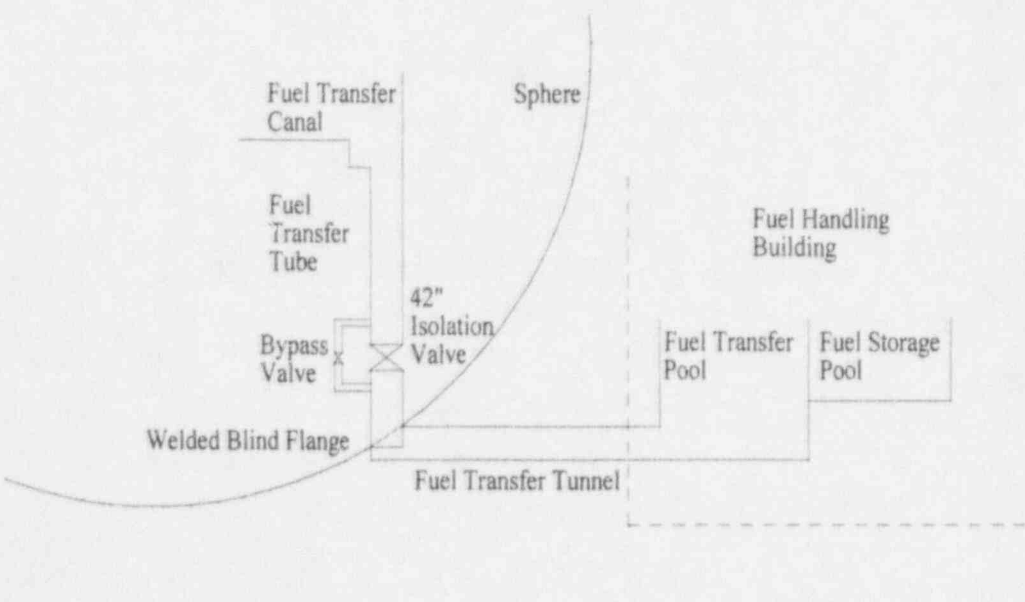
The permanent Fuel Pool Demineralizer System was installed in October of 1994. For the purposes of water quality, the initial Fuel Pool cleanup is complete. Fuel Pool water quality will be maintained within Technical Specification limits.

Fuel Storage Building - Fuel Handling

The Fuel Handling System inside the Fuel Storage Building includes the following structures:

- Fuel Storage Pool (elevation 494'-10" to 521'-3")
- Fuel Transfer Pool (elevation 474'-9" to 521'-3")
- Fuel Transfer Tunnel (elevation 474'-9" to 490'-3")
- Fuel Building Grapple Crane

The Fuel Transfer Pool was previously connected with the Fuel Transfer Tube via the Fuel Transfer Tunnel. However, a blind flange was welded to the lower end of the Fuel Transfer Tube which isolates the Fuel Transfer Tube from the Fuel Transfer Tunnel. Fuel pool gates provide isolation between the Fuel Storage Pool and the Fuel Transfer Pool.



The Fuel Building Grapple Crane is an overhead travelling crane above the Fuel Transfer and Storage Pools. The crane is used to transport materials underwater within or between the Fuel Storage Pool and Fuel Transfer Pool.

Prior to any fuel movements, restrictions requiring Fuel Storage Building doors to be closed, the Ventilation System to be operational, and the Fuel Building Area Radiation Monitors to be operational will be controlled by procedures.

Sphere - Fuel Handling

The Fuel Handling System inside the Sphere includes the following structures:

- Fuel Transfer Canal (elevations 545'-6" to 584'-9½")
- 42" diameter Transfer Tube (elevation 490'-3" to 545'-6")

The Fuel Handling Canal has been drained and is not operable. The Fuel Transfer Tube is no longer in use. A blind flange isolates the Fuel Transfer Tube from the Fuel Transfer Canal. A welded blind flange isolates the Fuel Transfer Tube from the Fuel Transfer Tunnel.

The installation of the welded blind flange accomplishes the following:

- The possibility of draining the Fuel Transfer and Storage Pools through the Transfer Tube is eliminated.

- The Fuel Transfer Tube has been drained to a level below the 502' floor elevation. This level of draining precludes the potential for future Transfer Tube failure due to freezing (Figure 6.4).

- With the Fuel Transfer Tube sufficiently drained, the Sphere Fuel Handling System does not require heating during the winter.

- Surveillance of the isolation valves in the Fuel Transfer Tube is not required. However, scheduled surveillances are conducted to ensure structural integrity is not compromised.

The Fuel Pool Grapple inside the Sphere is no longer in operation. This system was previously utilized to load fuel into the Reactor.

2. RADWASTE SYSTEMS

Processing of Unit 1 radwaste is presently being conducted at the Unit 2/3 Radwaste Facility. The Unit 1 Radwaste System is utilized to collect and temporarily store the limited amount of Unit 1 liquid radwaste. Figure 6.7 provides a layout of Unit 1 tanks.

Radwaste Collector Tank, Filters, and Waste Demineralizer Tank

The Radwaste Collector Tank (T-109) and Surge Tank (T-124) will remain in service. 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. Components which are no longer in operation include:

- Concentrated Sludge Storage Tank (T-112)
- Demineralizer
- Demineralizer Resin Mixing Tank (T-107)
- Fuel Pool Filter Tank (C-25B)
- Permanent Resin Storage Tank (T-113)
- Reactor Water Filter (C-25A)
- Sludge Receiver Tank (T-125)
- Waste Concentrator
- Waste Demineralizer Tank (C-9)
- Waste Filter Tank (C-25C)

Waste Neutralizer Tank and Secondary Steam Generator Collector Tank

The Waste Neutralizer Tank (T-117) is still in service with active input from the Radwaste Building Sump. The Secondary Steam Generator Waste Collector Tanks (T-126A and T-126B) have no active inputs and are no longer used except for occasional surge volume capacity. The Radwaste Acid Tank (T-130) and Radwaste Caustic Tank (T-131) are no longer in operation.

Turbine Building Floor Drain and Laundry Waste Treatment

The Turbine Building Floor Drain and Laundry Drain Systems remain in service. Discharge from the Laundry and Turbine Building Drain Tanks (T-119 and T-127) can be routed directly to the Radwaste Systems for Units 2/3. The Lab Drain Tank (T-118) and Laundry Hold Tanks (T-119A and T-119B) are no longer in use. The Turbine Blow Down Tank (C-21) no longer receives inputs.

Reactor Enclosure Drain Tanks

The Reactor Enclosure Drain Tanks (T-122A and T-122B) remain in service.

Building Sumps

Drainage sumps remain active for Unit 1 structures including the Sphere, Turbine Building, Radwaste Building, Decant Facility, Off-Gas Building, Drain Tank Vault, and Chemical Cleaning Facility. These sumps discharge to the Radwaste System.

Liquid Waste Storage and Hold-up Tanks

The Liquid Waste Storage Tank T-114 and Waste Hold-Up Tanks (T-129A, B and C) have been dismantled and shipped to a process facility for disposition. Unit 1 liquid radwaste goes directly to Unit 2/3 Radwaste for treatment.

Decant Facility Systems

Radwaste systems in the Decant Facility are no longer in operation.

Chemical Cleaning Facility Systems

Radwaste systems in the Chemical Cleaning Facility including the Radwaste Receiving Tanks (T-102A and T-102B), Rinse Water and Condensate Holding Tanks (T-104A and T-104B) remain operational.

3. REACTOR AND AUXILIARIES

The Reactor and auxiliaries are no longer in operation and have been drained.

Reactor Vessel

The Reactor Vessel is made of low-alloy steel, clad inside with stainless steel. The shell thickness opposite the nuclear core is 5-5/8" (including the 3/8" cladding). A drawing of the Reactor Vessel is presented in Figure 6.2.

The Reactor Vessel has been drained and the head detensioned. All nuclear fuel assemblies have been removed.

Nuclear Core

The Nuclear Core of the Reactor had space for 488 fuel assemblies, however, it was never loaded in excess of 464. All remaining fuel assemblies are now located in the Unit 1, Unit 2, and Unit 3 fuel pools as described in Section 6.1.3.1.

Technical Specifications prohibit reloading fuel into the Unit 1 Reactor.

Control Rod Drive

The Control Rod Drive System was comprised of 80 hydraulically operated control rod drive mechanisms, each fitted with cruciform shaped control blades. The control blades contained rods made of stainless steel and boron carbide; each blade contained 44 tubes of boron compacted to 70% of theoretical density.

This system is no longer in operation and has been drained to the extent possible. The irradiated control blades have been disposed of off-site.

Liquid Poison System

The Liquid Poison System is shown in Figure 6.3. The system consisted of a storage tank (C-20), pressure equalizer and a feedline running from the reservoir to the sparger system. Sodium pentaborate was used as the neutron poison.

This system is no longer in operation and has been drained.

Reactor Recirculation Water Cleanup System

The Reactor Recirculation Water Cleanup System consists of two identical loops. Each loop contains a booster pump, a regenerative and non-regenerative heat exchanger, and a demineralizer.

This system is no longer in operation and has been drained.

4. STEAM SUPPLY SYSTEM

The Steam Supply System is comprised of a steam separating drum, 4 secondary steam generators, 4 recirculating pumps, an emergency condenser and unloading heat exchangers (see Figure 6.6 for a schematic drawing).

There are four separate recirculation loops, each consisting of a secondary steam generator, recirculating pump and secondary valves. Each loop could be independently isolated. The Steam Generator and associated pump units are installed in separate shielded compartments and could be isolated from the remainder of the system.

This equipment is no longer in operation and has been drained.

5. POWER EXTRACTION SYSTEM

As indicated in Figure 6.1, the saturated primary and secondary steam, during previous operations, entered the dual-admission turbine from the Main Steam Lines which connect the Reactor to the Turbine. This system consists of a high pressure turbine, low pressure turbine, and tandem compound turbine connected on a shaft to the generator.

The Generator was rated at 245,000 kVA, at a power factor of 0.85, with field excitation by either of two exciter sets with automatic voltage regulation.

The Power Extraction System is no longer in operation.

6. CONDENSATE SYSTEM

The Condensate System includes the Main Condenser, Condensate Pumps, Steam Jet Air Ejector Condensers, Gland Steam Exhauster Condensers, Condensate Demineralizers, chemical feed equipment, Condensate Storage Tank, and Condensate Drip Tank Systems.

This system is no longer in operation. The Condensate Storage Tank (T-121) has been removed.

7. RIVER WATER

The Screen Wash System remains in service to support the Fire Protection Water Supply System. The Screenwash Pumps provide makeup and pressurization for the Fire Protection Water Supply System. The Unit 1 Fire Pump also remains in service. The Circulating Water System is no longer in operation.

8. TURBINE BUILDING CLOSED COOLING WATER (TBCCW)

The Turbine Building Closed Cooling Water (TBCCW) System is no longer in use and has been drained.

9. REACTOR ENCLOSURE COOLING WATER

The Reactor Enclosure Cooling Water System is no longer in operation and has been drained.

10. SERVICE WATER

The Service Water System is no longer in use and has been drained.

11. WELL WATER

The Unit 1 Well Water System including the Well Water Storage Tank (T-108) continues to supply domestic water for Dresden Station (Figure 6.7). Additionally, this system provides cooling water for the Unit 1 Service Air Compressors and Unit 2/3 Prime Computer Room Backup HVAC System.

12. DEMINERALIZED WATER

Unit 1 clean demineralized water originates from the Unit 2/3 Make-Up Demineralizer System (MUDS). The Unit 1 MUDS is not in operation. The Clean Demineralized Water Piping System and Storage Tank (T-105B) remain in operation to supply Units 1, 2 and 3. Portions of the Contaminated Demineralized Water Piping System and Storage Tank (T-105A) remain in operation to supply Units 2 and 3. (Figure 6.7) Make up water for the Unit 1 Fuel Storage and Transfer Pools originates from the Clean Demineralized Water Storage Tank (T-105B).

13. FIRE PROTECTION

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. The Unit 1 Diesel Fire Pump is located in the Unit 1 Crib House. Operation of the Unit 1 Fire Pump is required by the Station Fire Protection Program and controlled by the Dresden Administrative Technical Requirements (DATR).

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

14. SERVICE AND INSTRUMENT AIR

Unit 1 service and instrument air is provided through a connection to the Unit 2 Service Air System. Unit 1 instrument air is primarily utilized for pneumatic instrumentation on tanks and ventilation control systems.

The Unit 1 Instrument Air Compressors have been retired. The Service Air Compressors are being maintained as an alternate supply of Instrument and Service Air for Unit 1. The Chemical Cleaning Building Air Compressor is currently not in use. It may be returned to service following resolution of environmental monitoring constraints.

15. HEATING VENTILATING AND AIR CONDITIONING (HVAC)

Each major building has its own ventilation system, which is operated when required. Ventilation exhausts from the Fuel Storage Building are treated by filtration through a HEPA filter prior to discharge through the Main Chimney. Ventilation from the Radwaste Building is filtered through a HEPA filter prior to discharge through the Radwaste Chimney. The Chemical Cleaning Facility exhaust is filtered through a HEPA filter prior to discharge through the Chemical Cleaning Building Chimney.

Ventilation systems for the Unit 1 Off-Gas Building, Turbine Building, Maintenance Shops, and Sphere are designed to exhaust through the Main Chimney. Continuous operation of these ventilation systems is not normally required.

Main Chimney exhausts are continuously monitored for noble gases, particulates, and iodine as required by Technical Specifications. Chemical Cleaning Building exhaust is monitored for particulates and iodine weekly. Exhaust from the Radwaste Building is not sampled or monitored.

Unit 1 buildings are heated with steam and/or electric heat. Steam heat for Unit 1 is supplied from a connection to the Unit 2/3 Heating System. The Unit 1 Heating Boilers are no longer operational. Electric heat is supplied through permanent fixed units or portable heaters. In the Sphere, electric heat is provided in the Sphere Sump, and Reactor Equipment Drain Tank Rooms to prevent freezing.

Although air conditioning is currently provided in some Unit 1 areas, air conditioning is not required to support continuing Unit 1 operations.

The Reactor Enclosure air conditioning system is no longer in operation. This system has been drained.

16. RADIATION MONITORING SYSTEMS

The Fuel Storage Building noble gas monitor provides local indication of abnormal Kr-85 activity in the ambient air with an audible alarm and rotating beacon. This could occur in the event of a fuei failure in the Fuel Storage Building. A remote alarm is provided in the Unit 2/3 Control Room.

Two (2) area radiation monitors located in the Fuel Storage Building have been maintained operational and will remain in service while spent fuel is stored in the building. A remote alarm is provided in the Unit 2/3 Control Room.

A chimney radiation monitor (SPING) provides monitoring of Main Chimney discharges in accordance with Technical Specifications.

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

The Service Water System is no longer in use and has been drained. The Service Water Radiation Monitor is, therefore, no longer required or in use.

The Discharge Canal Sampler continues to be utilized at Unit 1, as required by the Technical Specifications. Changes to this system are not anticipated. Technical specifications prohibit a planned liquid release from Unit 1 to the environment.

17. ELECTRICAL SYSTEMS

This system is a "Unit System" in which the Generator, Main Power Transformer 1, and Station Service Transformer 11 are all solidly connected together. This equipment is no longer in operation.

Station Service Transformer 12 is connected to the 138 kV yard which is the normal auxiliary power supply for Unit 1. Reserve Station Service Transformer 13 can supply auxiliary power in the absence of normal power. Switching to and from Transformer 13 requires a dead bus transfer.

The 125 V DC power supply system consisting of batteries and battery chargers on the 517'6" elevation of the Turbine Building remain in operation. Batteries and battery chargers for the Unit 1 Fire Pump remain in operation. The Unit 1 Diesel Generator is no longer in operation.

The following Unit 2/3 or Station electrical loads are supplied from Unit 1:

<u>DC Loads</u>

- Control power for 138 kV Switchyard breakers
- Control Room emergency lighting
- Control Room standby lighting
- Control Room Panel 901-2
- Evacuation sirens
- Access Control Building emergency lighting
- Unit 1 Fire Pump

<u>AC Loads</u>

- Station Blackout Building
- Prime Computer Room HVAC
- Meteorological Tower and Environmental Monitoring Stations
- Access Control and Administration Building
- Maintenance Shops
- Shift Engineer's Office
- Electrical distribution from Unit 2 Transformer 22 to 138 kV Switchyard
- Evacuation sirens

18. CRANES

The Fuel Storage Building Overhead Crane and Fuel Grapple Crane are operational. Procedures restrict the movement of heavy loads over the Unit 1 Fuel Storage Pool and Fuel Transfer Pool.

The Sphere Refueling Floor Crane is not operable.

The crane on the Unit 1 Turbine Deck is not required for Unit 1 operations. This crane remains in use to support Units 2/3.

Inoperable Unit 1 cranes may be returned to service to facilitate future decontamination and dismantlement

19. FUEL AND LUBE OIL SYSTEMS

The Lube Oil System for Unit 1 is no longer in operation and has been drained.

The Fuel Oil System for Unit 1 remains in service to supply the Unit 1 Fire Pump Diesel Day Tank. The Fuel Oil System for the Unit 1 Boilers and Diesel Generator are no longer in operation and have been drained.

6.1.4 Decontamination and Dismantlement During SAFSTOR Operations

During SAFSTOR Operations limited decontamination and dismantlement activities have been performed. Waste generated during decontamination and dismantlement are temporarily stored on-site or were shipped to licensed facilities for disposal.

In 1994 and 1995, the Unit 1 Fuel Pool, Transfer Pool, and Transfer Tunnel were cleaned by removing metallic components and sludge.

In 1995 and 1996, the above ground Unit 1 Radwaste Tanks were dismantled. This effort included the dismantling and removing the Liquid Waste Storage Tank (T-114) and Waste Hold-Up Tanks (T-129A, B, and C).

In 1995 and 1996, a majority of the asbestos insulation in the Unit 1 Sphere was abated.

In 1996, stored piles of contaminated dirt were removed from Unit 1 areas. This effort allowed free access to these areas.

FIGURE 6.1
TURBINE SYSTEM

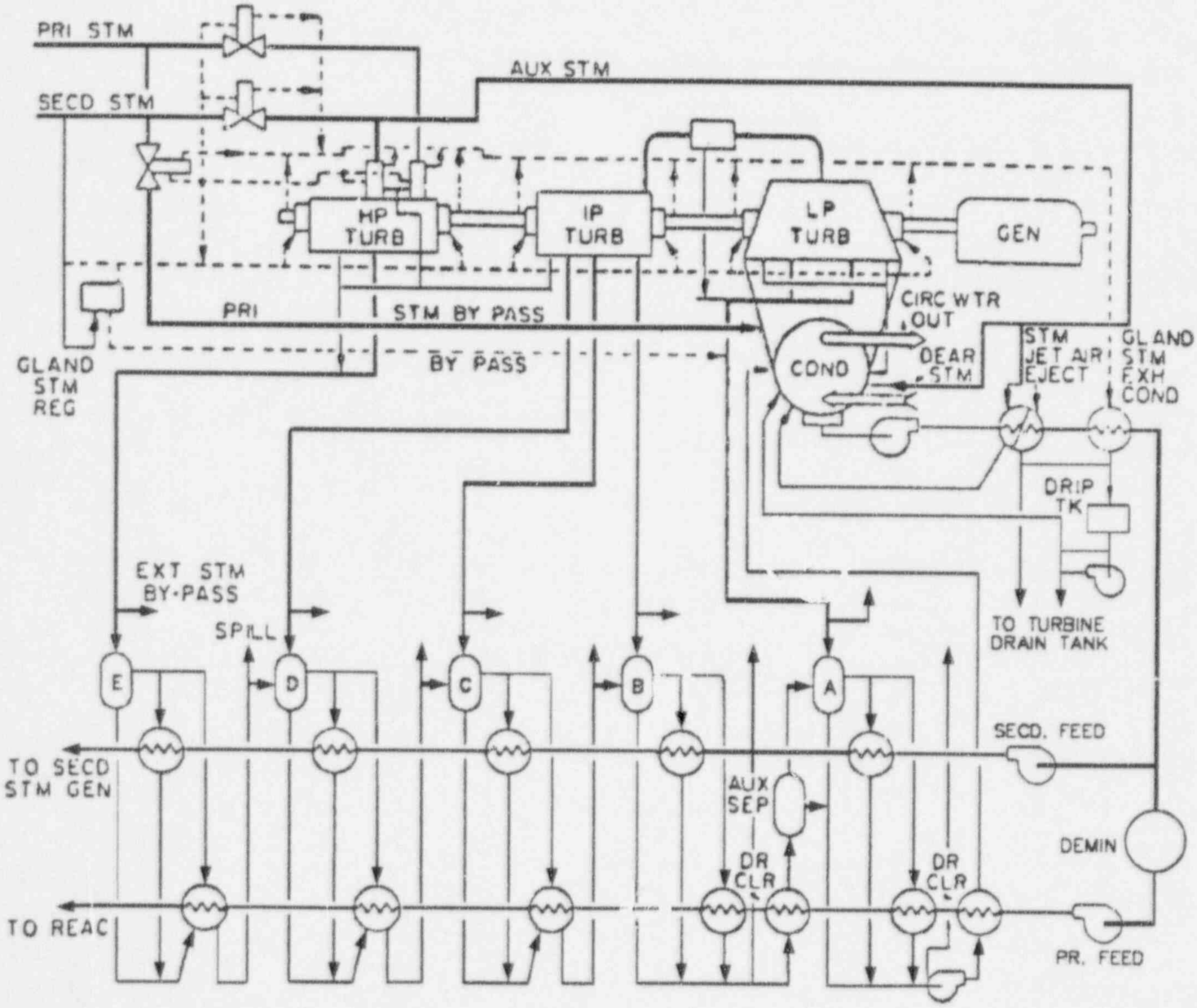


FIGURE 6.2
REACTOR VESSEL

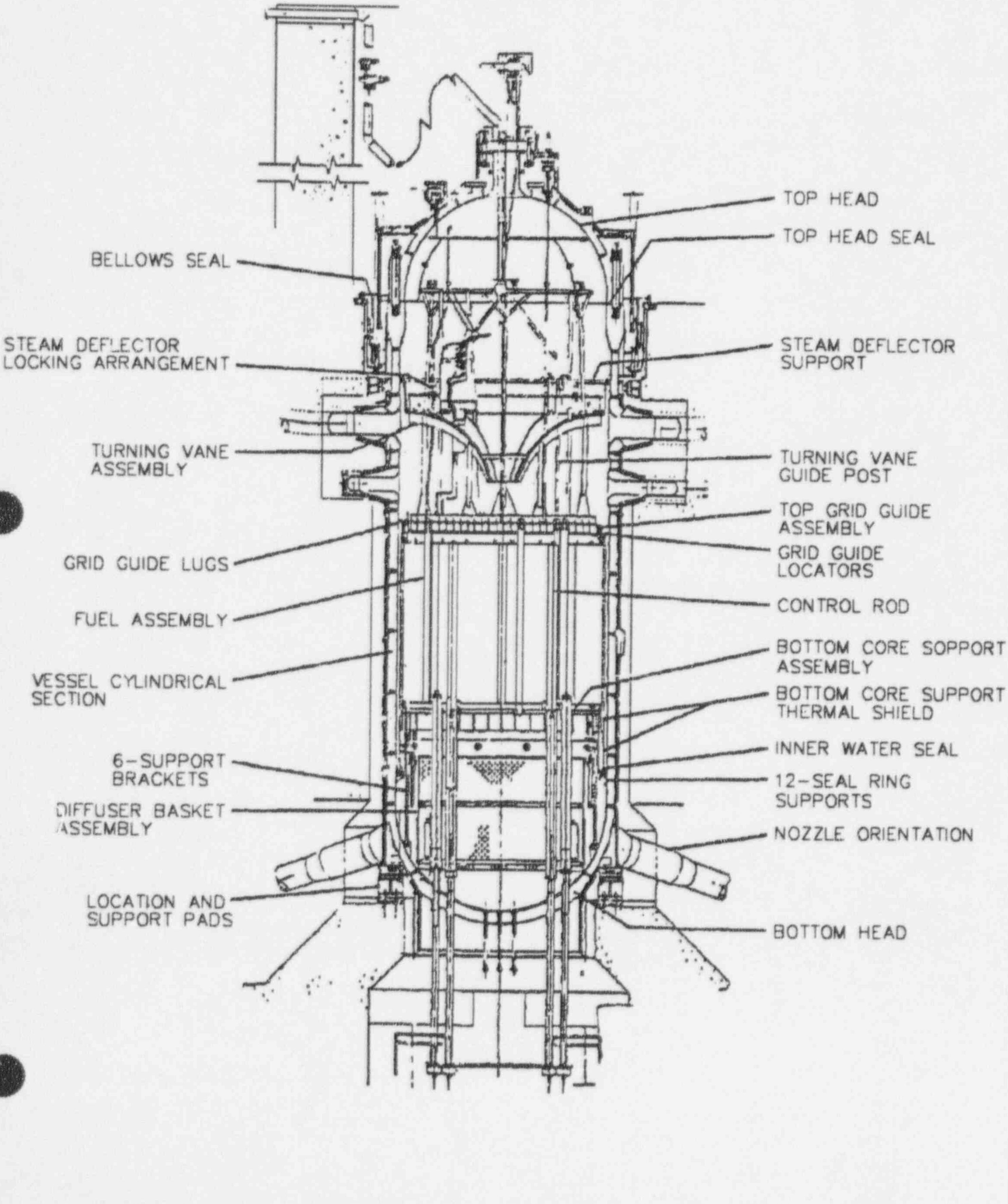


FIGURE 6.3
LIQUID POISON SYSTEM

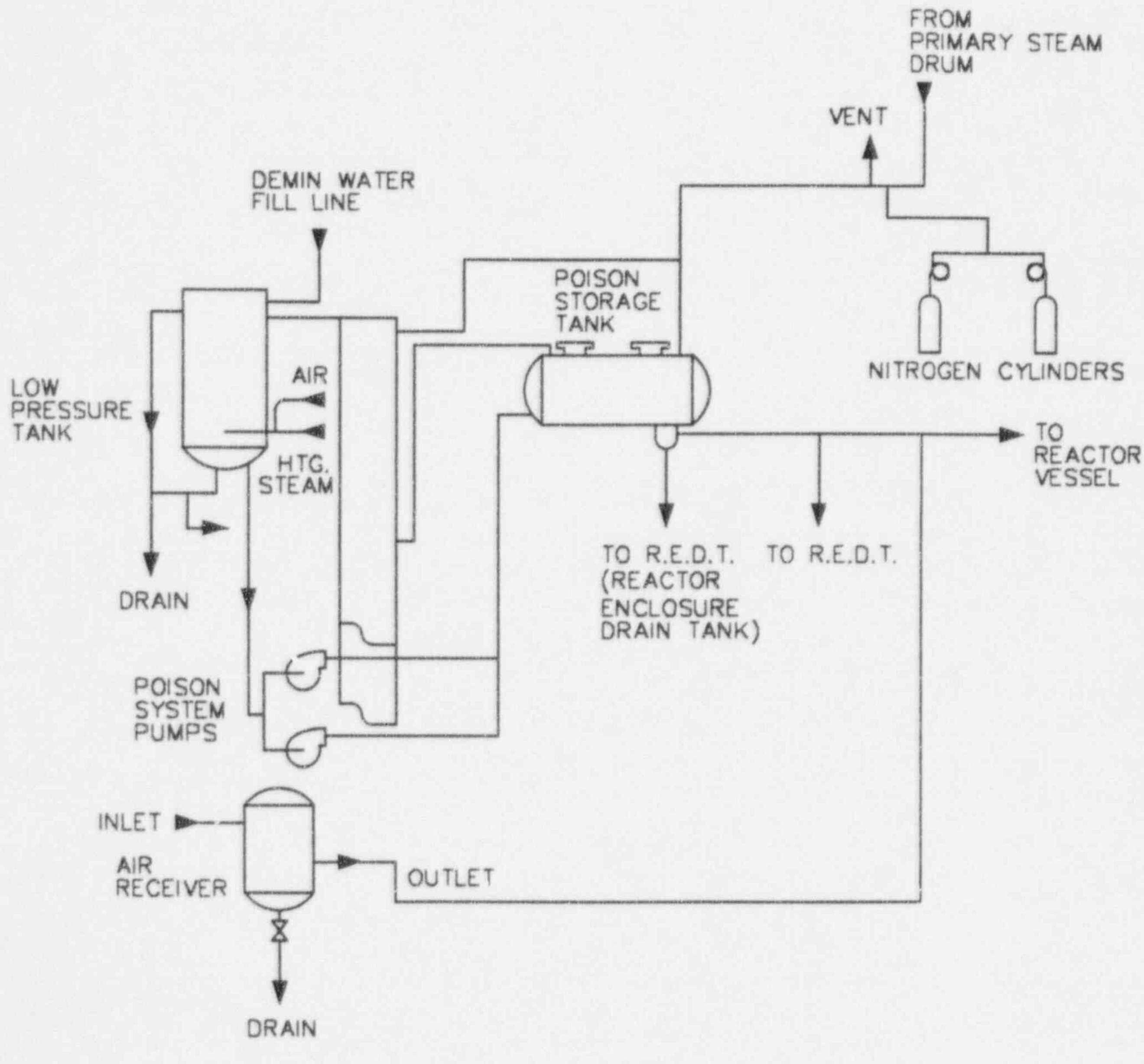


FIGURE 6.4
FUEL HANDLING SYSTEM

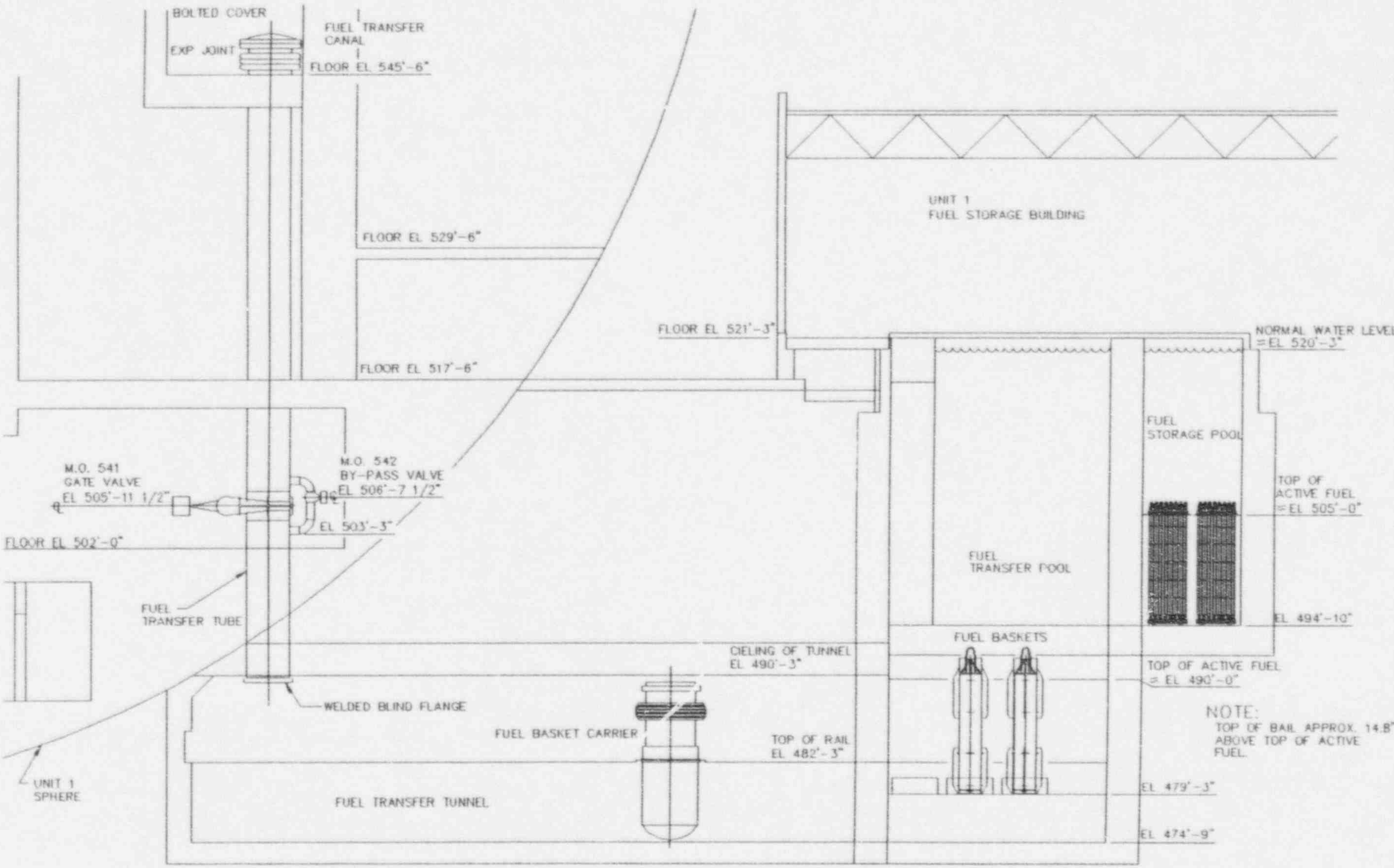


FIGURE 6.5
UNIT 1 FUEL STORAGE POOL & FUEL TRANSFER POOL

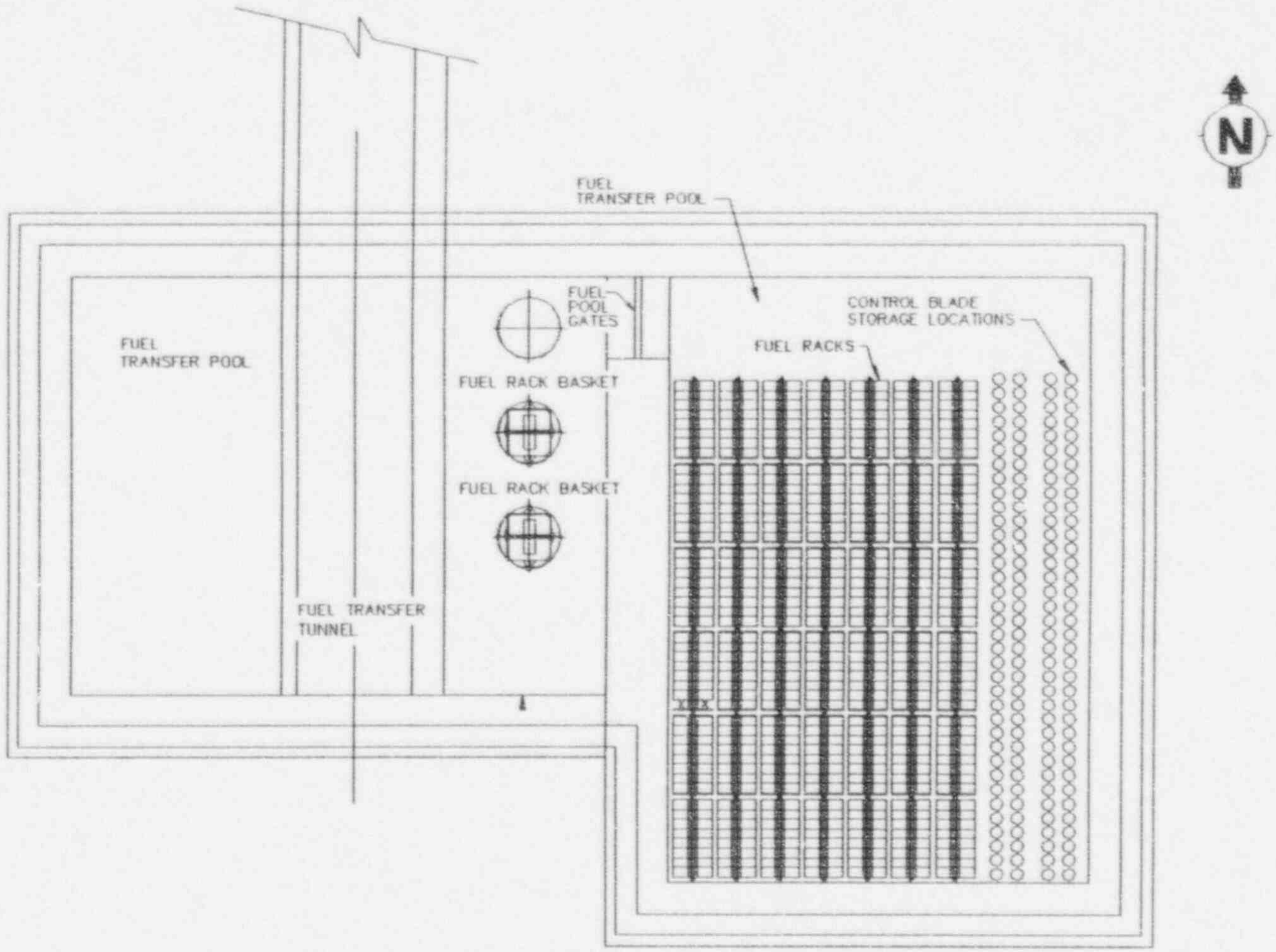


FIGURE 6.6
SCHEMATIC DRAWING OF STEAM SUPPLY SYSTEM

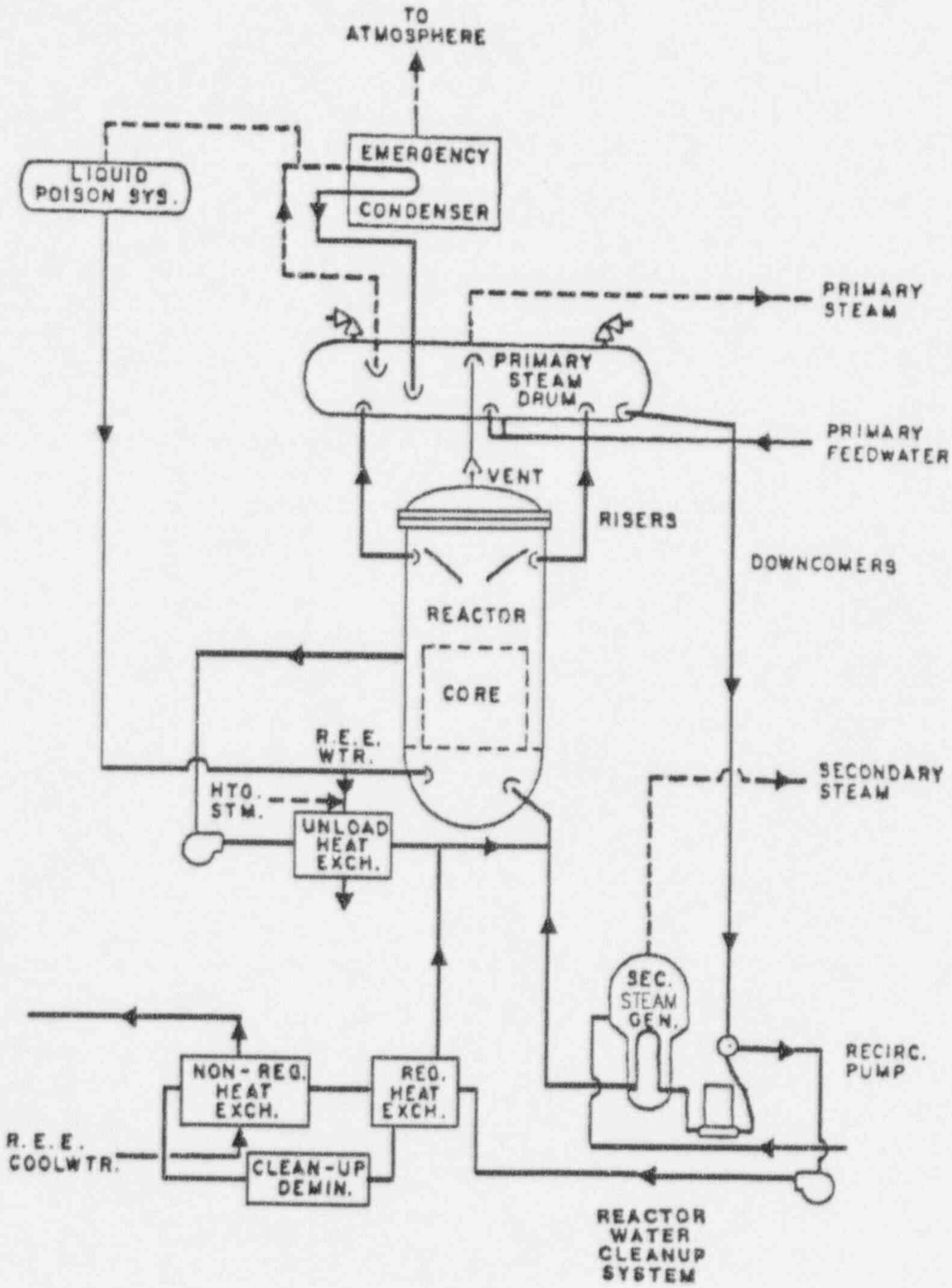
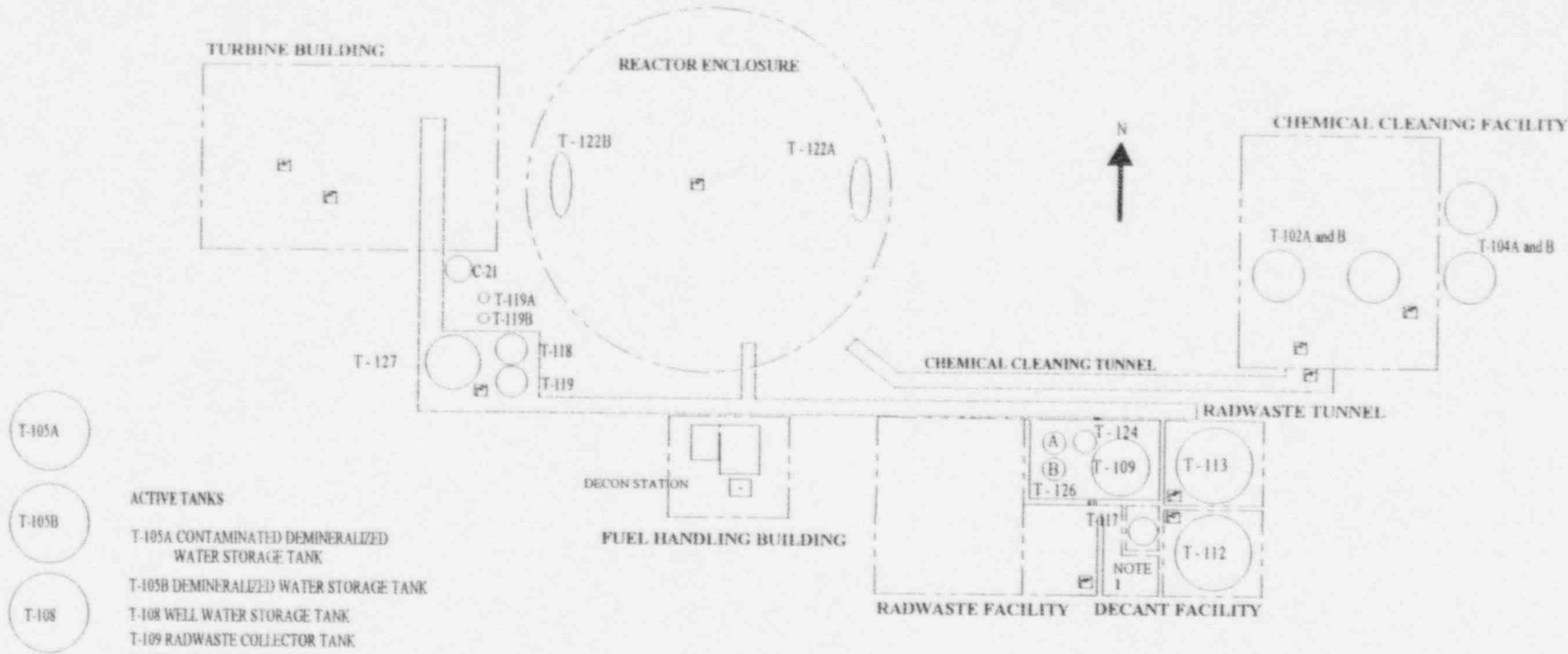


FIGURE 6.7 - UNIT 1 TANKS



ACTIVE TANKS

T-105A CONTAMINATED DEMINERALIZED WATER STORAGE TANK
T-105B DEMINERALIZED WATER STORAGE TANK
T-108 WELL WATER STORAGE TANK
T-109 RADWASTE COLLECTOR TANK
T-117 WASTE NEUTRALIZER TANK
T-119 LAUNDRY DRAIN TANK
T-122A and B REACTOR ENCLOSURE DRAIN TANK
T-124 SURGE TANK
T-126A and B SECONDARY STEAM GENERATOR WASTE COLLECTOR TANK
T-127 TURBINE BUILDING FLOOR DRAIN TANK
CHEMICAL CLEANING FACILITY SUMP
DECANT FACILTY SUMPS
DRAIN TANK VAULT SUMP
TURBINE BUILDING SUMPS
RADWASTE FACILTY SUMP
REACTOR ENCLOSURE SUMP

INACTIVE TANKS

C-9 WASTE DEMINERALIZER (NOTE 1)
C-21 TURBINE BLOWDOWN TANK
C-25A REACTOR WATER FILTER (NOTE 1)
C-25B FUEL POOL FILTER (NOTE 1)
C-25C WASTE FILTER (NOTE 1)
T-107 DEMINERALIZER RESIN MIXING TANK (NOTE 1)
T-118 LABORATORY DRAIN TANK
T-119A and B LAUNDRY HOLD TANKS
T-130 RADWASTE ACID TANK (NOTE 1)
T-131 RADWASTE CAUSTIC TANK (NOTE 1)

KEY

BUILDING
TUNNEL
PIPING
WALL PENETRATIONS TO ALLOW DRAINAGE
SUMP PUMP

NOTE 1 THESE INACTIVE TANKS ARE LOCATED IN THE RADWASTE FACILITY THEY ARE NOT SHOWN ON THE DRAWING.

NOT DRAWN TO SCALE

6.2 PERIOD 2: SAFSTOR DORMANCY

During SAFSTOR Dormancy, administrative procedures, structures, components and equipment will be maintained for the continued safety of workers and the general public.

Generic List of Activities:

Radiation Survey

A baseline radiological survey was taken prior to the Safe Storage period. Routine quarterly surveys are being performed to compare with the baseline survey.

Operation of Plant Systems

Systems will be operated as required by the Technical Specifications. The operation will be in accordance with approved procedures.

Maintenance of Structures, Systems and Components

The Maintenance Program will be a continuation of the existing program and will include both preventive and corrective maintenance. The preventive maintenance aspect will provide for regular surveillance of structures, systems and components. The frequency will be dependent upon previous plant experience, on-going conditions, Technical Specifications, and Dresden Administrative Technical Requirements. The corrective maintenance aspect will provide for appropriate action to be taken in the event of degraded systems, components or structures.

During SAFSTOR Dormancy, ComEd will continue to implement a program to monitor the performance or condition of systems, structures, and components (SSCs) associated with the storage, control, and maintenance of spent fuel in a safe condition in a manner that provides reasonable assurance that the SSC's are capable of performing their intended function, as required by 10CFR50.65.

Limited Decommissioning

Commonwealth Edison Company may undertake limited decommissioning activities [including disposal and/or removal of systems, components, and structures] that do not (1) foreclose release of the site for possible unrestricted use; (2) result in significant environmental impacts not previously reviewed; (3) result in there no longer being reasonable assurance that adequate funds will be available for decommissioning; or (4) violate terms of the License.

Structures, Systems and Components Summary

Structures, systems, and components will be maintained in accordance with the generic activities listed above. Maintenance may include the following items:

- Painting the exterior of the Sphere, Turbine Building and other facilities.
- Repair of fencing and/or barriers.
- Repair of roofing systems to prevent leaks.
- Maintenance of the Security Systems.
- Periodic testing of the Fire Protection System.
- Radwaste Systems.
- Heating and ventilation where necessary.

6.3 PERIOD 3: PREPARATION FOR DECONTAMINATION AND DISMANTLEMENT

In preparation for the final dismantlement of Dresden Unit 1, the following activities will be accomplished:

- Review plant drawings and specifications.
- Perform a detailed radiation survey.
- Define the major work sequence.
- Perform a safety analysis.
- Calculate the residual byproduct material inventory.
- Prepare specific removal procedures for plant systems components and equipment.
- Prepare and submit a final dismantlement plan.

6.4 PERIOD 4: DECOMMISSIONING OPERATIONS

Dismantlement may begin upon receipt of the dismantlement order from the USNRC. Decommissioning Operations involves the following:

- Construct temporary facilities to support dismantlement activities.
- Decontaminate and dispose of piping/components.
- Remove and dispose of the spent fuel racks.
- Decontaminate and dispose of the Nuclear Steam Supply System.
- Remove major equipment (Turbine, Condenser, CRD's, etc.).
- Decontaminate site buildings.
- Ship remaining radioactive materials.
- Conduct final radiation survey to assure that radioactive materials have been removed.
- Remove and dispose of plant systems/associated components in accordance with the sequence established in the preparation phase. These systems include:
    * Radwaste
    * River, Well and Service Water
    * Fire Protection
    * Instrument and Service Air
    * Heating and Air Conditioning
    * Control Rod Hydraulics
    * Turbine and Auxiliaries
    * Electrical Power
    * Instrumentation and Control
    * Reactor and Auxiliaries
- Survey the facility to certify the removal of radioactivity, prepare a final dismantlement program report, terminate the License, and release the site for unrestricted use.

6.5 PERIOD 5: SITE RESTORATION

Following completion of the decommissioning operations, site restoration activities may begin. This involves demolition and removal of site structures, systems, and components no longer being utilized. The building foundations will be backfilled with non-contaminated material. The plant site will be graded and landscaped as required.

6.6 SITE RELEASE CRITERIA

Prior to the release of Dresden Unit 1 for unrestricted use, and to comply with Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," a radiological site release survey will be made. This survey will show the following items:

- Identification of areas surveyed.
- Show that reasonable effort has been made to reduce residual contamination to levels as low as are reasonably achievable.
- Description of the scope of the survey and general procedures followed.
- The survey results will be recorded in units that comply with the latest revision of Regulatory Guide 1.86, Table 1.

6.6.1 Survey Designs

Indoor Survey -

In accordance with NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria" (Ref. 6.), each indoor survey is divided into two sub-units:

(1) Lower surfaces, comprised of floor surfaces, wall surfaces, up to a height of 2m, and any other surfaces easily accessible to a surveyor standing on the floor, and

(2) Overhead surfaces, comprised of ceiling surfaces, wall surfaces higher than 2m and all other surfaces not described in (1) above (i.e., on top of piping or beams).

The areas to be surveyed will be divided into a rectangular grid system. The survey block will be no less than 1m nor more than 3m on a side. There should be at least 30 survey blocks in the population.

The radiological conditions to be characterized include direct alpha contamination levels, beta-gamma dose rates at 1cm above the surface, external gamma radiation levels at 1m above the floor, and removable alpha and beta contamination levels.

The surveyor will record all measurements and the average of five measurements of each type in each block is to be reported as an "unbiased"

measurement for that block, and the measurements at the "beta-gamma maximum point" are reported as "biased" measurements. Smear or dust samples will be taken at some of the beta-gamma maximum points for correlation of data.

Records of the survey should contain, as a minimum, the following:

(1) Survey block numbers, identifiable to a scale drawing and
   * The building name or number.
   * The building floor number.
   * The surfaces surveyed.
   * The type of measurement and unit.

(2) Name of surveyor, date of survey.

(3) Type, model number,and calibration date of instruments used.

Outdoor Survey -

In general outdoor surveys are the same as indoor surveys with the following exceptions:

(1) No survey block should be less than 5m nor more than 15m on a side.

(2) Soil samples will be collected to determine radionuclide concentrations.

(3) Water and air samples will be collected in addition to biota sampling to define radionuclides present or movement on-or off-site.

(4) Core drilling will be taken if there is any reason to suspect subsurface contamination. The number of cores will be dependent upon the extent of contamination.

7. WASTE MANAGEMENT

Wastes from decommissioning operations consist of four types:

Radioactive materials
Radioactive special materials*
Special waste materials*
Nonradioactive materials

* See Sections 7.2 and 7.3.

These estimated types and quantities of these wastes will be identified for each period of the decommissioning operations.

Information contained throughout Section 7 pertains to decommissioning cost estimates prepared prior to 1996. As part of the site specific cost estimate and site specific decommissioning experience, this information will be revised prior to February 1997.

7.1 RADIOACTIVE MATERIALS

The total quantity of radioactive materials for each period is shown in Table 7.1 and is based on the Decommissioning Study for Dresden Unit 1 (Ref. 4). The volume of wastes include the burial container volume at an average void fraction of 40% to 60%. These wastes consist of piping, valves, pumps, heat exchangers, concrete, structural steel, and soil.

Most of the materials for controlled burial are categorized as Low Specific Activity (LSA) material containing less than Type A quantities, as defined in 49 CFR 173-189 (Ref. 7). The Reactor Vessel and materials are mostly Type B shipments and by existing regulations and technologies are expected to be shipped in reusable shielded casks with disposable liners. Some portions of the Vessel remotely located from the core center (e.g., Vessel Head) can qualify as LSA material and would be shipped as an LSA shipment.

TABLE 7.1
RADIOACTIVE WASTE VOLUME (REF. 4)

Activity		Volume, cu yds
Period 1	SAFSTOR Operations	257
Period 2	SAFSTOR Dormancy	(Note 1)
Period 3	Preparation for Decontamination and Dismantlement	10
Period 4	Decommissioning Operations	9,056
Period 5	Site Restoration	None

Note 1 Minimal radioactive waste is expected to be generated during SAFSTOR Dormancy.

7.2 SPECIAL WASTE AND TSCA WASTE

In Illinois, special waste is defined as industrial process waste or pollution control waste that must be specially manifested and disposed at an Illinois Environmental Protection Agency (IEPA) authorized facility as required by Title 35 Illinois Administrative Code (IAC) Part 808. Industrial process wastes are those generated as a result of the manufacture of a product or performance of a service, and which pose a present or potential threat to human health or the environment or exhibit inherent properties which make the disposal of such waste in a landfill difficult to manage by normal means. Industrial wastes that fall under the special waste designation include asbestos, spent resins, oil-contaminated soil and certain process sludges.

Polychlorinated biphenyls (PCB's) are regulated under the Toxic Substance and Control Act (TSCA). In 40 CFR 761, the USEPA has established rules and regulations for the handling, marking, disposal and record-keeping of PCB's and PCB-containing equipment. PCB's have been historically used in the dielectric fluids found in capacitors and some transformers. PCB's have also been found as contaminants in some mineral oil filled transformers.

The source of special wastes for the Dresden Unit 1 decommissioning would be asbestos insulation on piping and components. The amount of non-radioactively contaminated asbestos insulation is approximately 129 cubic yards (Ref. 4), assuming all insulation contains asbestos.

The source of TSCA waste would be from transformers contaminated with PCB's. The amount of oil in the 480V transformers is shown in Table 7.2. This waste will be disposed of at a TSCA-permitted disposal facility as part of Commonwealth Edison Company's continuing program to dispose of PCB's.

TABLE 7.2

TRANSFORMER OIL VOLUMES

Transformer Number	Volume (gals)
14	340
15	340
16	340
17	340
	1,360

Oil from Transformers 1, 11, 12, 13, 118, 119 and 120 have been sampled and do not contain PCBs. A program is in progress to reduce or eliminate PCBs in transformers 14, 15, 16 and 17.

7.3 RADIOACTIVE SPECIAL WASTES

The primary source of radioactive special wastes would be asbestos insulation on radioactively contaminated piping and components. The estimated volume of this waste is approximately 535 cubic yards (Ref. 4) assuming that all insulation contains asbestos. It is assumed the controlling concern will be radioactivity, and therefore this waste must be disposed of in a low-level waste facility. The Dresden Unit 1 Decommissioning Study cost estimate was based on this waste being packaged in the same burial containers as the associated piping and components (Ref. 4).

7.4 NONRADIOACTIVE MATERIALS

Nonradioactive (and non-special) waste materials will be generated during the ultimate dismantlement of Dresden Unit 1. The wastes will consist of clean piping, components, structural steel, concrete rubble and miscellaneous trash. The estimated volume of this material is approximately 6,890 tons of scrap and 31,000 cubic yards of concrete rubble and trash.

There are no federal regulations governing disposal of this material in local landfills. Local ordinances may require a dumping permit and a disposal fee.

8. REFERENCES

1. USNRC Final Rule, "Decommissioning of Nuclear Power Reactors," (August 1996)

2. USNRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors"

3. U.S. Code of Federal Regulations, EPA Title 40, "Protection of the Environment," Part 61

4. "Decommissioning Study for the Dresden Nuclear Power Station Unit 1," prepared for Commonwealth Edison Company by TLG Engineering, Inc. (November, 1985)

5. USNRC, "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor," NUREG/CR-0672, prepared by Battelle Pacific Northwest Laboratory (June, 1980)

6. USNRC, "Monitoring for Compliance with Decommissioning Termination Survey Criteria", NUREG/CR-2082, Oak Ridge National Laboratory (June, 1981)

7. U.S. Code of Federal Regulations, Transportation Title 49, Parts 173-178

8. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, RCRA Public Law 94-5800

9. Sargent & Lundy Report SL 4904, Radiation and Thermal Characteristics of U1 Fuel Pool with Lower Than Normal Water Levels (3/25/94)

10. TLG Report, Determination of the Potential Radiation Consequences From a Fuel Handling Accident at Dresden Unit 1 (1992)

11. META, Generic Regional Decommissioning Cost Estimate (February 1994)

12. NUS Study, Criticality Analysis and Source Term Evaluation of Dresden-1 Spent Fuel Storage Pool Accidents (January 15, 1987)

13. Letter from P.B. Erickson (USNRC) to D.L. Farrar (Commonwealth Edison Company) dated April 25, 1994

14. On-Site Review 94-358, Revision 4 to the Decommissioning Program Plan.

15. On-Site Review 96-373, Revision 5 to the Decommissioning Program Plan.