DAIRYLAND POWER COOPERATIVE

NRC Docket No. 50-409

LA CROSSE BOILING WATER REACTOR (LACBWR) • ROUTE 1, BOX 275
GENOA, WISCONSIN 54632 • (608) 689-2331

TO: NRC Document Control Desk CONTROLLED DISTRIBUTION NO. 53

FROM: LACBWR Plant Manager December 16, 1994

SUBJECT: Changes to LACBWR Controlling Documents

I. The following documents have been revised or issued new.

DECOMMISSIONING PLAN, revised November 1994

Instructions:

| | |
|---|---|
| Remove pages 2-4/3-1 & 3-2/3-3 | Replace with new pages 2-4, 3-1, 3-2 & 3-3 |
| Remove pages 3-6/3-7 | Replace with new pages 3-6 & 3-7 |
| Remove pages 4-2/4-3 & 4-4/4-5 | Replace with new pages 4-2, 4-3, 4-4 & 4-5 |
| Remove pages 5-10/ 5-11 | Replace with new pages 5-10 & 5-11 |
| Remove pages 5-12/5-13 | Replace with new page 5-12 & 5-13 |
| Remove pages 6-2/6-3 | Replace with new page 6-2 & 6-3 |
| Remove pages 7-3/7-4 | Replace with new pages 7-3 & 7-4 |
| Remove pages 7-5/8-1, 8-2/8-3, 8-4/8-5, 8-6/8-7, 8-8/8-9 & 8-10/9-1 | Replace with new pages 7-5, 8-1 thru 8-10, and 9-1 |
| Remove pages 9-4/9-5 | Replace with new page 9-4 & 9-5 |
| Remove pages 9-8/10-1 & 10-2/10-3 | Replace with new pages 9-8, 10-1, 10-2 and 10-3 |

**Note**: Due to a printing problem, reverse sides of the pages are being reissued separately.

☒ The material listed above is transmitted herewith. Please verify receipt of all listed material, destroy superseded material, and sign below to acknowledge receipt.

☐ The material listed above has been placed in your binder.

☐ Please review listed material, notify your personnel of changes, and sign below to acknowledge your review and notification of personnel. [To be checked for supervisors for department specific procedures and LACBWR Technical Specifications.]

☐ The material listed above has been changed. [To be checked for supervisors when materials applicable to other departments are issued to them.]

/S/______________________________ DATE____________________

Please return this notification to the LACBWR Secretary within ten (10) working days.

ventual disassembly of the above listed systems. The majority of this material is located on horizontal surfaces in the Fuel Element Storage Well and the Reactor Vessel.

### 2.5.2 Fuel Element Storage Well Leakage

The stainless steel liner in the Fuel Element Storage Well (FESW) has had a history of leakage. From the date of initial service until 1980, the leakage increased from approximately 2 gallons per hour (gph) to just over 14 gph. In 1980, epoxy was injected behind the liner and leakage was reduced to approximately 2 gph. Since then, the leakage rate has slightly increased. Therefore, during SAFSTOR, the leakage rate will be periodically monitored. FESW water level will be continuously monitored in the control room and verified periodically by local inspection. The control room level instrument(s) will also generate an audible alarm when FESW level decreases to a selected level which is significantly above the minimum allowable level as specified in the technical specifications.

### 2.5.3 References

1) DPC Letter, LAC-4935, Madgett to Director of NRR, dated October 5, 1977.

2) DPC Letter, LAC-6274, Linder to Director of NRR, dated May 9, 1979.

3) DPC Letter, LAC-8553, Linder to Director of NRR, dated September 7, 1982.

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# 3. FACILITY SITE CHARACTERISTICS

## 3.1 GEOGRAPHY AND DEMOGRAPHY CHARACTERISTICS

### 3.1.1 Site Location and Description of Site Layout

The La Crosse Boiling Water Reactor is located on the east bank of the Mississippi River approximately 19 miles south of the city of La Crosse, Wisconsin, and 1 mile south of the populated portion of the village of Genoa, Wisconsin. The site is, in the most part, owned by the Dairyland Power Cooperative and currently includes the 50-megawatt La Crosse Boiling Water Reactor and the 350-megawatt coal-fired generating facility, Genoa Unit 3.

The site is on fill in the river-bottom area of the east bank of the Mississippi River and includes a portion of a wooded hillside to the east of the nuclear unit. The site also contains DPC's 161-KV and 69-KV transmission switching center.

The municipalities, including villages, towns and cities within a 25-mile radius of the facility, are shown in Figure 3.1. The population dispersion out to 5 miles is shown on Figure 3.2.

### 3.1.2 The Authority of the Exclusion Area and Licensee Authorities

The site exclusion area referenced in 10 CFR 100, Section 3(a) was initially established as approximately 1,109 feet in radius from the center of the Reactor Building. The area to which access will potentially be excluded during a postulated accident while in SAFSTOR is the area within the Effluent Release Boundary (ERB). The ERB is the Dairyland Power Cooperative property line within the former 1,109 ft. radius exclusion area. (See Figure 3.3.) DPC exercises direct control over its own employees and visitors on the site to exclude them if adverse radiological conditions require. Additionally, Dairyland Power Cooperative maintains a letter of agreement with the Vernon County Sheriff's Department for them to provide any necessary assistance.

## 3.2 TRANSPORTATION, INDUSTRIAL AND MILITARY FACILITIES WITHIN PROXIMITY TO THE PLANT

There are no military facilities located within a 5-mile radius of the nuclear plant site. The only industrial facility of any significant size is the Dairyland Power Genoa Unit 3 coal facility located approximately 200 feet from the nuclear plant and sharing the same site. There are no major manufacturing facilities of any type in this area; it is principally used for agriculture. Transportation routes include the Burlington Northern Railway line from Chicago, Illinois, to the West Coast which crosses through the original exclusion area. The Burlington Northern Railway line is a twin-track line of welded steel track and constitutes a major rail corridor for the railroad. Wisconsin State Trunk Highway 35 also crosses through the original exclusion area. The Mississippi River main channel which is used for barge transportation crosses through the original exclusion area. The Milwaukee Railroad single track line from Minneapolis, Minnesota, to

St. Louis, Missouri, is on the opposite side of the Mississippi River from the plant and was abandoned from 1980 to 1981. The line has since been restored to service but is not frequently used. State Trunk Highway 56 originates in the village of Genoa and runs East towards Viroqua, the county seat. The origin point for Highway 56 is approximately 1-1/2 miles north of the reactor plant.

On the Iowa and Minnesota side of the river, State Trunk Highway 26 runs within 4 miles of the original exclusion area. All the mentioned highway facilities are two-lane paved roadways with unlimited access.

The car count on the road (Highway 35) passing through the nuclear facility original exclusion area is 2,950 cars per 24 hours, as determined by the Vernon County Wisconsin Highway Department in 1984.

There does exist north of the plant, approximately .9 mile, a U.S. Army Corps of Engineers Lock and Dam on the Mississippi River. This lock is not classified as an industrial facility, although it employs approximately 11 individuals.

## 3.3 METEOROLOGY

### 3.3.1 Meteorological Measurement Program

The LACBWR meteorological measurement program consists of onsite equipment located within the Mississippi River valley. Meteorological parameters monitored are wind speed, wind direction, and temperature. Data is also available from the National Weather Service (NWS) station at the La Crosse Municipal Airport, approximately 35 km (21.7 mi.) north of LACBWR.

### 3.3.2 General Climatology

The plant site area exhibits a typical continental type of climate. Temperature extremes in the La Crosse/LACBWR region are more marked because of the river-valley location. Average temperatures vary from -7.1°C (19.2°F) in the three months of winter to 21.9°C (71.4°F) in the summer months.[1] A maximum temperature of 42.2°C (108.0°) was recorded in July 1936, with a minimum low of -41.7°C (-43.0°F) recorded in January 1873, both in La Crosse. Monthly precipitation in the area averages between 5.1 cm (2.0 in.) and 10.7 cm (4.2 in.) from March through October and 2.5 cm (1 in.) and 5.1 cm (2 in.) for the rest of the year. Average annual precipitation is 79.2 cm (31.2 in.). Monthly snow and sleet averages between 12.7 cm (5 in.) and 35.6 cm (14 in.) from November through March, the largest amount normally occurring during March. The normal annual amount of snow and sleet is 110.5 cm (43.5 in.).

The prevailing winds are subjected to the channeling effects of the river valley. This channeling directs almost all of the regional scale cross- valley winds into the north-south orientation of the valley. Wind speeds are also lower as a result of vertical decoupling caused by the river valley. In summer, low wind speeds cause air stagnation in the valley during periods of hot humid weather, and in winter some deepening of inversion conditions can cause a stagnant layer of cold air on the valley floor.

### 3.3.3 Local Meteorology

Onsite meteorological data was collected at two levels (top of stack and 10-meter surface tower) from 1976 to 1994 and provides the data that follows. (See Figure 3.4.)

Wind direction frequency distributions for the surface and stack levels are shown in Table 3-1. The distributions demonstrate the strong predominance of wind directions from the SSE and NNW sectors for the surface and S and N sectors for the stack. The Mississippi River valley has a north-south orientation at the plant site, and it would be expected that winds should be predominantly from the north and south because of the river valley's channeling effect. It is suspected that the layout of the buildings on site reduces the frequency of winds observed from the southwest to west.

TABLE 3-1

WIND DIRECTION FREQUENCY DISTRIBUTION
AT LACBWR SITE AND LA CROSSE NWS
(Percentage 1982-1984)

| | Surface | Stack | East Bluff | LaCrosse NWS |
|---|---|---|---|---|
| N | 10.4 | 15.9 | 5.6 | 5.5 |
| NNE | 2.1 | 5.1 | 4.7 | 1.9 |
| NE | 1.8 | 2.5 | 3.7 | 1.1 |
| ENE | 2 | 1.8 | 4.9 | 1.3 |
| E | 3 | 1.9 | 5.5 | 6.7 |
| ESE | 3.1 | 2.3 | 5.9 | 9.1 |
| SE | 6.1 | 5.2 | 6.2 | 10.6 |
| SSE | 20.9 | 10.2 | 7.5 | 10.9 |
| S | 14.1 | 22.5 | 10.8 | 12.1 |
| SSW | 3.4 | 6.6 | 9.5 | 3.4 |
| SW | 1.4 | 2.8 | 5.6 | 2.3 |
| WSW | 1 | 2.2 | 4.2 | 1.6 |
| W | 1.3 | 2.9 | 5.6 | 7.7 |
| WNW | 2.7 | 3.7 | 6.7 | 6.1 |
| NW | 9.3 | 7.2 | 6.8 | 10.9 |
| NNW | 17.7 | 7.3 | 6.8 | 8.6 |

### 3.4.5 Potential Dam Failures

The U. S. Army Corps of Engineers maintains a lock and dam less than a mile upstream from the facility. The lock and dam was constructed in the 1930's. The NRC technical reviewers noted that Lock and Dam No. 8, upstream from the La Crosse Boiling Water Reactor, has its right bank earth-bermed to control water and direct flow to the dam spillway, which is located in the main river channel. Locks are located on the east bank adjacent to which is the U. S. Army Corps of Engineers' Field Office.

The failure of the main dam or adjacent earth-berms will have a variable effect on the water surface elevations at the La Crosse site. Barges depend on the river discharge for adequate channel depth. The nominal operating pool elevations of Lock and Dam No. 8 are 631 feet MSL (upstream) and 620 feet MSL (downstream). The difference in elevation between head and tail waters of the dam is 0.8 feet at the five-year discharge flow rate of 134,000 cfs. The elevation difference decreases with increasing discharge, so that at a 500-year discharge flow rate (321,000 cfs), the difference is reduced to 0.4 feet. Additional increases in discharge result in a smaller difference in elevation up to the elevation at which the dam is submerged.

Should the dam fail with discharges ranging from 100,000 cfs to 300,000 cfs, the increase in dam tail water elevations will be attenuated as water reaches the La Crosse site. Consequent increase of water elevation will certainly be less than 1 foot of elevation at the site. It was concluded that the effect of a catastrophic failure of Lock and Dam No. 8, during high flow conditions, would have negligible effect on water surface elevations measured at the La Crosse site.

### 3.4.6 Flooding Protection Requirements

Historical flooding protection at the La Crosse site was consistent with the initial design criteria of meeting the passive protection needs of a 100-year return frequency flood. These design criteria were based on the return frequencies established by the United States Geological Survey. During the Systematic Evaluation Program, the Nuclear Regulatory Commission reviewed, through a consultant, current criteria which establish a return frequency more in the approximate range of one in a million years. In this particular review, it was determined that in order to comply with criteria for a probable maximum flood certain evaluations would have to be completed. The existing reactor site did not comply with passive protection requirements to the level of one-in-a-million-year return frequency (probable maximum flood). The site was required to review the stability of certain structures at this flood level. It was determined that the reactor containment building and reactor stack would be able to withstand this flood. Procedures have been established which require certain actions to be taken at various water levels. A river elevation of 630 feet MSL activates the flood-alert stage in which management is alerted of the condition and monitoring is increased. A flood warning condition is declared at 635 feet MSL. At this point, flood control operations are coordinated with any offsite resources needed. Any

anticipated temporary dike construction is commenced depending on estimated final flood level. At 639 feet MSL, a flood emergency is declared. At 643 feet MSL a flood crisis level is declared. At this point, actions are taken to minimize the differential pressure on the containment vessel. The warning available to the facility of flood cresting is 4-5 days following crest at Minneapolis, Minnesota.

### 3.4.7 Ultimate Heat Sink and Low Flow Conditions

The ultimate heat sink of the La Crosse Boiling Water Reactor is the Mississippi River. Low flow to the site occurs in the fall and winter and the most frequently recorded lowest monthly average flow occurs in February. Minimum flows have also been recorded in August and September during periods of drought. Records of minimum and average flows maintained over the period of 1930 to 1955 at the United States Geological Survey Station at La Crosse were reviewed and are summarized as follows. These low flows should vary only slightly from those at the site.

Summary Flow Data for the Mississippi River at La Crosse Station 1930-1955:

| Condition | Discharging Cu. Ft./Sec. |
|---|---|
| All Time Low Flow Rate December 30 and 31, 1933 | 3,200 |
| Median of Annual Minimum Flow Rates (Averaged over 1 day) | 8,100 |
| Overall Average Flow Rate 1930-1955 | 27,970 |

As of January 1, 1988, the fuel pool could be without active cooling for up to five days before boiling commenced. A test (LACBWR Technical Report 137) performed in September of 1993, after six years of decay, indicates that water temperatures would stabilize at a temperature less than boiling. This allows ample time to arrange for alternate cooling methods.

### 3.4.8 Ground Water

As the site has valley sand overlaying a layer of Eau Claire sandstone of the Cambrian Age which is underlaid by a Mount Simon sandstone, wells have been driven in areas closest to the site but not in valleys characterized by sublayers of Mount Simon sandstone. Deep wells penetrating the Mount Simon layer flow to the surface indicating an artesian head above the level of the river valley floor. Use of water from these artesian aquifers has been limited because the chemical quality of this deep water is poorer than that from shallow aquifers. As a result, there has been no extensive withdrawal of water and no serious decrease in the artesian head. Therefore, an accidental release of contaminants cannot enter the artesian aquifer.

The interior of the shell is lined with a 9-inch-thick layer of concrete, to an elevation of 727 ft. 10 in., to limit direct radiation doses in the event of a fission-product release within the containment building.

The containment building is supported on a foundation consisting of concrete-steel piles and a pile capping of concrete approximately 3 ft. thick. This support runs from the bottom of the semi-ellipsoidal head at about el. 612 ft. 4 in. to an elevation of 621 ft. 6 in. The 232 piles that support the containment structure are driven deep enough to support over 50 tons per pile.

The containment bottom head above el. 621 ft. 6 in. and the shell cylinder from the bottom head to approximately 9 in. above grade elevation (639 ft. 9 in.) are enveloped by reinforced concrete laid over a 1/2 in. thickness of premolded expansion joint filler. The reinforced concrete consists of a lower ring, mating with the pile capping concrete. The ring is approximately 4-1/2 ft. thick at its bottom and 2-1/2 ft. thick at a point 1-1/2 ft. below its top (due to inner surface concavity). The ring then tapers externally to a thickness of 9 in. at the top (el. 627 ft. 6 in.) and the 9 in. thickness of concrete extends up the wall of the shell cylinder to 639 ft. 9 in. The filler and concrete are not used, however, where cavities containing piping and process equipment are immediately adjacent to the shell.

Except for areas of the shell adjacent to other enclosures, the exterior surface of the shell above el. 639 ft. 9 in. is covered with 1-1/2-inch-thick siliceous fiber insulation, faced with aluminum. The insulation of the dome is Johns-Manville Spintex of 9 $lb/ft^3$ density, faced with embossed aluminum sheet approximately 0.032 in. thick. The insulation of the vertical walls is Johns-Manville Spintex of 6 $lb/ft^3$ density, faced with corrugated embossed aluminum sheet approximately 0.016 in. thick. The insulation minimizes heat losses from the building and maintains the required metal temperature during cold weather, and reduces the summer air-conditioning load.

The shell includes two airlocks. The principal access to the shell will be through the personnel airlock that connects the containment building to the turbine building. The airlock is 21 ft. 6 in. long between its two doors, which are 5 ft. 6 in. by 7 ft. and are large enough to permit passage of a spent fuel element shipping cask. The containment building can also be evacuated, if necessary, through the emergency airlock, which is 7 ft. long and 5 ft. in diameter, with two circular doors of 32-1/2 in. diameter (with a 30-in. opening). Both airlocks are at el. 642 ft. 9 in. and lead to platform structures from which descent to grade level can be made. When the doors are closed, a clamp exerts a positive force, which is transmitted through the doors to live-rubber gaskets around the door frames to ensure gas tightness.

An 8 ft. by 10 ft. freight door opening in the containment building accommodates large pieces of equipment. It will be opened only when containment isolation is not required. Nine-inch-thick concrete blocks are placed on the outside of the door for shielding. The door is bolted

internally to the door frame in the shell. Two rubber gaskets between the door and door frame ensure a pressure-tight seal.

Approximately 300 mineral insulated (MI) cables and 75 bulkhead conductors penetrate the containment shell. These are in the northwest quadrant of the shell adjacent to the electrical room under the control room. The majority of pipe penetrations leave the containment vessel 1 to 10 ft. below grade level and enter either at the northwest quadrant into the pipe tunnel that runs to the turbine building, or on the northeast side into the tunnel connecting the turbine building, reactor building, stack, and the water treatment and waste gas storage areas.

An approximately 45,000-gal. storage tank in the dome of the containment building supplied water for the emergency core spray system and the building spray system. The piping connection to the emergency core spray system is near the bottom of the tank. The connection to the building spray system supply header is a standpipe within the tank (the spray system piping and nozzles having been removed); the top of the standpipe is sufficiently above the bottom of the tank to leave 15,000 gal. of water for use in the emergency core spray system. The storage tank also provides water for use during refueling and other operations in the fuel element storage well.

A 50-ton traveling bridge crane with a 5-ton auxiliary hoist is located in the upper part of the containment building. The bridge completely spans the building and travels on circular tracks supported by columns around the inside of the building just below the hemispherical upper head. A trolley containing all the lifting mechanisms travels on the bridge to near the crane rail, and it permits crane access to any position on the main floor under the trolley travel-diameter. The lifting cables of both the 50-ton and the 5-ton hoists are also long enough to reach down through hatchways into the basement area. Hatches at several positions in the main and intermediate floors may be opened to allow passage of the cables and equipment.

The spent fuel is stored in racks in the bottom of the spent fuel storage well located adjacent to the reactor biological shielding in the containment building. The storage rack system is a two-tier configuration such that each storage location is capable of storing two (2) fuel assemblies, one above the other. Fuel assemblies stored in the lower tier are always accessible (e.g., for periodic inspection) by moving, at most, one other assembly. Each storage rack consists of a welded assembly of fuel storage cells spaced 7 inches on center. A neutron absorbing $B_4C$/Polymer Composite plate is incorporated between each adjacent fuel storage cell in each orthogonal direction. Horizontal seismic loads are transmitted from the rack structures to the fuel storage well walls at three elevations (the top grid of the upper tier rack section, the top grid of the lower tier rack section and the bottom grid of the lower tier rack section) through adjustable pads attached to the rack structures. The vertical dead-weight and seismic loads are transmitted to the storage well floor by the rack support feet. The fuel storage racks and associated seismic bracing are fabricated from Type 304 stainless steel.

The remaining grade or above grade areas contain a shower/wash/frisking area, and the dry active waste (DAW) compactor unit and temporary storage space for processed DAW containers.

Beneath the grade floor are two shielded cubicles. One cubicle, through which access is gained by removal of floor shield plugs, is available for the storage of up to nine higher activity solid waste drums. The other area, through which access is gained by a stairway, contains the dewatering ion exchanger, the WTB sump and pump, and additional waste storage space.

The Waste Treatment Bulding ventilation is routed through an HEPA filter to the stack plenum. The building is normally maintained at a negative pressure. The general arrangement of the WTB is shown on Figure 4.5.

The LSA Storage Building is southwest of the Turbine Building. It is used to store processed, packaged and sealed low level dry active waste materials, and sealed low level activity components for a period of approximately 5 years. The building has the capacity for 500 DOT17H-55 gallon drums of waste. No liquids are stored in this building. There are no effluent releases from this building during normal use.

### 4.2.4 Cribhouse

The Cribhouse is located on the bank of the Mississippi River to the west of the plant and through its intake structure, provides the source of river water to the various pumps supplying river water to the plant. The Cribhouse contains the diesel-driven high pressure service water pumps, travelling screens, low pressure service water pumps and the circulating water pumps.

### 5.2.8 Alternate Core Spray System

The Alternate Core Spray System consists of two diesel-driven High Pressure Service Water (HPSW) pumps which take a suction from the river and discharge to the reactor vessel through duplex strainers and two motor-operated valves installed in parallel.

The Alternate Core Spray System was installed to provide backup for the High Pressure Core Spray System. It provided further assurance that melting of fuel-element cladding will not occur following a major recirculation line rupture. It has a secondary function of providing backup to the High Pressure Service Water System and Fire Suppression System.

The Emergency Service Water Supply System (ESWSS) Pumps were portable pumps which served as backups to the diesel-driven High Pressure Service Water Pumps in the event the Cribhouse or underground piping were damaged. The ESWSS system has been removed.

System Status

Since the reactor is defueled, the Alternate Core Spray System is not required to be operational. Therefore, the manual isolation valve to the Containment Building is closed. The balance of the system continues to be operational to provide the requirements of the HPSW System.

### 5.2.9 Control Rod Drive Auxiliaries

The function of this system was to provide hydraulic fluid under pressure for the purpose of hydraulically inserting the control rods when an immediate plant shutdown was necessary.

System Status

This system has been removed along with the lower Control Rod Drive mechanisms.

### 5.2.10 Gaseous Waste Disposal System

This system routed main condenser gasses through various components for drying, filtering, recombining, monitoring and holdup for decay. Most of the system has been removed since it was no longer required for SAFSTOR nor necessary for any potential repowering.

### 5.2.11 Fuel Element Storage Well System

The storage well is a stainless lined concrete structure 11 feet by 11 feet by approximately 42 feet deep. When full, it contains approximately 38,000 gallons.

It is completely lined with Type 316 stainless steel. The walls are 16-gauge sheet and the bottom a 3/8-inch plate. All joints are full penetration welds. Vertical and horizontal expansion joints in the storage well allow for thermal expansion. A three-section aluminum cover, with two viewing windows, has been manufactured to cover the pool.

**Design values** for the storage well are given below:

Well Floor: safe uniform live load . . . . . . . . 5,000 $lb/ft^2$

Spent fuel elements and control rods are stored in two-tiered racks in the Fuel Element Storage Well until they can be shipped. A transfer canal connects the upper portion of the well to the upper vessel cavity and is closed with a water-tight gate and a concrete shield plug. The water level in the well is normally maintained at an elevation of ≥ 695 feet with fuel in upper rack.

Storage well cooling is accomplished by drawing water through a 6-inch penetration at elevation 679 feet, or a 4-inch line at elevation 679 feet 11 inches, and pumping it through the fuel storage well cooler and returning it at the bottom of the well, with either of two storage well pumps.

Cleanup is provided by the FESW ion exchanger. A 4-inch line from the Overhead Storage Tank is used to flood the well or pump water back to the Overhead Storage Tank. Overflow and drain pipes from the well and cavity are routed to the retention tanks.

Normal makeup to the storage well is provided by demineralized water through one of two "FESW Remote Operated Fill Valves," which are operated from Benchboard E in the Control Room.

The cooling system is conservatively designed to remove the decay heat of a full core one week after shutdown, with the storage well water at 120°F and the ultimate heat sink, the river, at 85°F.

System Status

**The Fuel Storage** Well contains 333 irradiated fuel elements, 10 control rods, startup sources and a number of zirconium and stainless steel shroud cans. The Fuel Element Storage Well System will remain in operation as part of the SAFSTOR Program until all fuel is sent offsite.

The Plant Manager is also responsible for the day-to-day activities of the operators, maintenance mechanics, instrument technicians and electricians. He is responsible to insure that adequate staff is present to comply with the terms of the license, training commitments and responsibilities are met, and that the personnel reporting are fit for duty. He is responsible for coordination of all Technical Specifications required tests.

The Shift Supervisor is responsible for operating the shift and insuring that the facility is maintained in a safe and efficient manner. The Shift Supervisor will direct and be responsible for all operations and maintenance activities occurring on shift. The Shift Supervisor will insure that routine rounds are made, logs are kept and equipment maintenance requests are properly initiated.

The Operators are responsible for the operation of the facility. They will ensure that all equipment is operated in a proper manner consistent with the license. When it is necessary to handle fuel, they will do so in compliance with their training certification and the procedures of the facility. The Operators will also be responsible to insure that procedural deficiencies they discover receive a prompt review by initiating necessary paperwork. The Operators will tour the facility and insure that the fuel storage well and its fuel, as well as all supporting systems, are in a clean, operable mode.

The Instrument Technicians will be responsible for maintaining the instrumentation within the facility necessary to safely store the expended fuel. They will perform all surveillance tests required as well as all maintenance requests initiated on instrumentation.

The Electricians will be responsible for maintaining all electrical equipment in operating systems in accordance with procedures and completing all maintenance requests and surveillance tests that are required. They will be responsible for any other equipment within the plant which may be used as backup or spares for operable systems or for backups for other facilities within the Dairyland system. They are also responsible for electrical breaker maintenance and such other responsibilities as may be assigned by supervision.

The Health and Safety Supervisor is responsible for the radiological health and safety of the general public in the area surrounding the plant as well as the safety of the staff and all visitors to the plant. The Health and Safety Supervisor will ensure that all long-term radiological and environmental surveillance programs in the SAFSTOR operation are carried out and that proper reports on radiation exposure throughout the facility are maintained. This individual will ensure that all radiation exposure controls are in place and ensure that contamination and daily, monthly and annual exposure limits on personnel are complied with. The Health and Safety Supervisor will be responsible for the ALARA program and will ensure that all personnel

stationed at or visiting LACBWR comply with it in spirit as well as regulation. This supervisor will also assign the day-to-day duties of the health physics technicians.

The Health Physics Technicians will be responsible for the radiation protection and chemistry programs at LACBWR. They will perform all tasks required for surveillance and will provide all work coverage required by special work permits. They will maintain as required the exposure records of personnel, take all the readings necessary to guard against the spread of contamination and provide input to the long-term radionuclide inventory program. They will report, as directed by the Health and Safety Supervisor, to the Duty Shift Supervisor as required.

The Mechanical Maintenance Lead Mechanic is responsible for the assignment of mechanical maintenance duties and will direct the completion of all maintenance requests and surveillance tests of a mechanical nature. He is responsible for the preventive maintenance program established on those systems necessary to maintain the SAFSTOR condition. The Lead Mechanic is responsible for overall maintenance on all of the plant equipment which may serve as backups to the required systems or backup supplies to the rest of the Dairyland system.

Maintenance Mechanics are responsible for the completion of all mechanical maintenance tasks. These tasks include all surveillance requirements and work requests defined in maintenance orders as well as general duties as assigned by the Lead Mechanic.

The Administrative Secretary is responsible for overall administration of LACBWR. She will maintain all records required under technical specifications for plant operation and will maintain a record of all activities involved in facility shutdown and establishment of the SAFSTOR mode. The Administrative Secretary will ensure that all clerical functions are performed adequately. She will maintain all budget expense and project accounts and will coordinate preparation of the LACBWR budget. Duties will also include assigning to staff personnel required responses to regulatory agencies, other Dairyland departments, etc., and ensuring that these tasks are completed by the established deadline.

The Clerk-Typist will report to the Administrative Secretary two and one-half days per week and will assist in the clerical tasks at LACBWR, including word processing and the personal computer database. She will also operate the telephone communication switchboard and other tasks as assigned by the Administrative Secretary.

The Licensing Engineer will be responsible for all facility licensing. This will include steps preparatory to eventual shipment of SAFSTOR fuel and proceeding into the DECON mode. The Licensing Engineer will be the principal liaison on behalf of the Plant Manager for the contact with the Nuclear Regulatory Commission and other regulatory agencies. This engineer will be

such as surface texture, material type, contamination levels, and the tenacity with which the radioactive material clings to the contaminated surfaces.

Surface areas are primarily decontaminated using hand wiping, wet mopping, and wet vacuuming techniques. Detergents and other mild chemicals may be used with any of these techniques. The residual water cleaning solutions are collected by floor drains and processed through the liquid waste system. Most areas are routinely decontaminated to levels below 2000 dpm/ft$^2$ (about 500 dpm/100 cm$^2$). Many areas are maintained below the Lower Limit of Detection (LLD). Efforts will be made to maintain all accessible areas in the plant as free of surface contamination as is reasonably achievable.

Small tools and components will be periodically decontaminated by wiping with cleaning agents, steam cleaning, abrasive blasting, dishwasher, ultrasonic cleaning, electropolishing or other methods. Some unused equipment may be decontaminated as a prior step to removal for disposal as commercial or radioactive solid waste. Some unused equipment may be decontaminated prior to continued use in unrestricted areas.

Larger systems and components in accessible areas may be decontaminated using hydrolazers, abrasives, chemicals or other methods, after appropriate ALARA and economic evaluations are conducted.

### 7.3.2 Removal of Unused Equipment During SAFSTOR

During the SAFSTOR period, some equipment and plant components will no longer be considered useful or necessary to maintain the plant in the SAFSTOR condition. Some equipment located in non-controlled areas may be transferred directly for use at another location or disposed of as commercial solid waste.

Some unused equipment or components located within controlled areas, which have not previously been used for applications involving radioactive materials will be thoroughly surveyed and documented as having no detectable radioactive material (less than LLD) prior to transfer to another user or disposal as commercial solid waste.

Other unused equipment or plant system components which have previously been used for applications involving radioactive materials may be removed, thoroughly surveyed and transferred to another licensed user, or disposed of as low level solid radioactive waste material. Some equipment may be decontaminated and will be surveyed to verify that it contains no detectable radioactive material (less than LLD), prior to transfer to an unlicensed user, or for disposal as commercial solid waste.

Removal of plant equipment wil be performed only after review. A safety evaluation similar to a 10 CFR 50.59 safety analysis will be conducted prior to dismantling any system.

Asbestos removed from plant systems will be handled in accordance with the Dairyland Power Cooperative asbestos control program.

### 7.3.3 Research

During the SAFSTOR period, an Aging Research Program may be conducted. This program may entail records research and possible removal of unused components for testing.

### 7.3.4 Testing and Maintenance Program to Maintain Systems in Use

During the SAFSTOR period, a testing and maintenance program will continue for those systems previously designated as being required for SAFSTOR. Routine preventive maintenance will be performed as before, but where the present maintenance interval is listed as "Outage," a new interval will be specified. Corrective maintenance will be performed as necessary. Instrument calibrations and other routine testing will continue as before for equipment which will be required to be operable.

## 7.4 PLANT MONITORING PROGRAM

Activities and plant conditions at LACBWR will continue to be maintained to protect the health and safety of both the public and plant workers. Baseline radiation surveys have been performed to establish the initial radiological conditions at LACBWR during SAFSTOR. An in-plant as well as offsite surveillance program will be established and maintained to assure plant conditions are not deteriorating and environmental effects of the site are negligible.

### 7.4.1 Baseline Radiation Surveys

Baseline surveys have been performed to establish activity levels and nuclide concentrations throughout the plant and surrounding area. These surveys included:

a) Specific area dose rates and contamination levels.

b) Specified system piping and component contact dose rate.

c) Radionuclide inventory in specified plant systems.

d) Radionuclide concentration in the soil and sediment in close proximity of the plant.

Baseline conditions will be compared with routine monitoring values to determine the plant/system trends during SAFSTOR. Some specific monitoring points may be reassigned during the SAFSTOR period if it is determined that a better characterization can be obtained based on radiation levels measured or due to decontamination or other activities which are conducted and experience achieved.

### 7.4.2 In-Plant Monitoring

Routine radiation dose rate and contamination surveys will be taken of plant areas along with more specific surveys needed to support maintenance at the site. A pre-established location contact dose rate survey will be routinely performed to assist in plant radionuclide trending. These points are located throughout the plant on systems that contained radioactive liquid/gases during plant operation.

### 7.4.3 Release Point/Effluent Monitoring

During the SAFSTOR period, effluent release points for radionuclides will be monitored during all periods of potential discharge, as in the past. The two potential discharge points are the stack and the liquid waste line.

a) Stack - the effluents of the stack will be continuously monitored for particulate and gaseous activity. The noble gas detector(s) will be recalibrated to Kr-85. The stack monitor will be capable of detecting the maximum Kr-85 concentration postulated from any accident during the SAFSTOR period. Filters for this monitor will be changed and analyzed for radionuclides on a routine basis established by plant Technical Specifications.

b) Liquid discharge - the liquid effluents will be monitored during time of release. Each batch release will be gamma analyzed before discharge to ensure plant Technical Specifications will not be exceeded.

All data collected concerning effluent releases will be maintained and will be included in the effluent report.

### 7.4.4 Environmental Monitoring

Offsite area dose rates as well as fish, air, liquid, and earth samples will continue to be taken and analyzed to ensure the plant is not adversely affecting the surrounding environment during SAFSTOR. The necessary samples and sample frequencies will be specified in plant Technical Specifications. Meteorological data will be continuously collected to be used in offsite dose calculations to ensure the safety of the general public.

All data collected will be submitted in the annual environmental report.

# 8. HEALTH PHYSICS

During the SAFSTOR period of LACBWR, radiation protection and health physics programs will be provided to ensure the health and safety of LACBWR workers. The programs will also provide the necessary monitoring and control of radiological conditions to protect the health and safety of the general public and to ensure compliance with LACBWR license requirements. In addition, programs will be provided to maintain radiation exposures as low as reasonably achievable (ALARA).

## 8.1 ORGANIZATION AND RESPONSIBILITIES

The organization described below is the organization as it is expected to exist during the SAFSTOR activities. The organization may be changed slightly during the SAFSTOR period as staffing levels requirements change. Responsibilities assigned to a position which is deleted will be assigned to another individual in order to maintain continuity.

The LACBWR Plant Manager has the overall responsibility for all onsite activities including assurance that ALARA policies and the radiation protection program are carried out. He is the chairman of the ORC. He is also responsible for approving all plant procedures.

Health Physics management shall provide the first-line supervision, training and technical assistance to the Health Physics department. Management personnel will report directly to the Plant Manager. They shall assure that all ALARA policies and all aspects of the Radiation Protection Program are implemented. They shall also be members of the ORC. Health Physics management will be responsible for all departmental budgeting and scheduling.

The Health Physics Technician (HP) will perform chemical and radiological sampling, surveys and analysis as directed by HP management. In addition, they will also be responsible for conducting the personnel monitoring program, maintaining radiation protection records and monitoring work in progress within the radiologically restricted area.

## 8.2 ALARA PROGRAM

### 8.2.1 Basic Philosophy

The radiation exposure criteria set forth shall be for the protection of personnel against radiation hazards arising from work associated with LACBWR. As good practice, no person under 18 years of age shall be employed by DPC to be occupationally exposed to ionizing radiation. A continuous effort should be made to reduce levels of radiation and radioactivity in order to maintain radiation doses at the lowest achievable value below the established limits of 10 CFR 20.1201.

A further goal of the Health Physics Procedures in use at LACBWR shall be to reduce personnel exposures to radiation and radioactive material to <u>As Low As Reasonably Achievable</u> (ALARA).

### 8.2.2 Application of ALARA

a) To obtain the goal of ALARA, the <u>TOTAL</u> dose to be received during a specific job and the total allowable for the year for the entire operation of the facility should be balanced.

b) The dose received by an individual from occupational exposures will be considered with respect to internal and external accumulation. The individual's TOTAL dose should be balanced with the TOTAL dose received by the entire LACBWR work force and temporary DPC/ contractor employees to aid the overall ALARA Program.

c) A Special Work Permit (SWP) ALARA review should be conducted if a job is expected to require between 1.0 and 2.0 personRem. An SWP ALARA review form used for this application should be governed by total personRem estimates, based upon current surveys and job-time estimates, and total personRem for past similar jobs based upon an SWP dose accountability file.

d) An SWP ALARA review will be conducted if a job is expected to require between 2.0 and 5.0 personRem.

e) If a job is expected to require greater than 5.0 personRem, a more intensive ORC ALARA review will be required. This may include the use of special procedures.

f) Documentation of ALARA engineering work and cost benefits will be maintained in files.

g) HP management will conduct ALARA review of Actual versus Projected (goal) exposures. PersonRem exposures will be reviewed regularly with the Plant Manager. Included should be a review of the effectiveness of specific steps that were taken to reduce radiation exposure (ALARA Engineering).

### 8.2.3 Radiation Exposure Limits

a) <u>Daily Administrative Limit</u>

An administrative guideline of 100 mRem per day will not be exceeded without the prior approval of the Health and Safety Supervisor or alternate. Assignment to an SWP by the Health and Safety Supervisor (or his authorized representative) will authorize an individual to exceed the 100 mRem per day administrative limit.

b) Yearly Administrative Limit

Administratively, personnel will be limited to a total effective dose equivalent being equal to 5 Rem per calendar year of whole body radiation. Every effort will be made to equalize exposures of all personnel in accordance with ALARA principles.

## 8.3 RADIATION PROTECTION PROGRAM

The radiation protection program that will be utilized during the SAFSTOR period will be an extension of the program that was used during the period of reactor operations at LACBWR. This program is in compliance with the requirements of 10 CFR 20. Implementation of the radiation protection program will be done at LACBWR through Health and Safety procedures. The following section describes the radiation protection program.

### 8.3.1 Personnel Monitoring

To ensure that the radiation exposure limits of 10 CFR 20 are not exceeded, a personnel radiation exposure monitoring system will be maintained. Two basic means shall be used to evaluate each individual's radiation exposure:

a) Film Badges - to give integrated dose measurements over relatively long periods of time.

b) Self-Reading Dosimeters - to give interim indication of accumulated doses.

Film badges and self-reading dosimeters will be worn by all plant personnel entering the radiological controlled area. They will be worn at or above the waist and on the front of the body, unless the Health and Safety management specifies that the badges be worn differently. Extremity dosimetry will be worn by all personnel when conditions exist that could cause a significantly higher than whole body dose to be received by a worker's extremities.

Long-term visitors expecting to receive a radiation exposure of 50 mRem will be issued film badges and dosimeters and will be monitored in the same manner as the regular plant personnel.

Casual and short-term visitors (those for whom exposures are expected to be insignificant) will be issued pocket dosimeters only.

Film badge records received from the badge processor will be evaluated and maintained. Periodic quality testing of film badges and pocket dosimeters will be conducted.

Bioassays will be performed in accordance with the requirements of 10 CFR 20.1204 and in conformance to the recommendations of Regulatory Guide 8.26, "Application of Bioassay for Fission and Activation Products," and Regulatory Guide 8.32, "Criteria for Establishing a Tritium Bioassay Program."

The LACBWR whole body counter will be used to detect any internal contamination for:

a) All new employees who will routinely work with radioactive material.

b) Any individual suspected of having received any internal deposition.

c) Routinely (annually for all plant personnel).

d) Upon termination of any employee who worked with radioactive material.

If it is determined that any employee has a significant internal deposition of any isotope, he may be required to submit a urine and/or fecal specimen.

All personnel leaving a restricted area will be required to conduct a personnel contamination survey using the contamination detection instrument provided at the exit.

### 8.3.2 Respiratory Protection Program

A respiratory protection program will be maintained during the SAFSTOR period.

The Health and Safety Supervisor is responsible for the Respiratory Program at LACBWR. The Health and Safety Supervisor or designated alternate will evaluate the total job hazard, recommend engineering controls if appropriate, specify respiratory protection if control cannot be otherwise obtained and forbid the use of respirators if conditions warrant. The Health and Safety Department is responsible for the selection, care, and maintenance of all respiratory protection equipment that falls under the scope of the respiratory protection program.

The acceptable manner for limiting the internal exposure of personnel is to control radioactivity concentration in the air breathing zones. Whenever possible, this will be accomplished by the application of engineering control measures such as containment, decontamination, special ventilation equipment and design. The use of personal respiratory protective equipment as a primary control is undesirable and is acceptable only on a non-routine basis or in an emergency situation.

Equipment such as hoods, blowers, and filtered exhaust systems will be used to provide controls for routine operations and, whenever possible, for non-routine operations. In some cases, such controls may be inadequate or impractical and the use of protective breathing apparatus will be approved on a short-term basis.

The periods of time for which respirators may be worn continuously, and the overall time of uses, should be kept to a minimum. The wearer shall leave the area for relief from respirator use in case of equipment malfunction, undue physical or psychological discomfort, or any other condition that, in the opinion of the user, his supervisor or the Health and Safety Department, might cause significant reduction in the protection afforded the user.

Respiratory protection equipment will be issued to individuals only after documentation has been received that shows that the person has satisfactorily completed:

a) medical exam,

b) respiratory protection training, and

c) respiratory fit test (does not apply to in-line supplied air hoods and Self-Contained Breathing Apparatus).

8.3.3 Protective Clothing

Personnel working in contaminated areas of LACBWR are provided with protective clothing to minimize the potential for personnel contamination. Routine entry into a contaminated area will require a minimum protective clothing requirement of:

a) coveralls
b) head covering
c) gloves
d) shoe coverings

Specific jobs may require additional protective clothing. These additional requirements will be determined by the Health and Safety Department and will be listed on the Special Work Permit for the job.

During the SAFSTOR period, the laundry facility will remain operational to ensure an adequate supply of clean protective clothing.

8.3.4 Access Control

To limit radiation exposures, personnel access is controlled in areas where such exposure is possible. This control consists of a system of physical barriers, warning signs and signals.

A Special Work Permit (SWP) will be issued as authorization for personnel to perform work of a non-routine nature in a specific area which involves unusual hazards. SWP's will be used to inform personnel of these hazards and the safeguards/protective measures which need to be taken during the work to ensure their well being.

8.3.5 Postings

Postings shall be in accordance with the requirements of 10 CFR 20, Subpart J, as applicable.

## 8.4 RADIATION MONITORING

A program for routine surveys and monitoring will be continued during the SAFSTOR period at LACBWR. This program will continue to assure all personnel are aware of the possible hazards involved before entering a potential radiation area or a potentially contaminated area. This will be done to ensure that the potential hazards are adequately defined, that adequate controls are instituted so that radiation exposure to personnel working in radiation areas or working with radioactive materials is minimized, and that each person carries out his work in a radiologically safe manner.

Survey data records will be maintained to assist in the evaluation of the radiological conditions and trends at LACBWR during SAFSTOR activities.

The radiological monitoring program will include the following surveys:

a) airborne activity surveys
b) dose rate surveys
c) contamination surveys
d) liquid activity surveys
e) environmental surveys

8.4.1 Airborne Radioactivity Surveys

In addition to using the fixed location or mobile air monitors, particulate airborne activity shall also be determined as needed by drawing a sufficient quantity of air through a filter paper. The samples shall be counted for beta-gamma activity in gas-flow proportional detector and scaler equipment. Alpha activity of a sample shall be determined by means of a windowless gas-flow proportional detector and a scaler when alpha radioactivity is suspected of being present. Samples are analyzed for specific isotopic concentrations, by the use of a gamma analyzer. Particulate samples of the stack releases will be obtained and analyzed weekly to determine release rates.

Non-routine air samples to establish protection requirements for maintenance activities or to verify airborne radioactivity conditions during work activities are obtained and analyzed when routine samples are not sufficient for monitoring plant conditions.

### 8.4.2 Radiation Surveys

Radiation surveys are conducted for the following purposes:

a) Measure and document radiation and contamination levels in areas of interest.

b) Identify trends in radiation and contamination levels, particularly during work in progress.

c) Determine appropriate protective measures for personnel working in restricted areas.

d) Provide information so that workers can maintain their doses ALARA.

e) Identify locations and situations where special dosimetry is required.

In addition to the measurements made by the fixed-location area radiation monitors, the measurement of external dose-rates shall be accomplished by portable survey instruments. The operation of the survey instruments shall be in accordance with the operating instructions outlined in each particular instrument manual or by procedure. Instruments covering high, intermediate, and low ranges shall be available on site.

Surveys will be conducted by the Health and Safety Department to determine general area dose rates. They will also monitor areas to locate any radiological hot spots. Surveys will be performed on a routine basis established by procedures.

Special radiation surveys of particular items or areas are performed on an "as needed" basis. Examples of special radiation surveys are the removal of equipment or materials from a restricted area, leak testing of sealed radioactive sources, or the shipment or receipt of radioactive material packages.

### 8.4.3 Contamination Surveys

Contamination surveys will be conducted routinely by the Health and Safety Department as established by procedure to determine area contamination levels.

Special contamination surveys of particular items or areas are performed on an "as needed" basis. Examples of special contamination surveys are the removal of equipment or materials from a restricted area, leak testing of sealed radioactive sources, or the shipment or receipt of radioactive material packages.

A dry filter paper or cloth disc will be wiped over approximately one square foot (12"x12" square or 12'-long S-shaped) of the surface being monitored. Swipes will be counted for beta-gamma activity in a gas-flow proportional detector or with a 2 π GM probe or equivalent in fixed geometry sample holder as necessary. Alpha activity of a swipe will be determined by means of a windowless gas-flow proportional detector and a scaler or equivalent, when alpha radioactivity is suspected of being present.

### 8.4.4 Liquid Activity Surveys

Samples of water containing radioactivity are collected and analyzed on a routine basis. Spent fuel pool water is analyzed to detect indications of degradation of the fuel stored in the pool. Samples of liquid radioactive wastes and processed wastes are analyzed to ensure levels of radioactivity are below the levels permitted for release. Samples are analyzed by Health and Safety Department personnel in accordance with established procedures.

### 8.4.5 Environmental Surveys

Environmental samples will be taken within the surrounding areas of the plant. These samples will be analyzed to determine any effects plant effluent releases may have on the environment. This program will be conducted to comply with LACBWR Technical Specifications.

## 8.5 RADIATION PROTECTION EQUIPMENT AND INSTRUMENTATION

A variety of equipment and instruments are used as part of the radiation protection program. Equipment and instrumentation are selected to perform a particular function. Sensitivity, ease of operation and maintenance, and reliability are factors that are considered in the selection of a particular instrument. As the technology of radiation detection instrumentation improves, new instruments are obtained to more accurately measure radioactivity and ensure an effective radiation protection program.

This equipment can be broken down into several specific groups each with its own dedicated functions. These groups are:

a) Portable Instruments
b) Installed Instruments
c) Personnel Monitoring Instruments
d) Counting Room Instruments

This equipment will be used, checked and calibrated by trained personnel according to in-plant procedures.

### 8.5.1 Portable Instruments

There will be sufficient types and quantities of portable instruments to provide adequate beta, gamma, and alpha surveys at LACBWR. This equipment will have the ability to detect these types of radiation over the potential ranges that will be present during SAFSTOR. Portable dose rate instruments will be source checked pri to use, and they will be calibrated semiannually.

### 8.5.2 Installed Instrumentation

There will be sufficient types and quantities of installed instrumentation to provide continuous in-plant and effluent release monitoring. This will assure the safe reliable monitoring of both area dose rates and airborne activity concentration throughout the area. These instruments will be response tested monthly and calibrated once every 18 months.

### 8.5.3 Personnel Monitoring Instrumentation

Friskers and personnel instrumentation monitors will be provid d throughout the plant to provide personnel contamination monitoring. These monitors will be of the type and sensitivities necessary to minimize the spread of in-plant contamination and prevent the introduc on of contamination to outside areas. This equipment will be checked daily during normal workdays and calibrated semi-annually.

### 8.5.4 Counting Room Instrumentation

Laboratory equipment will be available to perform gross alpha and beta analyses and gamma isotopic analyses of samples collected in the plant. There will also be equipment available in a low background area to provide adequate analysis of environmental samples. A quality control program will be in effect for this equipment to ensure the accurate and proper operation of the equipment. This equipment will be traceable to NIST standards.

## 8.6 RADIOACTIVE WASTE HANDLING AND DISPOSAL

Radioactive waste at LACBWR during SAFSTOR will primarily consist of two different major types:

a) Resin
b) Dry active waste (DAW)

Waste generation will be maintained to as low as possible to minimize the volume generated for disposal.

### 8.6.1 Resin

Spent resin will be transferred to the spent resin receiving tank where it will be held until there is a sufficient quantity available for shipment to an approved processing facility. The resin will be transferred to an approved shipping container where it will be dewatered and made ready for shipment.

### 8.6.2 Dry Active Waste (DAW)

Any material used within the restricted area will be considered radioactive and will be disposed of as DAW, unless it can be demonstrated to be within established releasable limits. The generation of this material will be maintained as low as possible to reduce the total waste volume generated onsite. The material generated will be placed into approved shipping containers.

Volume reduction of all radioactive waste will be in accordance with all pertaining guidelines and will be made only to approved processing facilities.

## 8.7 RECORDS

Records generated in the performance of the radiation protection program will be maintained as required to provide the necessary documentation of the program. These records will be maintained in a designated storage area.

## 8.8 INDUSTRIAL HEALTH AND SAFETY

LACBWR will continue to participate in Dairyland Power Cooperative's industrial safety program as prescribed by the DPC Safety Department. These programs will include:

a) Accident prevention
b) Hazardous waste management and control
c) Asbestos control
d) Hearing conservation

# 9. SAFSTOR ACCIDENT ANALYSIS

## 9.1 INTRODUCTION

The probability of an accident occurring during the SAFSTOR period is considerably less than during plant operation. The focus of the potential accidents has also changed. During operation, the focus was on minimizing the plant transient and cooling the reactor core. During SAFSTOR, the only major concern is protecting the fuel in the Fuel Element Storage Well.

The fuel in the well, while not benign, is not as much a hazard as the fuel in the operating reactor was. Since April 30, 1987, the fission product inventory has decreased and the decay heat generation is significantly less. These factors reduce the consequences of any accident affecting the fuel. As time passes, the consequences will continue to decrease.

The reactor's design basis accidents were reviewed to determine which could still occur during SAFSTOR. Some other accident scenarios which were not previously considered design basis accidents were also evaluated. A list of 8 postulated accidents was identified. These events are:

- Spent Fuel Handling Accident
- Shipping Cask or Heavy Load Drop into FESW
- Loss of FESW Cooling
- FESW System Pipe Break
- Uncontrolled Liquid Waste Discharge
- Loss of Offsite Power
- Earthquakes
- Wind and Tornado

Each of these postulated events was evaluated based on the revised plant status to identify their potential consequences during the SAFSTOR period. The following sections discuss these accidents.

One additional event was examined - a fire. Fire protection is covered in Section 6.9. The potential safety consequences of any fire fall within the scope of other evaluated events.

## 9.2 SPENT FUEL HANDLING ACCIDENT

This accident postulates a fuel assembly falling from the hoist into the Fuel Element Storage Well. The probability of this accident is extremely small, since minimal fuel handling will be performed during the SAFSTOR period until the fuel assemblies are removed from the FESW. Periodic inspections may be conducted during the years the fuel remains onsite. In the almost 20 years of operation and associated fuel handling at LACBWR, no fuel assemblies were ever dropped.

In this event, it is assumed that the cladding of all the pins in 2 fuel assemblies ruptures. The fuel handling crew evacuates when the local area radiation monitor alarms. Containment Building ventilation would isolate on high activity, but for this analysis, no containment integrity is assumed.

## 9.3 SHIPPING CASK OR HEAVY LOAD DROP INTO FESW

This accident postulates a shipping cask or other heavy load falling into the Fuel Element Storage Well. Reference 1 stated that extensive local rack deformation and fuel damage would occur during a cask drop accident, but with an additional plate (that was installed during the reracking) in place, a dropped cask would not damage the pool liner or floor sufficiently to adversely affect the leak-tight integrity of the storage well (i.e., would not cause excessive water leakage from the FESW).

For this accident, it is postulated that all 333 spent fuel assemblies located in the FESW are damaged. The cladding of all the fuel pins ruptures. The same assumptions used in the Spent Fuel Handling Accident (Section 9.2) are used here. A total of 35,760 Curies of Kr-85 is released within the 2-hour period. The doses calculated are as follows:

Elevated Release

Whole Body Dose at 500m E

4.2 mRem

Skin Dose at 500m E

350 mRem

Ground Level Release at EAB

Whole Body Dose at 338m

40.2 mRem

Skin Dose at 338m

3.34 Rem

Ground Level Release at Proposed Emergency Planning Zone Boundary

Whole Body Dose at 100m E

186 mRem

Skin Dose at 100m E

15.6 Rem

As can be seen, the estimated offsite doses for the cask drop accident are below the 10 CFR 100 limits. The postulated maximum whole body dose is more than a factor of 100 below the 10 CFR 100 limit of 25 Rem (25,000 mRem).

## 9.4 LOSS OF FESW COOLING

This accident postulates a loss of FESW cooling. The most likely causes of a loss of cooling are:

1) Both FESW pumps fail or FESW piping has to be isolated for maintenance;

2) The Component Cooling Water (CCW) System is out of service due to failure of both pumps or other reason. The CCW System removes heat from the FESW cooler.

3) The Low Pressure Service Water (LPSW) System is out of service due to failure of both pumps or other reason. The LPSW System removes heat from the CCW coolers.

If the third possibility is the cause, cooling to the CCW coolers can be restored by cross-connecting the High Pressure Service Water System to the coolers, in lieu of LPSW.

A calculation was performed to determine FESW heatup rate if active cooling were lost. The decay heat generation rate for January 1, 1988, was used. Pool boiling would have commenced approximately 5 days after the loss of cooling. The tops of the control rods stored in the fuel racks would have become uncovered after 13.6 days. After 23.1 days, the top of the fuel would have been exposed. Since that time, a fuel pool heatup test was run and results documented in LACBWR Technical Report 137 that indicate the temperature of the pool water would stabilize at less than boiling.

Substantial time is therefore available for restoration of FESW cooling. No immediate action is necessary during this postulated accident.

## 9.5 FESW PIPE BREAK

This accident postulates a break in the FESW system piping, other than in the pump discharge piping between the redundant check valves and the pool liner. A load analysis was performed on this approximately 20 feet of piping. It was concluded that all stresses are within ASME Code allowable. (Reference 1 calls this line the spent fuel pool drain line.) The series check valves were added during the 1980 FESW reracking.

If the postulated break occurs, the lowest the FESW could drain is approximately 679'. At this level all spent fuel will remain covered. The control rods which are currently stored in the fuel racks will be partially uncovered. The tops of the control rods are about elevation 686'.

The operator would be alerted to this accident by receipt of the FESW Level Lo/High alarm. Any makeup water added may run out the break, depending on the size of the break.

## 9.9 WIND AND TORNADO

This accident postulates that design basis high wind or tornado event occurs. The magnitude of the event and damage incurred is the same as that assumed during the Systematic Evaluation Program (SEP) and the Consequence Study prepared as part of the SEP Integrated Assessment (References 4-9). The major concern of the previous analyses was to ensure that adequate cooling of the reactor core was maintained. The focus now is to prevent damage to the fuel stored in the Fuel Element Storage Well.

The previous evaluations determined that the Containment Building would withstand this event. The Turbine Building, Diesel Building, Cribhouse and Switchyard may be damaged. The probability of the LACBWR or Genoa Unit 3 stacks failing and impacting the Containment Building was determined to be low enough that it need not be considered. Personnel outside the Containment Building may not survive.

The potential plant consequence of primary concern is the loss of all offsite and onsite power. As discussed in Section 9.7, Loss of Offsite Power, considerable time is available before action must be taken to protect the fuel.

## 9.10 REFERENCES

1) NRC Letter, Ziemann to Linder, dated February 4, 1980.

2) NRC Letter, Reid to Madgett, dated October 22, 1975.

3) DPC Letter, Taylor to Document Control Desk, LAC-12377, dated September 29, 1987.

4) DPC Letter, Linder to Paulson, LAC-10251, dated October 11, 1984.

5) NRC Letter, Zwolinski to Linder, dated January 16, 1985.

6) DPC Letter, Linder to Zwolinski, LAC-10639, dated March 15, 1985.

7) NRC Letter, Zwolinski to Taylor, dated September 9, 1986.

8) DPC Letter, Taylor to Zwolinski, LAC-12052, dated January 14, 1987.

9) NRC Letter, Bernero to Taylor, dated April 6, 1987.

# 10. SAFSTOR OPERATOR TRAINING AND CERTIFICATION PROGRAM

## 10.1 INTRODUCTION

This program describes the training and certification for supervisors and operators associated with the maintenance and monitoring of the La Crosse Boiling Water Reactor (LACBWR) in the SAFSTOR mode consistent with its possession-only license.

## 10.2 APPLICABILITY

The LACBWR Technical Specifications will require that certain operations associated with the maintenance and handling of reactor spent fuel be performed by or under the supervision of persons certified by the Plant Manager or his delegate. The following members of the plant staff (as a minimum) shall be certified in accordance with this program:

- Plant Manager
- Shift Supervisors
- Selected operators who shall be performing duties requiring certified operators.

## 10.3 INITIAL CERTIFICATION

Certification candidates shall participate in a training program covering the following topic areas:

a) Reactor Theory (as applicable to the storage and handling of spent reactor fuel)

b) Spent Fuel Handling and Storage Equipment - Design and Operating Characteristics

c) Monitoring and Control Systems

d) Radiation Protection

e) Normal and Emergency Procedures

f) Administrative Controls applicable during the SAFSTOR period

Reactor Theory training will include characteristics of the stored spent fuel, subcritical multiplication, factors affecting reactivity and criticality, and the basis for fuel handling restrictions and procedures.

The design and operating characteristics will include training in the functions and use of fuel handling tools, cranes, the fuel element storage well, and pool service systems and equipment. Prior to shipments of spent fuel this training will include shipping casks, cask handling equipment, and procedures.

Monitoring and Control Systems will include training on the Fuel Element Storage Well monitoring systems and area radiation monitors.

Radiation protection training will include theory of radioactive emissions, control of radiation exposure, use of radiation detection and monitoring equipment, protective clothing and respiratory protection, and contamination control procedures. Training will emphasize the principles and practices associated with maintaining exposures as low as reasonably achievable (ALARA).

Normal and Emergency Procedure Training will include the Emergency Plan and any operations and emergency procedures associated with the operation of LACBWR systems and equipment during SAFSTOR. This area shall also include training in the handling and processing of radioactive wastes.

Administrative Control Training will include LACBWR Technical Specifications, Security Plan, Quality Assurance Program Description and plant administrative procedures associated with the operation, surveillance, and maintenance of LACBWR.

Training will be provided through a combination of classroom instruction, audio-visual instruction, self-study, and on-the-job training.

Satisfactory completion of the training shall be based on passing of a comprehensive written examination including each of the above areas and an oral examination. Minimum passing grade for the written examination shall be 70% in each area and 80% overall. The oral examination shall be administered by a member of the plant management staff. Results of the oral examination shall be on a pass/fail basis. Weaknesses noted as a result of the written or oral examination shall be documented and remedial training provided.

## 10.4 PROFICIENCY TRAINING AND TESTING

Proficiency training shall be used to maintain the qualification level of certified personnel. Proficiency training will include periodic training through the use of classroom training, audio/visual instruction, self-study assignments, and/or on-the-job training. Frequency and topics to be included in the proficiency training will depend on actual activities planned or in progress and identified weaknesses. As a minimum, training in the six areas included in the initial certification program shall be covered at least once every 2 years.

A biennial written examination, combined with an annual oral examination administered in those years when no written exam is given, shall be used to demonstrate the proficiency of certified personnel. Examinations will be similar to, but not as comprehensive as, the initial certification examinations. Minimum passing grade for proficiency examinations shall be 70% in each section and 80% overall. Oral examinations shall be on a pass/fail basis.

## 10.5 CERTIFICATION

Upon successful completion of the initial certification training program, the Plant Manager or his delegate shall certify the individual as a Certified Fuel Handler. Normally an employee will complete the initial certification within one year after entering the program. After initial certification, personnel will be recertified every 2 years based on the successful completion of the Proficiency Training and Testing Program.

## 10.6 PHYSICAL REQUIREMENTS

As a prerequisite to acceptance into the training program and for recertification, a candidate must successfully pass a medical examination designed to ensure that the candidate is in generally good health and is otherwise physically qualified to safely perform the assigned work. Minor correctable health deficiencies, such as eyesight or hearing, will not *per se* prevent certification.

The medical examination will meet or exceed the requirements of ANSI Standard N546-1976, "American National Standard - Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants."

## 10.7 DOCUMENTATION

Initial Certification and Proficiency Training shall be documented and maintained for certified personnel while employed at LACBWR. The records shall include the dates of training, results of all quizzes and examinations, copies of written examinations, oral examination records, and information on results of physical examinations.