LA CROSSE BOILING WATER REACTOR

(LACBWR)

DECOMMISSIONING PLAN

Revised
October 1996

DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
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The Nuclear Regulatory Commission issued its Waste Confidence Decision in the Federal Register on August 31, 1984. In it, the NRC found "reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the expiration of that reactor's operating license at that reactor's spent fuel storage basin, or at either onsite or offsite independent spent fuel storage installations." Therefore, DPC's plan to maintain the activated fuel at LACBWR, until a federal repository, interim storage facility, or licensed temporary monitored retrievable storage facility is ready to accept the fuel, is acceptable from the safety standpoint, as well as necessary from the practical standpoint.

A possible fourth decommissioning alternative exists which combines some features of SAFSTOR and DECON. The possibility exists to use the secondary side of the plant with a new fossil-fired steam supply system. While DPC is not planning on pursuing this option at this time, it should not be eliminated as an alternative.

After evaluating the factors involved in selecting a decommissioning alternative, Dairyland Power Cooperative decided to choose an approximately 30-50 year SAFSTOR period, followed by DECON. The exact duration of the SAFSTOR period will be dependent on the availability of a high-level waste storage facility, availability of waste disposal, economics, personnel exposure, and various institutional factors. If any major changes are made in DPC's decommissioning plans, a revision to this plan will be prepared.

1.2 REFERENCES

1) Nuclear Regulatory Commission, proposed rule on Decommissioning Criteria for Nuclear Facilities, Federal Register, Vol. 50, No. 28, February 11, 1985.

2) Nuclear Regulatory Commission, Waste Confidence Decision, Federal Register, Vol. 49, No. 171, August 31, 1984.

3) "Decommissioning - Demonstrating the Solution to a Problem for the Next Century," Nuclear Engineering International, Vol. 32, No. 399, October 1987, p. 48.

4) Proceedings from the 1987 International Decommissioning Symposium, Conf-871018, October 4-8, 1987.

The stack wind directions demonstrate a higher percentage of winds coming from the S to N directions than the surface distribution, due to the better exposure of the stack sensor from those directions. It is obvious that winds from the eastern and western sectors (at either level) are very infrequent because of the bluffs approximately 305m (1,000 feet) east of the site and the interference of buildings on the site to the west. The similarity between topographical features of the site and the La Crosse National Weather Service station are shown in the wind direction frequency distribution in Table 3-1. The major differences in the La Crosse distribution are due to the better exposure of the instrumentation at the airport, and LACBWR's proximity to the eastern bluff.

Monthly average temperature and wind speed data is presented for both the La Crosse and LACBWR sites in Figure 3.5. There is excellent correlation between the temperature records for both sites, with some small differences in the winter period. The difference for the months of December through February are most likely the result of a micrometeorological heat island effect at the LACBWR site. The warmer winter temperatures result from the influence that the large concrete buildings and roads have on local environment. Wind speeds for both the stack and the surface follow each other quite closely, with the stack wind speeds on the average approximately 65 percent higher than the surface wind speeds at the LACBWR site. La Crosse NWS wind speeds average 42 percent higher than site surface wind speeds. All locations also exhibit the typical case of higher wind speeds in the spring and fall than in the summer and winter months.

High wind speeds, in excess of 11.2 m/s (25 mph) are not prevalent at either the surface or stack locations, equaling 0.0 and 1.3 percent, respectively. Low wind speeds (Figure 3.6) are very prevalent at the surface site due to the sheltering effects of the nearby bluffs and buildings. Overall, there is very good agreement between LACBWR and La Crosse NWS wind speed, direction, and temperature data. The minor differences that do exist are due to differences in river valley influences and sheltering effects.

3.4 HYDROLOGY

3.4.1 Hydrologic Description

The reactor site is in the Mississippi River valley. In the vicinity of the site, the valley is deeply cut into highly dissected uplands. From La Crosse to Prairie du Chien, approximately 40 miles south, the valley varies between 2-1/2 and 4-1/2 miles in width. The valley walls rise sharply 500 to 600 feet from river level.

There is little or no agricultural use of the river valley floor which consists primarily of marshy land, islands between river channels and extensions of low lying flood plain cut by ponds, sloughs and meandering stream channels. Numerous short, steep-sided valleys that have been cut into the uplands by tributary streams intercept the main river valley. Both walls of the main channel are wooded. The flat upland areas and some of the tributary valleys are cultivated and grazed.

The main channel of the river varies greatly in width above and below the site. A series of dams are operated by the United States Army Corps of Engineers for navigational purposes. Above Dam No. 8 (about 3/4 mile north of the site) the river is nearly four miles wide. Below the site, the river is relatively narrow for a distance of 20 miles, then gradually widens as the river approaches Dam No. 9, 33 miles south of the site.

3.4.2 Drainage

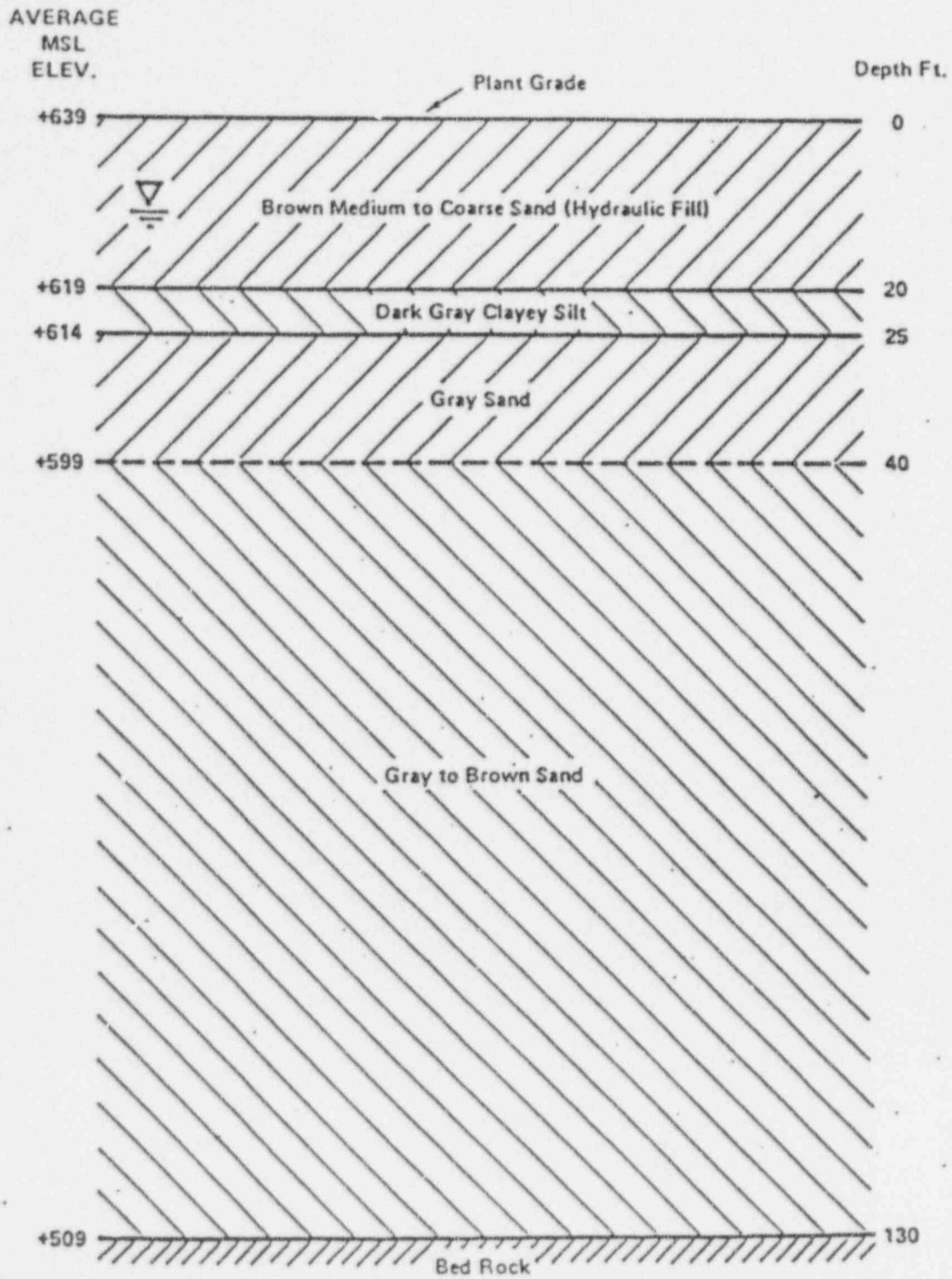
The site is on a filled-in area south of the original Genoa steam plant. Therefore, drainage at the site must be provided. There is allowance for runoff from the high valley walls to the east. The site is favorably located with respect to this runoff, however, because of two short valleys east of the bluffs bordering the site. One valley drains to the north and one to the south, so that only precipitation that falls on the bluff adjacent to the site and on a small portion of the upland area contributes to runoff directly across the site. This runoff is presently channeled along the highway and railroad to prevent interference with traffic. No problems of flash floods have occurred at the site.

3.4.3 Downstream Water Use

For a distance of 40 miles downstream of the site, virtually all municipal water supplies for cities and towns along the river are obtained from ground water. On the basis of readily available published records, the nearest major city using the river water for direct human consumption is Davenport, Iowa, about 195 miles downstream. The nearest user of river water for industrial purposes, excluding the adjacent fossil plant, is the steam-power plant in Lansing, Iowa, about 15 miles downstream. River water is used at this plant for condenser cooling. There is no other known user of river water for industrial purposes between the reactor site and Prairie du Chien, 40 miles down-river.

3.4.4 Flooding and Probable Maximum Flood

The flood profile at the site of the La Crosse Boiling Water Reactor has a return frequency (as described by the U.S. Army Corps of Engineers) of 635.2 feet above main sea level (MSL) for a 50-year flood, 637.2 feet MSL for 100-year, and 640.0 for a 500-year. The site fill is at 639 feet. The Nuclear Regulatory Commission, during the Systematic Evaluation Program, determined that the maximum historic flood (1965) was 638.2 feet MSL. The standard project flood is 643.2 feet MSL and the probable maximum flood is 658 feet MSL. The period of record keeping for evaluation of flooding, in the region of the La Crosse plant, goes back to records kept by the United States Weather Bureau in La Crosse, Wisconsin, from approximately 1873 on. Site surface run-off flooding for a local probable maximum precipitation was determined to meet NRC criteria as the total run-off would be approximately 6.4 inches above grade and the equipment is protected to a level of approximately 1 foot or more above grade. This was in compliance with the applicable Regulatory Guide criteria based on a local run-off area of a 35-acre water shed to the east of the facility.



Generalized Soil Profile

FIGURE 3.8

4. FACILITY DESCRIPTION

4.1 GENERAL PLANT DESCRIPTION

The LACBWR was a nuclear power plant of nominal 50 Mw electrical output, which utilizes a forced-circulation, direct-cycle boiling-water reactor as its heat source.

The reactor and its auxiliary systems are within a steel containment building. The turbine-generator and associated equipment, the control room for both turbine and reactor controls, and plant shops and offices are in a conventional building adjacent to the containment building.

Miscellaneous structures which are associated with the power plant, and are located adjacent to the Turbine Building, include the electrical switchyard, Cribhouse, Waste Treatment Building, LSA Storage Building, oil pump house, stack, warehouses, administration building, annex building, guard house, outdoor fuel oil tanks, underground septic tanks, gas storage tank vaults, underground oil tanks and the condenser circulating water discharge seal well at Genoa Unit 3.

Miscellaneous onsite improvements include roads, walks, parking areas, yard lighting, fire hydrants required for plant protection, access to and use of rail siding facilities, fencing, landscaping, and communication services.

4.2 BUILDING AND STRUCTURES

4.2.1 Containment Building

The containment building (Figs. 4.1 and 4.2) is a right circular cylinder with a hemispherical dome and semi-ellipsoidal bottom. It has an overall internal height of 144 ft. and an inside diameter of 60 ft., and it extends 26 ft. 6 in. below grade level. The shell thickness is 1.16 in., except for the upper hemispherical dome which is 0.60 in. thick.

The building contained most of the equipment associated with the nuclear steam supply system, including the reactor vessel and biological shielding, the fuel element storage well, the forced circulation pumps, the shutdown condenser, and process equipment for the reactor water purification system, decay heat cooling system, shield cooling system, seal injection system, emergency core spray system, boron injection system, and storage well cooling system.

The containment building was designed to withstand the instantaneous release of all the energy of the primary system to the containment atmosphere at an initial ambient temperature of 80°F, neglecting the heat losses from the building and heat absorption by internal structures. Its design pressure is 52 psig, compared to a calculated maximum pressure buildup of 48.5 psig following the maximum credible accident while in operation. The containment building shell is designed and constructed according to the ASME Boiler and Pressure Vessel Code, Sections II, VIII, and IX, and Nuclear Code Cases 127ON, 1271N, and 1272N.

TABLE 5-1 - (cont'd)

Radio-nuclide	Half Life (Years)(b)	Activity (Curies)	Radio-nuclide	Half Life (Years)(b)	(Curies)
^{95}Zr(Nb)	1.754E-1(9.58E-2)	3.555 E+5	^{95}Zr *	1.750 E-1	3.52 E+2
^{134}Cs	2.070 E+0	3.291 E+5	^{59}Ni *	8.000 E+4	2.87 E+2
^{85}Kr	1.072 E+1	1.160 E+5	^{99}Tc	2.120 E+5	2.76 E+2
^{110m}Ag	6.990 E-1	1.018 E+5	^{125}Sb	2.760 E+0	2.73 E+2
^{89}Sr	1.385 E-1	1.009 E+5	^{155}Eu	4.960 E+0	1.68 E+2
^{127m}Te	2.990 E-1	8.238 E+4	^{234}U	2.440 E+5	6.37 E+1
^{60}Co *	5.270 E+0	6.395 E+4	^{243}Am	7.380 E+3	6.31 E+1
^{103}Ru	1.075 E-1	6.334 E+4	^{113m}Cd	1.359 E+1	1.78 E+1
^{147}Pm	2.620 E+0	4.129 E+4	^{94}Nb *	2.000 E+4	1.59 E+1
^{63}Ni *	1.000 E+2	3.540 E+4	^{135}Cs	3.000 E+6	1.40 E+1
^{141}Ce	8.890 E-2	2.638 E+4	^{238}U	4.470 E+9	1.22 E+1
^{242}Cm	4.459 E-1	1.858 E+4	^{156}Eu	4.160 E-2	8.63 E+0
^{241}Am	4.329 E+2	1.474 E+4	^{242}Pu	3.760 E+5	8.58 E+0
^{238}Pu	8.774 E+1	1.262 E+4	^{236}U	2.340 E+7	6.32 E+0
^{239}Pu	2.410 E+4	8.837 E+3	^{121m}Sn	7.600 E+1	4.44 E+0
^{240}Pu	6.550 E+3	7.165 E+3	^{237}Np	2.140 E+6	2.19 E+0
^{154}Eu	8.750 E+0	4.020 E+3	^{235}U	7.040 E+8	1.89 E+0
^{244}Cm	1.812 E+1	3.603 E+3	^{151}Sm	9.316 E+1	1.51 E+0
^{51}Cr *	7.590 E-2	3.002 E+3	^{126}Sn	1.000 E+5	7.01 E-1
^{129m}Te	9.340 E-2	1.170 E+3	^{79}Se	6.500 E+4	5.52 E-1
^{3}H	1.226 E+1	5.510 E+2	^{129}I	1.570 E+7	3.90 E-1
^{59}Fe *	1.220 E-1	5.120 E+2	^{93}Zr	1.500 E+6	1.11 E-1
^{152}Eu	1.360 E+1	5.110 E+2	^{131}I	2.200 E-2	2.00 E-3
^{242m}Am	1.505 E+2	4.900 E+2			

(a) Computer Program, FACT-1, DPC, July 1987, and hand calculations.

(b) Computer Program, TPASGAM, Nuclide Identification Package, J. Keller, Analytical Chemistry Division, ORNL, June 1986.

* Activity in fuel assembly hardware based on neutron activation analysis.

5.2 PLANT SYSTEMS AND THEIR STATUS

5.2.1 Reactor Vessel and Internals

The reactor vessel consists of a cylindrical shell section with a formed integral hemispherical bottom head and a removable hemispherical top head which is bolted to a mating flange on the vessel shell to provide for vessel closure. The vessel has an overall inside height of 37 feet, an inside diameter of 99 inches, and a nominal wall thickness of 4 inches (including 3/16-inch of integrally bonded stainless steel cladding).

The reactor vessel is a ferritic steel (ASTM A-302-Gr-B) plate with integrally bonded Type 304L stainless steel cladding. The flanges and large nozzles are ferritic steel (ASTM A-336) forgings. The small nozzles are made of Inconel pipe.

The reactor internals consist of the following: a thermal shield, a core support skirt, a plenum separator plate, a bottom grid assembly, steam separators, a thermal shock shield, a baffle plate structure with a peripheral lip, a steam dryer with support structure, an emergency core spray tube bundle structure combined with fuel holddown mechanism, control rods and the reactor core.

System Status

The reactor core (fuel elements and startup source) has been removed. The 29 control rods remain in the reactor vessel. The reactor vessel head is installed and partially bolted in place. The reactor vessel and primary systems have been drained to the maximum extent practical. The reactor vessel is capable of being refilled. The control rods may be removed to the Fuel Element Storage Well or a licensed facility during SAFSTOR.

5.2.2 Forced Circulation System

The Forced Circulation System was designed to circulate sufficient water through the reactor to cool the core and to control reactor power from 60 to 100 percent.

Primary water passes upward through the core, and then down through the steam separators to the recirculating water outlet plenum. The water then flows to the 16-in. forced circulation pump suction manifold through four 16-in. nozzles and is mixed with reactor feedwater that enters the manifold through four 4-in. connections. From the manifold, the water flows through 20-in. suction lines to the two 15,000 gpm variable-speed forced-circulation pumps. The pumps are above the basement floor, within their own shielded cubicles. Hydraulically-operated rotoport valves are at the suction and discharge of each pump. The 20-in. pump discharge lines return the water to the 16-in. forced-circulation pump discharge manifold. From the manifold, the water flows through four equally spaced 16-in. reactor inlet nozzles to the annular inlet plenum, and then downward along the bottom vessel head to the core inlet plenum.

The system piping is designed for a maximum working pressure of 1450 psig at 650°F (a pressure above the maximum reactor working pressure to allow for the static head and the pump head).

Since the piping from the reactor to the rotoport valves is within the biological shield and is not accessible, the valves and piping are clad with stainless steel. The piping between the rotoport valves and the pumps is low-alloy steel. Provisions have been made for determining the rate and type of any corrosion, and the low-alloy piping can be replaced if the corrosion rate is excessive. To facilitate repair or replacement, decontamination solutions can be circulated to remove radioactive particles.

Each forced circulation pump has an auxiliary oil system and a hydraulic coupling oil system. Each auxiliary oil system supplies oil to cool and lubricate the three (1 radial and 2 thrust) pump coupling bearings. Each hydraulic coupling oil system supplies cooled oil at a constant flow rate to the hydraulic coupling.

System Status

The forced circulation system has been drained. The forced circulation pumps are not maintained operational.

5.2.3 Seal Injection System

The Seal Injection System provided cooling and sealing water for the seals on the two Forced Circulation (F.C.) Pumps and the 29 control rod drive units.

The Seal Injection System has two positive-displacement pumps, supplied with water from the seal injection reservoir. The reservoir is supplied from the Condensate Demineralizer System with a backup supply from the overhead storage tank. One pump is required for operation with the other on standby.

A cartridge-type filter is provided in the pump suction header. A deaerator, vented to the seal injection reservoir, is located on the suction of the pumps to remove entrained air from the system in the event air is introduced during makeup to the system.

Bladder-type accumulators are connected to the suction and discharge of each seal injection pump. The suction accumulators reduce pump and piping vibrations. The discharge accumulators dampen the pulsating flow from the pumps to provide the constant flow rate which is required for stable system conditions.

The water to the F.C. pump seals passes through a full-flow filter. There are two filters arranged in parallel with one normally in service and the other in standby. The filtered water is then distributed to the two F.C. pump seals. Each seal supply line contains a flow control valve, check valve, and a three-way valve for switching injection points on the seal. Both valves in each supply line can be operated from the Control Room.

The water to the control rod drive seals is filtered in the same manner as that of the F.C. pumps seals. The water passes through a flow control valve which maintains a constant flow rate to the seals. The individual supply lines to the 29 control rod drive units each have a throttle valve and flow indicator for setting the required flow rate to each seal. The normal leakoff from the seals (0.15 gpm or less) is drained to the reactor basement floor sump.

Continuous blowdown of water from the control rod drive upper housing is removed through a connection on each control rod drive upper housing flange. Each line contains a throttle valve, and all lines join at a common manifold, from which suction is taken by the control rod nozzle effluent pumps. The pumps discharge into the inlet of the Decay Heat System, which is directly connected to the Forced Circulation System.

System Status

This system is drained and not maintained operational.

5.2.4 Decay Heat Cooling System

The Decay Heat Cooling System is a single high pressure closed locp containing a pump, cooler, interconnecting piping, and the necessary instrumentation.

The decay heat loop is connected across the 20-in. Forced Circulation Pump 1A supply and return lines on the reactor side of the Forced Circulation Pump isolation valves. Both connections to the forced circulation piping are located outside the reactor biological shield.

Reactor water from the Forced Circulation Pump supply line passes through an 8-in. line to the suction side of the Decay Heat Pump. The water is then discharged through a 6-in. line into the Decay Heat Cooler where it is cooled and returned to the Forced Circulation Pump return line.

A 2-in. blowdown line to the Main Condenser takes off downstream of the Decay Heat Cooler. This may be used to remove the excess water due to seal inleakage and thermal expansion of the water.

Another 2-in. line downstream of the Decay Heat Cooler connects to the reactor vessel head vent line which can be used to promote better circulation of the water within the reactor vessel head.

System Status

This system is not required to be operable and has been drained.

5.2.5 Emergency Core Spray System

The Emergency Core Spray System consists of a spray header with individual spray lines for each fuel assembly mounted inside the reactor vessel.

The low pressure supply line allows the demineralized water from the Overhead Storage Tank, or the service water from the High Pressure Service Water (HPSW) supply line, to flow directly to the core spray header. The flow from the Overhead Storage Tank to the spray nozzles has been calculated to be approximately 85 gpm, assuming that the reactor vessel and the Containment Building are at the same pressure.

The core spray line penetrates the north wall of the biological shield at approximately 11 feet above the intermediate floor and enters the reactor vessel through a 1-1/2-inch nozzle on the northwest quadrant. The core spray header above the top of the core spray tube support grid, supplies the 72 spray lines. An individual 3/8-inch spray line is provided for each fuel element.

The spray lines are installed concentrically within tubes. Each spray line contains a needle valve on the spray header used to set the flow for each fuel assembly location. The valve stems are staked after being set so the required flow will be obtained when the reactor is operating at 577°F. The required flow per assembly varies between 0.40 and 0.87 gpm, depending on the assembly location.

System Status

The Emergency Core Spray Pumps, associated piping and valves have been removed. The low pressure supply is retained to provide Reactor Vessel refill capability.

5.2.6 Boron Injection System

The purpose of the Boron Injection System was to inject enough sodium pentaborate solution into the Primary System to make the Reactor subcritical in the event of stuck control rods.

System Status

This system has been removed.

5.2.7 Primary Purification System

The Primary Purification System is a high pressure, closed loop system consisting of a Regenerative Cooler, Purification Cooler, Pump, two Ion Exchangers and filters.

The functions of the Primary Purification System were:

(1) to maintain optimum reactor water quality (pH and conductivity) to minimize corrosion,

(2) to remove dissolved and suspended solids in order to minimize fouling of heat transfer surfaces, pipes and vessels, and maintain primary coolant activity level low, and

(3) to provide an alternate means of removing excess reactor water.

System Status

The Ion Exchange resins have been removed and the system has been drained.

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.

System Status

This system, except for the storage tanks, has been removed.

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 per section, 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.

5.2.12 Component Cooling Water System

The Component Cooling Water System provides controlled quality cooling water to the various heat exchangers and pumps in the Reactor Building. It also serves as an additional barrier between radioactive systems and the river.

The Component Cooling Water System is a closed system consisting of two pumps, two heat exchangers, a surge tank, and the necessary piping, valves, controls, and instrumentation to distribute the cooling water.

The Component Cooling Water Pumps, Coolers, and the Surge Tank are located in the Turbine Building. Water flows from the pumps, to the cooler, and then to the component cooling water supply header in the Reactor Building.

The flow requirements of the components cooled by the Component Cooling Water System were as follows during plant operation:

		Design (GPM)	Nominal (GPM)
(1)	FCP Hydraulic Coupling Coolers	60	60
(2)	FCP Lube Oil Coolers	30	30
(3)	Shield Cooler	75	75
(4)	Control Rod Nozzle Effluent Pumps	30	30
(5)	Purification Pump	15	15
(6)	Purification Cooler	260	200
(7)	Reactor Building Air Conditioners	60 ea	120
(8)	Decay Heat Pump	20	20
(9)	Decay Heat Cooler	570	100
(10)	Fuel Element Storage Well Cooler	260	100
(11)	Sample Coolers	5-10 ea	40
(12)	Failed Fuel Element Location System Cooler . . .	40	0
(13)	Station Air Compressors	20 ea	20
(14)	PASS		
	(a) Reactor Coolant Sample	10	5
	(b) Containment Atmosphere Sample	40	40
	TOTAL	1560	855

Water from each of the components, listed above, flows to the component cooling water return header. This header leaves the Reactor Building and connects to the suction of the Component Cooling Water Pumps. A sample stream from the supply header is monitored for radioactivity and returned to the suction header. The temperature of the water in the supply header is automatically controlled by varying the Low Pressure Service Water flow to the tube side of the Component Cooling Water Coolers.

System Status

This system remains in operation to provide cooling water to the Fuel Element Storage Well Cooler, Air-Conditioners and the Station Air Compressors.

5.2.13 Shield Cooling System

The Shield Cooling System was designed to maintain the temperature of the thermal shield and biological shield concrete below 140°F and 150°F, respectively.

System Status

All system components external to the biological shield have been removed, but because they are inaccessible the cooling coils have been abandoned in place.

5.2.14 Shutdown Condenser System

The primary function of the Shutdown Condenser was to provide a backup heat sink for the reactor, in the event the reactor was isolated from the main condenser, by the closure of either the Reactor Building Steam Isolation valve or the Turbine Building Steam Isolation valve. In addition, the Shutdown Condenser acted as an over-pressure relief system in limiting over-pressure transients.

The Shutdown Condenser is located on a platform 10 feet above the main floor in the Reactor Building. Steam from the 10-inch main steam line passed through a 6-inch line, two parallel inlet steam control valves, back to a 6-inch line and into the tube side of the condenser where it was condensed by evaporating cooling water on the shell side. The steam generated in the shell was exhausted to the atmosphere through a 14-inch line which penetrates the Reactor Building. An area monitor is located next to the steam vent line near the containment shell penetration in order to detect excessive activity release in the event of Shutdown Condenser tube failures. The main steam condensate was collected in the lower section and returned to the reactor vessel by gravity flow. The condensate line leaving the condenser is a 6-inch line along the horizontal run and is reduced to 4 inches for the vertical section. Two parallel condensate outlet control valves are located in the 4-inch return line. The condensate line also contains two 2-inch vent lines which join together and return to the lower section of the condenser for returning any vapors and/or non-condensible gases which were carried into the condensate line to prevent perturbations in the condensate flow leaving the condenser. The lower section in turn was vented to the offgas system through a 1-inch vent line. Flow in this vent line is restricted by a 1/16th-inch orifice, which is built into and is an integral part of the shutdown condenser offgas control valve seat.

A vent line containing two parallel control valves is connected to the 6-inch condensate return line. The valves discharge directly to the Reactor Building atmosphere and were capable of remote manual operation to vent the primary system directly to the Reactor Building atmosphere under emergency conditions. They performed the function of "Reactor Emergency Flooding Vent Valves" to equalize water level in the building with that in the reactor vessel, for a below-core break, and "Manual Depressurization System (MDS)" to rapidly depressurize the reactor vessel, on failure of the HPCS coincident with a major leak.

System Status

This system is not required to be operational.

5.2.15 Hydraulic Valve Accumulator System

The major components of the Hydraulic Valve Accumulator System are mounted on a common bed plate on the grade floor of the Containment Building. The system consists of a water accumulator tank, a water return sump tank, two air compressors, two water pumps, piping, valves, and the necessary instrumentation and controls.

Approximately 300 gallons of demineralized water is maintained in the Water Accumulator Tank by pumps which take a suction from the Water Return Sump Tank. The level is automatically maintained by a float switch which operates the pumps as required. The water is stored in the Accumulator Tank under 140 psi air pressure which is supplied by air compressors. The air compressors are automatically controlled by a pressure switch and are interlocked with the level float switch to prevent the compressors from running while a pump is running.

The function of the Hydraulic Valve Accumulator System is to supply the necessary hydraulic force to operate the five piston-type valve actuators, which operate the five Rotoport valves in the Forced Circulation and Main Steam Systems.

System Status

This system is not required to be operational.

5.2.18 Overhead Storage Tank

The Overhead Storage Tank is located at the top of, and is an integral part of, the Reactor Building.

The Overhead Storage Tank System consists of the approximately 45,000-gallon tank, the tank level instrumentation and controls, and the piping to the first valve of the systems served by the tank.

The Overhead Storage Tank serves as a backup source for the Seal Injection System; as a reservoir for the water used to flood the Fuel Element Storage Well and upper vessel cavity during fuel handling; and as a receiver for blowdown water from the Primary Purification System. It supplied the water for the Emergency Core Spray System and Containment Building Spray.

System Status

The Overhead Storage Tank remains in use, primarily for a source of makeup water tc the Fuel Element Storage Well.

5.2.19 Station and Control Air System

There are two station air compressors, a single-stage compressor and a 2-stage compressor, and a two-unit single-stage backup compressor. The single-stage compressor is a positive displacement lubricated type compressor which includes encapsulated compressor, fluid management system, motor section, and compressor cooling system. The 2-stage compressors consist of essentially three parts: the low-pressure unit, the high-pressure unit and the motor. Air from this compressor passes through an after-cooler and an oil separator to cool the air and to remove moisture and oil from the air before permitting it to enter the air receiver. One compressor is normally running, and the other compressor can be started when necessary. The air receivers act as a volume storage unit for the station.

The air receiver outlet lines join to form a header for supply to the station and the control air systems. Station air is provided to the Cribhouse, where it is piped to near the suction of the Low Pressure Service Water pumps; to the High Pressure Service Water tank to charge the tank; and to the generator and reactor plants at all floor levels, for station usage as needed.

Control air is supplied from the receiver discharge header through a control air prefilter, air filter, and Sullair air dryer, or through Deltech filters and Trinity air dryers to various instruments and valves in the reactor and generator plants.

Alarms are provided in the Control Room to warn of low control air header pressure, compressor breaker trip or low oil level in 1B Air Compressor.

A backup instrument air compressor is provided to ensure supply of control air to 1A Emergency Diesel Generator Room and to instruments inside the containment vessel.

The backup instrument air compressor consists of two carbon-ring, 2-cylinder compressors mounted on a surge tank and driven by a single motor. The surge tank is piped so that it floats on the instrument air system downstream of a check valve in the instrument air line at a point just before it enters the Containment Building.

System Status

This system is maintained and in continuous operation.

5.2.22 Circulating Water System

Circulating water is drawn into the Cribhouse intake flume from the river through traveling screens by circulating water pumps 1A and 1B, which are located in separate open suction bays. Each pump discharges into 42-inch pipe; the pipes join a common 60-inch pipe leading to the main condenser in the Turbine Building. At the condenser, the 60-inch pipe branches into two 42-inch pipes feeding the top section of the water boxes. The main condenser is a two-pass divided water box type. Circulating water enters the top section of the condenser tube side and is discharged from the bottom section tube side. The condenser tubes extend the length of the condenser and are fastened at each end to the tube sheets inserted between the water boxes and the shell.

The 42-inch condenser circulating water outlet lines tie into a common 60-inch line which discharges to the seal well from Genoa No. 3 Plant, located approximately 600 feet downstream from the LACBWR Cribhouse.

System Status

This system is maintained operational for periodic use for dilution of liquid waste discharges.

5.2.23 Condensate System and Feedwater Heaters

The Condensate System took condensed steam from the condenser hotwell and delivered it under pressure to the suction of the reactor feed pumps. Two identical full-capacity condensate pumps took suction from the hotwell, and pumped the condensate through a full-flow demineralizing system, the air ejector condensers, the gland steam exhaust condenser and two feedwater heaters before entering the feed pumps.

The Condensate System also supplied the turbine exhaust sprays, the reactor feed pump shaft sealing cooling system, the normal makeup to the seal injection system, and gland seal steam generator. Hotwell level is maintained by automatic makeup from, or overflow to, the Condensate Storage Tank.

System Status

This system has been flushed to reduce radiation levels and then drained. The Condensate Storage Tank has been left dry.

5.2.24 Reactor Feedwater Pumps

The feedwater pumps took preheated condensate from No. 2 feedwater heater and delivered it through No. 3 feedwater heater to the reactor. The pumps boosted the system pressure from about 200 psi to approximately 1300 psi. The pump coupling arrangement is such that pump speed, and therefore capacity, may be varied to control reactor water level. Each pump is a separate unit containing all the auxiliaries, controls, and other components necessary for independent operation.

System Status

The Reactor Feedwater Pumps are not used.

5.2.25 Full-Flow Condensate Demineralizer System

The Full-Flow Condensate Demineralizer System consists of three service tanks, each with one-half system capacity and arranged in parallel. Its purpose was to remove ionic impurities from the condensate system water before admitting it to the reactor. Each service tank is capable of delivering 700 gpm. With one of the three tanks on standby, the system is capable of delivering 1400 gpm to satisfy primary system requirements. The standby service tank was available for service whenever the effluent conductivity of the inservice tanks rose to an unacceptable level. Each of the three demineralizer tanks normally contained 45-50 ft^3 of pre-regenerated mixed resins with a cation/anion ratio of 2 to 1. The three service tanks are designed for 400 psig operation, and normal flow is supplied by the condensate pumps. A circulating pump is provided to circulate water through the standby demineralizer tank prior to placing it into service.

System Status

The regeneration portion of this system has been removed and pre-regenerated resins are used in this system.

One service tank contains resins. This system is not required to be operable.

5.2.26 Steam Turbine

The turbine is a high pressure, condensing, reaction, tandem compound, reheat 3600 rpm unit rated at 60,000 KW with the following steam conditions: 1250 psig, 547°F, exhausting at 1.0" Hg Absolute. The turbine consists of a high pressure and intermediate pressure and a low pressure element.

System Status

This system is not required to be operational.

5.2.27 60-Megawatt Generator

The 60-Mw generator is a high-speed turbine-driven wound-rotor machine that is rated at 76,800 kva, 85 percent P.F., 3600 rpm, 60 cycle, 3 phase, 13,800v A-C, and 3213 amp. The generator is cooled by a hydrogen system, lubricated by a forced-flow lubricating system, and excited by a separate exciter attached to the end of the generator shaft through a reduction gear. A reserve exciter is provided.

System Status

The generator casing was filled with nitrogen and the exciter brushes have been removed.

5.2.28 Turbine Oil and Hydrogen Seal Oil System

The Turbine Bearing Oil System receives cooled oil from the lube oil coolers to supply the necessary lubricating and cooling oil (via a bearing oil pressure regulator) to the turbine and generator bearings, exciter bearings, and exciter reduction gear. During normal operation, the necessary oil pressures are provided by the attached lube oil pump. During startup and shutdown, an ac motor-driven auxiliary lube oil pump provides oil pressure. Backup protection consists of the ac turbine bearing oil pump and the dc emergency bearing oil pump.

The Hydrogen Seal Oil System receives cooled oil from the lube oil coolers; and it supplies this oil, via a pressure regulator, to the inboard and outboard hydrogen seals of the generator. Backup protection is provided in the event the normal supply pressure drops or is lost, with an ac hydrogen seal oil pump and a dc emergency hydrogen seal oil pump.

Flexibility of the Turbine Oil Transfer System is brought about by the piping arrangement that allows the lubricating oil to be transferred or purified from several sources. With the lube oil transfer pump, turbine oil may be transferred from the lube oil reservoir to either the clean oil or dirty oil tanks located in the oil storage room.

System Status

This system is not required to be operational.

5.2.34.2 Stack Gas PASS System Description

The Stack Gas Post-Accident Sampling System makes use of the same equipment that provides the normal stack gas sample flow. The vacuum pump for stack gas sampling draws the extra flow, above what the stack monitors draw, to make the total flow isokinetic to the stack discharge. This flow can be diverted through the post-accident sample canister by opening manual isolation valves. The sample canister is connected to the system by two quick disconnects, and, therefore, can be easily removed from the system and taken to the laboratory for analysis. The sample canister diversion valve is controlled from the local control panel in the No. 3 Feedwater Heater area.

5.2.34.3 Reactor Coolant PASS System Description

The Reactor Coolant Post-Accident Sampling System takes primary coolant from an incore flux monitoring flushing connection, through 2 solenoid-operated isolation valves with a heat exchanger between them, to a motor-operated pressure reducing valve. Downstream of the pressure reducing valve, the coolant sample can be diluted with demineralized water which then flows through the sample cylinder or its bypass valve, through another solenoid isolation valve, and back to the Containment Building basement or to the waste water tanks.

System Status

The Stack Gas PASS System is maintained in continuous operation. The Reactor Coolant PASS System is no longer needed. The Containment Atmosphere PASS System is retained in place.

5.2.35 Containment Integrity Systems

With the plant in the SAFSTOR condition, there is no longer a postulated accident that would result in containment pressurization. The requirement for containment integrity during fuel handling has been retained.

Containment integrity shall exist when all penetrations required to be isolated are either capable of being closed by an operable containment automatic isolation valve system, or closed by at least one manual valve, blind flange, or deactivated automatic valve secured in its closed position. The freight door is closed, each airlock is operable, the containment leakage rates are within the limit and the sealing mechanism associated with each penetration is operable.

System Status

These systems will be maintained in accordance with LACBWR Technical Specifications.

5.3 RADIONUCLIDE INVENTORY ESTIMATES

Testing was conducted inhouse, using Health Physics personnel, to determine the location and the quantities of the radionuclides present at LACBWR. Several different types of samples and sampling techniques were used to qualify/quantify the radionuclide inventory. Each method will be described in the initial site characterization survey for SAFSTOR. All samples were gamma scanned using HPGe detectors coupled to a gamma spectroscopy computer system. This equipment has been calibrated to NBS traceable sources and is checked periodically to maintain this calibration.

5.4 RADIATION LEVELS

5.4.1 Plant Radiation Levels

Upon entering the initial phase of LACBWR's SAFSTOR mode, base line gamma radiation surveys were performed throughout the plant. General area radiation levels are listed below. These levels will be routinely monitored and tracked. Specific area hot spots will also be looked for and recorded on each area survey.

Area	General Area Gamma Radiation Levels
Containment Building:	
Shutdown Condenser Platform	10-20 mRem/hr
701' Level	6-12 mRem/hr
Mezzanine Level East	5-10 mRem/hr
Mezzanine Level West	20-30 mRem/hr
West Nuclear Instrument Platform	40-90 mRem/hr
East Nuclear Instrument Platform	10-20 mRem/hr
Purification Cooler Platform	5-10 mRem/hr
Grade Floor North and East	7-20 mRem/hr
Grade Floor West	75-120 mRem/hr
Upper Control Rod Drive Area	60-120 mRem/hr
Basement	10-40 mRem/hr
Primary Purification Demineralizer	7-17 mRem/hr
Retention Tank Area	250-400 mRem/hr
Lower Control Rod Drive Area	60-150 mRem/hr
Forced Circulation Pump Cubicles	150-400 mRem/hr
Turbine Building:	
Main Floor	<1-3 mRem/hr
Mezzanine	<1-4 mRem/hr
Stop Valve Area	10-85 mRem/hr
Grade Floor	1-10 mRem/hr
Feedwater Heater Area	5-20 mRem/hr
Tunnel 10-50 mRem/hr	
Machine Shop	<1 mRem/hr
1B Diesel Room	<1 mRem/hr
Electrical Penetration Room	2-7 mRem/hr
Waste Treatment Building:	
Main Floor	1-20 mRem/hr
Basement	10-100 mRem/hr
Building Exteriors:	
Exterior of Waste Treatment Building	<1 except for south side where there is one spot between 3-4 mRem/hr
Exterior of Containment Building	<1 except for one spot on south side reading 7 mRem/hr

5.4.2 System Radiation Levels

During SAFSTOR the major radioactively contaminated systems at LACBWR will be monitored in order to trend system cleanups and radioactivity decay. A program consisting of 100 survey points located throughout the plant has been established. Initial system contact readings have been taken and will be monitored on a frequency determined to adequately trend any radiation level changes. The individual survey locations may change during the SAFSTOR period as plant parameters change.

The following is a list of the initial survey points and the associated dose rates.

Survey Point #	Survey Point Location	Contact Dose Rate (mrem/hr)
1	Condensate Line to and from OHST	25
2	Condensate Line to and from OHST	24
3	Condensate Line to and from OHST	33
4	1A Condensate Pump Discharge Line	12
5	Emergency Overflow Line	27
6	Emergency Overflow Bypass Line	33
7	Ice Melt Line	3
8	1A Reactor Feed Pump	16
9	Near 1B Reactor Feed Pump Discharge Valve	11
10	Side of #3 Feedwater Heater	26
11	Reheater Level Control Chamber	26
12	South End of Reheater	13
13	Gland Exhaust Condenser Loop Seal	35
14	Main Steam Line	48
15	Main Steam Line	50
16	Offgas System Flame Arrestor	8
17	1B Waste Water Pump	26
18	1A Waste Water Pump	60
19	End of 3000 Gallon Waste Tank	170
20	End of 4500 Gallon Waste Tank	120
21	Side of Gland Seal Steam Generator	1100
22	Side of Gland Seal Steam Generator	160
23	Main Steam Bypass Line	17
24	Turbine Inlet Valve Body	23
25	Main Steam Line	24
26	Reheat to Flash Tank Line	11
27	Flash Tank	5
28	Seal Injection Heater	31
29	#2 Feedwater Heater Bypass Line	100

Survey Point #	Survey Point Location	Contact Dose Rate (mrem/hr)
30	Feedwater Heater Bypass Line	24
31	Bottom of Gland Exhaust Condenser	170
32	Top of Gland Exhaust Condenser	20
33	Condensate into Air Ejector Line	7
34	Air Ejector	8
35	Low Pressure Turbine Manhole Cover	6
36	End of High Pressure Turbine	2
37	Primary Purification 1A Filter Inlet Line	38
38	Primary Purification Pump	140
39	Exhaust Ventilation Duct	9
40	Containment Bldg. Grade Level N Shield Wall	6
41	1A Fuel Element Storage Well Pump	70
42	1B Fuel Element Storage Well Pump	80
43	FESW Filter Discharge Line	180
44	FESW System Cooler	1000
45	Hydraulic Valve Actuation System Header	60
46	Base of Hydraulic Valve Accumulator	24
47	Wall at Electrical Penetration	30
48	Handrail on NW Nuclear Instrumentation (NI) Platform	100
49	Shield Wall on N NI Platform	4
50	Primary Purification to OHST Line	6
51	Above Primary Purification Cooler Inlet Valve	25
52	Cold Leg of Reactor High Level Transmitter Line	46
53	Seal Injection Resevoir	30
54	Reactor Cavity Drain Line	44
55	1A Core Spray Pump Discharge Line	10
56	Reactor Water Level Sightglass Line	180
57	Reactor Water Level Sightglass Line	100
58	Cont. Bldg. Mezzanine Level N Shield Wall	4
59	Steam Trap Cont. Bldg. Mezz. Level NW Wall	23
60	Fuel Element Storage Well Line	400
61	Fuel Element Storage Well Line	420
62	Fuel Element Storage Well Line	60
63	Fuel Element Storage Well Skimmer Line	90
64	Wall near Fuel Transfer Canal Drain	35
65	Relief Valve Platform at Level Transmitter Isolation	80
66	Shutdown Condenser	11
67	Shutdown Condenser Condensate Line	6
68	1B Retention Tank	300
69	1A Retention Tank	130

Survey Point #	Survey Point Location	Contact Dose Rate (mrem/hr)
70	By Primary Purification Cation Tank	24
71	Decay Heat Cooler	25
72	Decay Heat Cooler	18
73	Decay Heat Cooler Bypass Valve	70
74	Decay Heat Pump Suction Line	32
75	Handrail at Shutdown Condenser Condensate Valves	28
76	Seal Injection DP Transmitter	44
77	Top of Upper Control Rod Drive Mechanism	370
78	Top of Upper Control Rod Drive Mechanism	200
79	Wire mesh screen on N Upper Control Rod Platform	22
80	Bottom of Upper Control Rod Drive Mechanism	1000
81	Top of Upper Control Rod Drive Mechanism	500
82	Bottom of Upper Control Rod Drive Mechanism	800
83	Effluent Lines on Upper Control Rod Platform	390
84	Sump Pump Discharge Line to Retention Tank	260
85	At Forced Circulation Pump Filters	33
86	Retention Tank Pump	60
87	Under Lower Control Rod Drive Mechanism	246
88	Control Rod Drive Hydraulic System Header	190
89	Decay Heat Pump	150
90	1B Forced Circulation Pump Suction Line	1000
91	1B Forced Circulation Pump Suction Line	1100
92	1A Forced Circulation Pump Suction Line	500
93	1A Forced Circulation Pump Suction Line	600
94	1A Forced Circulation Pump Discharge Line	700
95	Feedwater Line in Forced Circulation Cubicle	130
96	1A Forced Circulation Pump	130
97	Handrail at 1A Forced Circ. Pump Suction Line	250
98	1A Forced Circulation Pump Discharge Line	800
99	1A Forced Circulation Pump Discharge Line	600
100	1A Forced Circulation Pump Suction Line	700

5.5 PLANT PERSONNEL DOSE ESTIMATE

During normal/routine SAFSTOR operations at LACBWR, average whole body radiation dose received by plant personnel should be no more than 0.600 Rem per individual per year. This average dose is expected to decrease during the SAFSTOR period due to isotopic decay. Individual doses will be dependent upon work being performed. Plant personnel will not be allowed to exceed 5.0 Rem/year.

5.6 SOURCES

As authorized by the facility license, sealed sources for radiation monitoring equipment calibration, reactor instrumentation, reactor startup, and fission detectors will continue to be possessed and/or used. Additionally, sources will be used as authorized without restriction to chemical or physical form for sample analysis, instrument calibration and/or as associated with radioactive apparatus and components.

5.7 RADIATION MONITORING INSTRUMENTATION

Radiation monitoring instrumentation for the LACBWR consists of fixed plant surveillance equipment, portable survey meters, laboratory-type counting instrumentation, and personnel monitoring equipment.

The Radiation Monitoring System performs the following functions:

(1) Provides a permanent record of radioactivity levels of plant effluents.

(2) Provides alarms and automatic valve closures to prevent excessive radioactive releases to environment.

(3) Provides warning of leakage of radioactive gas, liquid, or particulate matter within the plant.

(4) Provides continuous radiation surveillance in normally accessible plant areas.

(5) Provides portable instrumentation for use in conducting radiation surveys.

(6) Provides instrumentation for personnel and material contamination surveillance, including that necessary for control of egress from restricted areas.

(7) Provides pocket dosimeters and necessary charging and readout equipment for personnel radiation exposure control and estimates.

5.7.1 Fixed Plant Monitors

The plant fixed surveillance monitoring equipment consists of liquid monitors, air monitors, and area monitors.

5.7.1.1 Liquid Monitors. The liquid monitors consist of a modular nim bin electronic system in the Control Room coupled to a NaI scintillation detector. The NaI scintillation detector is coupled to a photomultiplier tube base-preamplifier.

5.7.1.2 Containment Building Air Exhaust Gaseous and Particulate Monitor. A monitor is located on the Containment Building mezzanine level. This monitor has a fixed filter particulate detector and a gaseous detector. It takes its suction from the outlet of the C.B. ventilation filters.

5.7.1.3 Stack Monitor. A monitor is installed to sample the stack emissions. This monitor draws air from the stack through an isokinetic nozzle. This monitor detects particulate and gaseous activity released to the stack. This monitor alarms locally and in the control room.

5.7.1.4 Fixed Location Monitors. Area radiation monitors are used to detect and measure gamma radiation fields at various remote locations. There are fifteen remote units located throughout the plant. The measured dose rate is displayed on meters located in the Control Room.

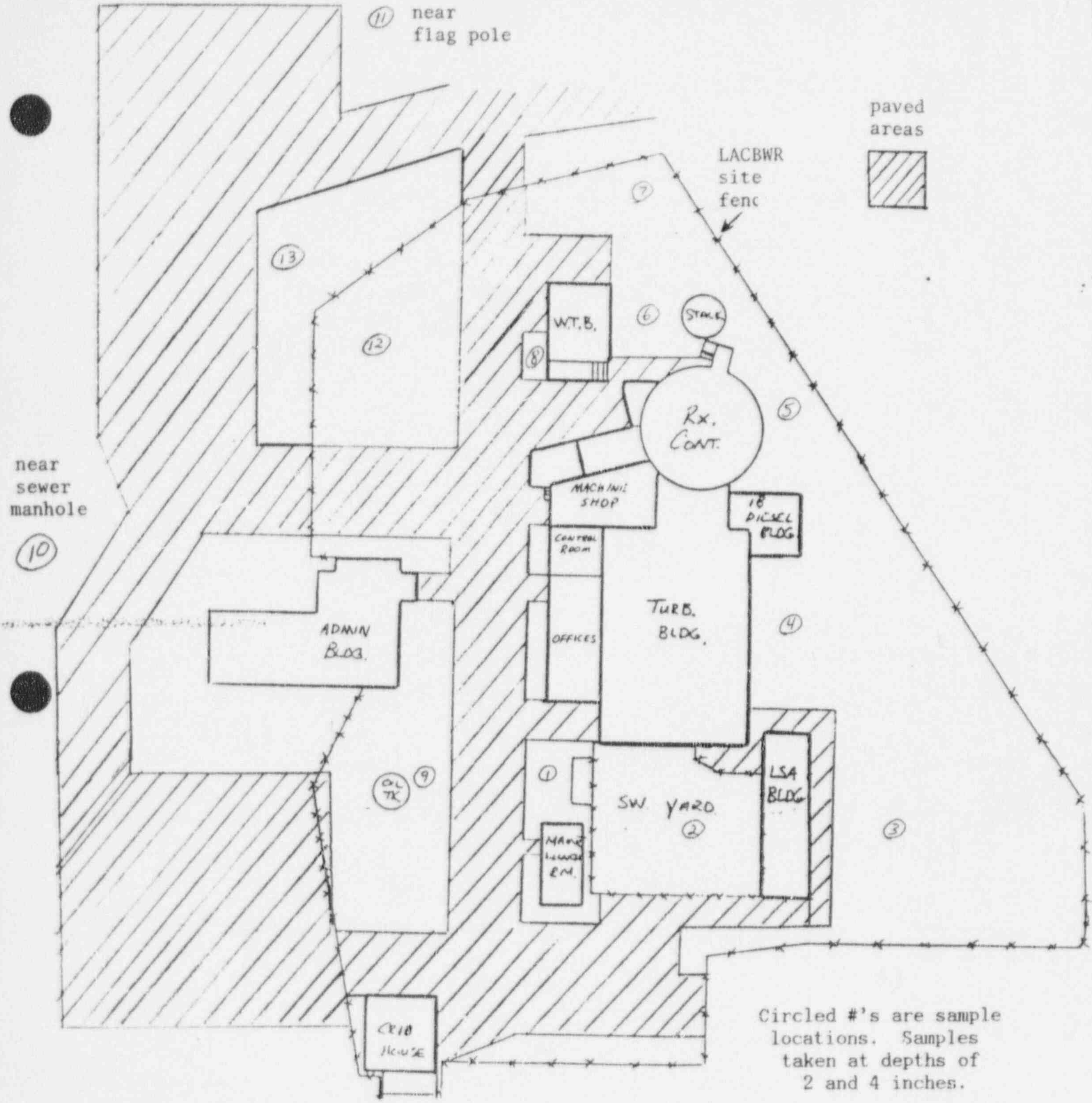
5.7.1.5 Containment Building High Range Area Radiation Monitor. The Containment Building High Range Area Monitor consists of two independent extended range area monitors. The detectors are on the 701' level and are installed on the containment wall approximately 180° apart.

5.7.2 Portable Monitors

Portable instruments are located throughout the plant. Instruments are available to detect various levels of beta, gamma, and alpha radiation.

5.7.3 Laboratory-Type Monitors

Laboratory instruments are available to determine contamination levels and radioisotope concentrations. These instruments consist of internal proportional counters, gamma analyzers, and liquid scintillation counters.



Ground sample background taken approx. 15 miles north of LACBWR

Ground Sample Survey Map

FIGURE 5.1

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 Supervisor 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 Supervisor 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 Administrative Secretary will report to the Administrative Supervisor 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 Supervisor.

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

6.4.3 Technical Training

The following areas consist of a formal initial training program, followed by a recurring continuing training program.

6.4.3.1 The Health Physics Technician (HP) Initial Training Program consists of the following topics:

a) Science Training

 (1) Nuclear Theory

 (2) Chemistry

  (a) Non-radiological
  (b) Radiochemistry

 (3) Radiological Protection and Control (including surveys)

b) Systems Training

 (1) Effluent Systems Sampling and Control

c) Emergency Plan Training

 (1) Onsite Survey Team Member
 (2) Nearsite Survey Team Member
 (3) Duty HP
 (4) Re-entry Team Members
 (5) PASS Sampling
 (6) Medical Emergency

d) Environmental Program

e) Waste Disposal

f) Whole Body Counting

g) Respiratory Protection Program

h) Radiation Monitoring and Instrumentation

i) Administrative Requirements

j) First Aid Training

6.4.3.2 The Health Physics Technician (HP) Continuing Training Program consists of the following:

a) The program will be of 12-month duration, and will be repeated each 12 months.

b) Health and Safety (H&S) management will review significant industry events and distribute, as required reading to all technicians, those events determined to be applicable to LACBWR HPT's.

c) H&S management will review LACBWR events and distribute, as required reading to all technicians, those events determined to be relevant and significant.

d) Emergency Plan Training commensurate with duties.

e) Procedure changes will be reviewed by H&S management and those determined to be relevant to the performance of a technician's duties will be distributed as required reading.

f) The H&S Supervisor may initiate additional training for the technicians at any time. This training could be for, but not limited to, any of the following:

(1) Equipment upgrade/replacement.
(2) Infrequent and/or important tasks.
(3) Significant procedure or department policy changes.
(4) Significant performance problems.

g) The H&S Supervisor will ensure all Journeyman Technicians successfully complete the HP continuing training. Records of satisfactory completion will be maintained by H&S management. The continuing training will cover the following topics.

(1) Intralaboratory comparisons in analytical chemistry - crosscheck analysis.
(2) Emergency Plan training.

h) A meeting will be conducted, at least semiannually, by the H&S Supervisor for all technicians for the purpose of discussing any pertinent information on the following topics:

(1) Significant Plant/Industry events.
(2) Equipment Changes.
(3) Management/Technician Concerns.
(4) Performance Problems.

Minutes of these meetings will be taken.

Transition year (1988)

Staff wages	$1,793,500
Fringe benefits	717,400
Employee Expenses & Training	24,956
Communication Costs	26,000
Equipment Costs	130,100
Operating & Construction Material and Expense	241,500
Maintenance Material & Expense	85,000
Outside Services including Security	1,157,293
Total for 1988	$4,175,749

Base Year (1989)

Total for 1989	$2,508,600

Total Projected for Year:

1990	$2,629,000
1991	2,755,200
1992	2,887,500
1993	3,026,000
1994	3,171,300
1995	3,323,500
1996	3,483,100
1997	3,650,300
1998	3,825,500
1999	4,009,100
2000	4,201,500
2001	4,403,200
2002	4,614,500
2003	4,836,000
2004	5,068,200
2005	5,311,400
2006	5,566,400
2007	5,833,600
2008	6,113,600
2009	6,407,000
2010	6,714,600

6.7.2 DECON (2011-2014)

The cost of deconning will be based on the selection of total radiological cleanup as the option to be pursued for the final decommissioning of the La Crosse Boiling Water Reactor. Once radioactive material and sources of contamination have been removed and the site meets established release criteria, buildings will be released for whatever activity the Cooperative chooses to perform. They may be used for other Cooperative purposes, sold for another purpose or demolished. The cost of the DECON phase is indicative of knowledge of technology as it exists at the time of preparation of this plan (1987). It is expected that better technologies will exist by the time that this activity is carried out and Dairyland Power Cooperative is committed to the utilization of the most effective technologies available at the time in optimizing the DECON activity. The cost estimates, therefore, are stated based on today's technology in projected 2011-2014 dollars as well as in fixed 1987 dollars.

The decommissioning fund will be placed in an external fund, outside DPC's administrative control, invested in instruments such as Treasury Notes. By the end of 1987, the decommissioning fund accumulated to approximately \$9,400,000. The decommissioning fund in the year 2000 will reach \$50 million (assumed equal to \$20 million in 1983 dollars, the original cost estimate). The decommissioning fund by the year 2010 will be approximately \$92,600,000 accrued.

In 1983, the Dairyland Power Cooperative Board of Directors resolved to ensure adequate funding for the decommissioning of LACBWR. An annual funding of \$1,300,000 was established, to be continued through 1999. This fund, with accumulated earnings, is projected to be able to adequately fund the decommissioning cost in 2010, based on the original cost estimate. The Board of Directors is also prepared to adjust the funding level, as necessary, to assure adequate funding.

The most recent site-specific decommissioning cost study performed by Sargent & Lundy and completed in 1994 identified a need for increased funding. The Dairyland Power Cooperative Board of Directors authorized and approved an adjusted annual decommissioning accrual of \$3 million with continued funding through 2010 to provide sufficient funding with commencement of decommissioning in 2019.

The DPC Board of Directors remains committed to assuring that adequate funding will be available for the decommissioning of the LACBWR facility and is prepared to adjust the funding level for the LACBWR Decommissioning Plan, from time to time, and/or take such other actions as it deems necessary or appropriate to provide such assurance, based upon its review of the most recent decommissioning cost estimate and other relevant developments in this area.

Every five years during the SAFSTOR period, a review of the decommissioning cost estimate will be performed in order to assure adequate funds are available at the time final decommissioning is performed.

6.8 SPECIAL NUCLEAR MATERIAL (SNM) ACCOUNTABILITY

The LACBWR Accountability Representative is the person responsible for the custodial control of all SNM located at the LACBWR site and for the accounting of these materials. He is appointed in writing by the Dairyland Power Cooperative General Manager.

The LACBWR Spent Fuel (333 assemblies) is stored under water in the high density spent fuel storage racks in the LACBWR Fuel Storage Well which is located adjacent to the reactor in the LACBWR containment building.

Additional small quantities of SNM are contained in neutron and calibration sources and in fission detectors which are appropriately stored at various locations in the LACBWR plant.

All fuel handling and all shipment and receipt of SNM is accomplished according to approved written procedures. Appropriate accounting records will be maintained and appropriate inventories, reports and documentation will be accomplished by or under the direction of the LACBWR Accountability Representative in accordance with the requirements set forth in 10 CFR 70, 10 CFR 73 and 10 CFR 74.

6.9 SAFSTOR FIRE PROTECTION PROGRAM

6.9.1 Program Administration

6.9.1.1 The LACBWR Plant Manager is responsible for the fire protection program. A member of the Dairyland technical staff is responsible for annual evaluation of equipment provided for fire fighting, training, and maintaining a current and effective fire protection program.

6.9.1.2 The training program for the Fire Response Team will be maintained under the direction of a designated staff member and will meet or exceed the requirements of Section 27 of the NFPA Code 1976.

6.9.1.3 The Fire Response Team will consist of three (3) members. These individuals will be available to respond in the event of a fire emergency at the LACBWR Unit. The Fire Response Team Leader will be a member of the Operations Department. The Fire Response Team will not include any personnel required for other essential functions during a fire emergency.

6.9.1.4 Implementing procedures for surveillance testing and inspection, to assure that necessary equipment is in place and operable, have been established. Four fire drills, conducted under the direction of the Fire Protection Supervisor, will be held each quarter, with the intent of maximizing the number of fire brigade members to be drilled.

6.9.1.5 Self-contained breathing apparatus will be supplied for each member of the Fire Response Team and for any control room personnel. One hour of breathing air spare bottles for each of the above required masks will be available within the confines of the unit with cascade recharging facilities located on the Genoa site.

6.9.1.6 A section of technical specifications shall delineate inspection and surveillance test frequency, reports necessary, and statements of actions.

6.9.2 SAFSTOR Analysis

LACBWR can safely maintain and control the FESW in the case of the worst postulated fire in each fire area of the plant.

The SAFSTOR fire protection program and systems were reviewed using the criteria and guidelines of Branch Technical Position 9.5-1 for general guidance. It was concluded that the LACBWR Fire Protection Program and detection and extinguishing systems are adequate, considering the reduced risk due to plant being in the SAFSTOR mode. The installed fire protection equipment being maintained during the SAFSTOR period is the same as that used during plant operation.

Fire protection practices include isolation of fire areas via sealed penetrations; detection of potential fires and location identification for the plant operators, coverage by automatic extinguishing systems in the plant, protecting cables with fire resistant coverings, and installed emergency lighting systems.

6.9.3 Plant Fire Layout

The LACBWR plant is divided into fire areas. These areas are separated from each other by one or more of the following:

1) 3-hour or better fire walls.

2) Walls and ceilings with ratings well in excess of the combustibles involved.

6.9.4 Fire Protection Systems

The LACBWR Fire Protection System and equipment provide the means to quickly combat all types of fires that might occur at the plant and to maintain the plant in a safe condition. The Fire Protection System consists of a CO_2 flooding system for the 1B Emergency Diesel Generator (EDG), Halon flooding system, portable extinguishers, sprinkler systems, hose stations and fire hydrants, transformers, deluge sprinklers, portable smoke ejectors, and a fire and smoke detection system.

6.9.4.1 Fire Suppression Water. The fire suppression water system is a combined usage water system and is called the High Pressure Service Water System (HPSW). Water is supplied from the Mississippi River which is the west boundary of the plant. A reinforced concrete flume juts out from the cribhouse to channel water to the pumps.

Two 125 psi net head, vertical turbine, diesel fire pumps are connected in parallel and take suction from the well supplied by the flume.

The operating pump discharges into a six-inch steel underground main system that loops the plant. One leg of the loop is run overhead through the grade floor of the Turbine Building at the west end. Two underground sectionalizing valves with locked curb boxes are provided to isolate the overhead main section in case of a rupture of either inside or outside buried mains. Two locked valves are also provided inside the plant for this purpose.

All HPSW services are fed from the overhead main except for five 6-inch fire hydrants which are spaced at approximately 200 feet intervals around the plant. Pressure is maintained at 80 to 120 psi in the HPSW system by a 500 gpm electric, fire booster pump in the west end of the grade floor of the Turbine Building. This pump takes suction from the 16-inch Low Pressure Service Water (LPSW) main. LPSW is supplied by one of two large electric vertical turbine pumps in the Cribhouse. The HPSW system inside of the building can be isolated from the outside underground loop in case of an underground break.

As a backup system to the HPSW system, the LACBWR fire main can be cross connected to the Genoa-3 station fire main.

6.9.4.2 Sprinkler Systems. There are seven sprinkler systems located throughout the plant. Five of these are of the fusible link type, one is a dry pipe sprinkler requiring manual initiation of flow, and one system is initiated by either automatic or manual means.

Four of the fusible link sprinklers are located above the turbine oil tank, above the Alternate Core Spray ac and dc valves, above the HPSW diesels in the cribhouse, and in the heating oil storage tank room. All of these systems have flow switches installed in their supply piping with associated alarms at the control room fire panel.

A manually enabled fusible link sprinkler system is located in the 1A Diesel Generator Room.

The dry pipe sprinkler system is located in the electrical penetration room.

The other system is a transformer deluge system in the LACBWR switchyard.

6.9.4.3 Fire Hose Protection. Outside hose is jacketed, lined, 300 psi test fire hose with the necessary approved fog nozzles and fittings. This equipment is stored in four strategically located cabinets. The hoses are adequate to provide at least two 1.5 inch streams on any fire in the plant. There is also hose available in the outside cabinets to cross connect LACBWR with Genoa-3 plant if necessary.

Inside hose cabinets are provided at five locations in the Turbine Building. Each cabinet contains 75 feet of approved, 1.5 inches, lined hose and an approved fog nozzle. A similar cabinet is located in the Waste Treatment Building.

A hose reel with approved 1.5 inch, jacketed and lined, fire hose and approved fog nozzle is installed in the 1B Diesel Generator electrical equipment room.

The Containment Building has four hose reels, each with 75 feet of 1.5 inch rubber hose and adjustable nozzle. These hose connections are at the four main levels of the building and within easy reach of any fire that might occur on those levels.

All hose fittings, nozzles, hydrant butts and hose couplings are National Standard Fire Hose Thread.

6.9.4.4 Special Hazard Extinguishing Systems. The special hazard extinguishing systems at LACBWR are the approved high pressure carbon dioxide total flooding system for the 1B Diesel Generator room and Halon systems for the electrical equipment room and the record storage room, which is in the administration building.

Due to the diminished probability of a health and safety threat with the reactor non-operable, the need for Halon protection in the electrical equipment room has also diminished and will not be needed. This area is alarmed and can be treated as a Class A fire area.

6.9.4.5 Alarm and Detection System. A Class B smoke and fire alarm system has been installed throughout the plant. The system has an alarm panel in the main control room. Alarms connected to the system include smoke and fire detectors and sprinkler alarms. Fire pump, CO_2, and Halon systems also alarm in the control room.

Areas of potential fires throughout the plant are covered by approved, ionization chamber-type detectors and/or thermal fire detectors which combine rate-of-rise and fixed temperatures, which are connected to 20 separate alarm zones on the fire alarm panel. The pilot light on the detector indicates which detector in an alarm zone has been activated.

A fire alarm zone bypass switch panel is located in the control room, next to the multi-zone fire cabinet. In the "BYPASS" position, the alarm circuit for that zone is bypassed, the 1-1/2 hour timer motor for that zone is started and the red flashing light at the zone detector head is turned off if the detector was alarming. This allows welding or other maintenance to be conducted in a zone without disabling the entire fire detection system.

Four of the sprinkler systems are monitored by flow alarms to indicate a water flow in the systems. The alarm is initiated by a water flow switch in each of the systems and is alarmed at the fire alarm panel.

The two diesel fire pumps are alarmed to an alarm panel in the control room showing trouble and operating alarms.

6.9.4.6 Inspection. The diesel fire pumps are tested on a monthly frequency and the data recorded. In addition, an 18-month flow test of the pumps and a triannual test of the flow characteristics of the piping system is performed.

Various other tests and inspections of all equipment are made by plant personnel and the fire insurance company retained by Dairyland Power Cooperative.

6.9.5 Fire Fighting Equipment

6.9.5.1 Fire Extinguishers. An adequate supply of portable extinguishers of appropriate types are provided throughout the plant.

6.9.5.2 Outside Storage Cabinets and Equipment. Four outside cabinets have been provided for storage of equipment necessary for use of the fire hydrants. One cabinet is located on the northeast corner of the Waste Treatment Building, one east of the Cribhouse, one by 1B Diesel Building, and one at the southwest corner of the Turbine Building. All are painted vermillion red for easy identification. Equipment consists of: 2-1/2" hose, 1-1/2" hose, fog nozzles, gate valves, hydrant wrench, hose spanner wrenches, and coupling gaskets.

6.9.5.3 Tool Kits. Tool kits have been provided in two locations, one located in an outside hose cabinet, the other located in the maintenance shop on the north wall.

6.9.5.4 Self-Contained Breathing Apparatus. Self-contained breathing apparatus is located in the turbine hall outside the control room door and in the change room.

6.9.5.5 Portable Smoke Ejectors. Smoke ejectors are provided for the removal of smoke from confined or non-ventilated areas. These are stored along the north stairs to the machine shop and are of 2000 cfm rating.

6.9.5.6 Firefighting Clothing and Equipment. Fire clothing and equipment is stored in the change room. There are enough coats, boots, gloves, and fire fighter helmets for the Fire Response Team.

6.10 SECURITY DURING SAFSTOR AND/OR DECOMMISSIONING

During the SAFSTOR status associated with the LACBWR facility, security will be maintained at a level commensurate with the need to insure safety is provided to the public from unreasonable risks.

Guidance and control for security program implementation are found within the LACBWR Security, Safeguards Contingency, and Guard Force Training and Qualification Plans, along with the Security Control Procedures.

6.11 RECORDS

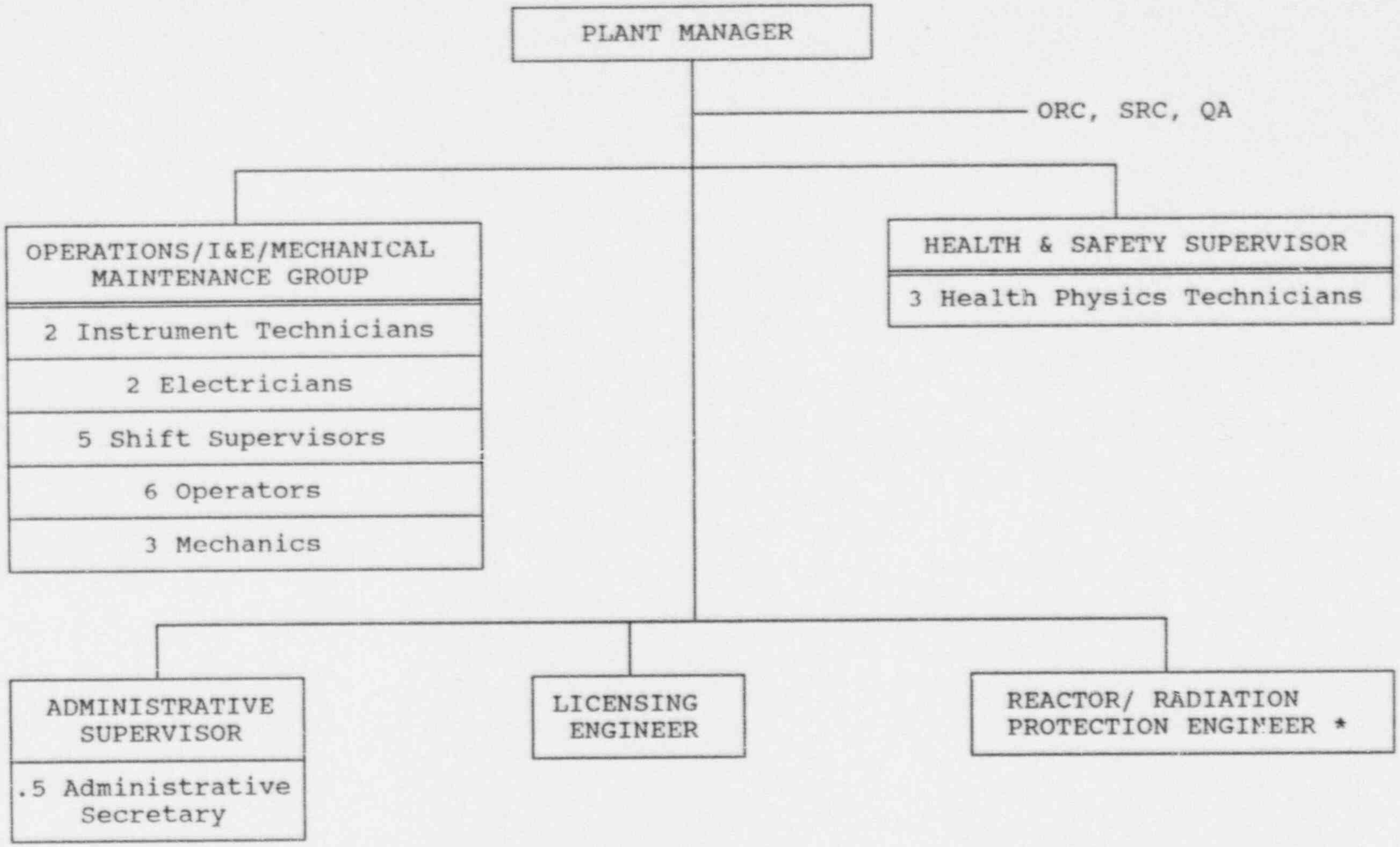
Any records which are generated for the safe and effective decommissioning of LACBWR will be placed in a file explicitly designated as the decommissioning file. Any records generated which are not specifically for decommissioning, but could affect decommissioning activities, will be indexed, filed, and retrieved in accordance with the LACBWR Quality Assurance Program Description (QAPD).

Examples of records which would be required to be placed in the decommissioning file are:

- Records of spills or spread of radioactive contamination, if residual contamination remains after cleanup.
- Records of contamination remaining in inaccessible areas.
- Plans for decontamination (including processing and disposal of wastes generated).
- Base line surveys performed in and around the LACBWR facility.
- Analysis and evaluations of total radioactivity concentrations at the LACBWR facility.
- Any other records or documents, which would be needed to facilitate decontamination and dismantlement of the LACBWR facility and are not controlled by other means.

Supporting documentation (i.e., as-built drawings, modifications, procedures, etc.) will be generated, maintained, updated, filed, and controlled in accordance with the LACBWR-approved QAPD.

LA CROSSE BOILING WATER REACTOR SAFSTOR STAFF



Assumes Cooperative-wide Security & QA

* Duties to be performed with assistance of qualified consultants when necessary.

FIGURE 6.1

Activities	Year / Period: 1987 2nd Qtr	1987 3rd Qtr	1987 4th Qtr	1988	1989	1990 - 2039
Reactor Shutdown	x					
File for Possession-Only License	x					
Reactor Defueling	x					
Receive Possession-Only License		x				
File Technical Specifications for Interim Period	- - -	- - -	- - -			
Submit Decommissioning Plan			x			
Submit SAFSTOR Technical Specifications			x			
Perform Baseline Radiation Survey		- - -				
Perform System Modifications				- - -	- - -	- - -
Decommissioning Plan Approval					x	
*SAFSTOR Period					- - -	- - -
**Shipment of Fuel Offsite						x
**Modification to Decommissioning Plan for SAFSTOR						x
*Update DECON Plan						- - -
*Commence DECON						- - -

* SAFSTOR period expected to last 30-50 years. A detailed DECON Plan will be submitted prior to end of that period.
** Dependent on schedule of federal repository.

<u>Tentative Schedule for LACBWR Decommissioning</u>

FIGURE 6.2

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 unrestricted areas may be transferred directly for use at another location or disposed of as commercial solid waste.

Some unused equipment or components located within restricted 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 will 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.

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 prior 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 provided 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 introduction of contamination to outside areas. This equipment will be checked daily during normal workdays and calibrated semiannually.

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.

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.

After the final discharge of fuel to the FESW, a conservative calculation of the FESW heatup rate was performed using the estimated decay heat source in the spent fuel on January 1, 1988. This calculation indicated that coolant boiling could occur approximately 5 days after the loss of cooling.

In July 1993, a test was conducted to determine the actual heat-up rate of the FESW with all cooling and coolant circulation to the pool isolated. This test, as documented in LACBWR Technical Report, LAC-TR-137, showed that the pool temperature increased from 80°F to only 114°F in 15.5 days. The test was terminated at 114°F to limit increasing radioactivity in the pool water, but extrapolation of the data indicates the temperature would stabilize at approximately 150°F.

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.

A calculation has been performed to determine the radiation levels due to the exposed control rods. In the vicinity of most of the FESW piping and isolation valves, the radiation dose would not be substantially increased due to the loss of water.

A repair team should be able to access the break location or piping isolation valves and either isolate the break or effect temporary repairs. FESW level could then be restored to normal.

There would be no immediate urgency to restore the level. The partially uncovered control rods only create a local problem. No offsite release is associated with this event. Active FESW cooling would be lost during this accident, but as discussed in Section 9.4, considerable time is available to take action. Due to the lesser water volume to act as the heat sink and reduced fuel coverage, less time would be available to restore cooling during this accident scenario than in just a loss of FESW cooling event, but boiling would not commence for more than 1 day. As with the loss of FESW cooling event, if water is added to the FESW, any consequences of water heatup can be delayed or prevented. Water can be added from the Demineralized Water System or the Overhead Storage Tank.

9.6 UNCONTROLLED WASTE WATER DISCHARGE

This accident postulates that an operator starts pumping a Waste Water or Retention Tank to the river which is not sampled or for which the sample was incorrectly analyzed. If the contents of the tank are of normal activity, this event will not be detected until the lineup is being secured after pumping, if then.

If the liquid in the tank is of high activity, the waste water monitor will alarm and the Auto Flow Control Valve (54-22-002) automatically will close, terminating the discharge. The Turbine Condenser Cooling Water Monitor will also alarm, if the activity is high enough. If the automatic valve does not close, an operator will try to close it from the Control Room. If it cannot be closed, an operator will close a local valve or secure the pump to terminate the discharge.

After the discharge is terminated, a sample of the tank will be taken to analyze the uncontrolled release. Waste water is diluted by LACBWR Circulating Water and Low Pressure Service Water flow, in addition to circulating water from the adjacent coal-fired plant, prior to being discharged into the river.

9.7 LOSS OF OFFSITE POWER

This accident postulates a loss of offsite power. If both Emergency Diesel Generators and a High Pressure Service Water (HPSW) Diesel start, FESW cooling can be provided and adequate instrumentation is available to monitor FESW conditions from the Control Room. All that is needed is for an operator to cross-connect HPSW to the Component Cooling Water (CCW) coolers.