DAIRYLAND POWER COOPERATIVE LA CROSSE BOILING WATER REACTOR (LACBWR) • 4601 STATE ROAD 35
GENOA, WISCONSIN 54632-8846 • (608) 689-2331

NRC Docket No. 50-409

TO: NRC Washington CONTROLLED DISTRIBUTION NO. 53

FROM: LACBWR Plant Manager 3/19/2003

SUBJECT: Changes to LACBWR Controlling Documents

I. The following documents have been revised:

DECOMMISSIONING PLAN, revised February 2003

Remove and replace the following pages:

Title Page
1-1 thru 1-3
2-4
4-4
5-4, 5-25, 5-29, 5-35, 5-36, 5-37
6-11, 6-15
7-5
8-9, 8-10
9-2 thru 9-4, 9-7

SITE CHARACTERIZATION SURVEY

Remove and replace the following pages:

Title Page
pages 24 thru 28

☒ 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 Please verify receipt of all listed material, destroy superseded material, and sign below to acknowledge receipt.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.]

NMSS01

/S/________________________ DATE________________

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

Add Michael A. Dusaniwskyj 1 paper copy

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WILLIAM L. BERG
President and CEO

March 13, 2003

In reply, please refer to LAC-13794

DOCKET NO. 50-409

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Dairyland Power Cooperative
La Crosse Boiling Water Reactor (LACBWR)
Possession-Only License DPR-45
Annual Decommissioning Plan Revision

REFERENCES:
(1) DPC Letter, Taylor to Document Control Desk, LAC-12460, dated December 21, 1987 (original submittal of LACBWR's Decommissioning Plan)
(2) NRC Letter, Erickson to Berg, dated August 7, 1991, issuing Order to Authorize Decommissioning of LACBWR
(3) NRC Letter, Brown to Berg, dated September 15, 1994, modifying Decommissioning Order

The annual update of the LACBWR Decommissioning Plan has been completed, and the pages with changes and their explanations are included with this letter. Each page with a change will have a bar in the right-hand margin to designate the location of the change. None of the changes was determined to require prior NRC approval, and they have been reviewed by both onsite and offsite review committees.

The individual pages requiring revision are attached to this letter. Please substitute these revised pages in your copy(ies) of the LACBWR Decommissioning Plan. Reasons for the changes are listed on a separate attachment.

If you have any questions concerning any of these changes, please contact Jeff Mc Rill of my staff at 608-689-4202.

Sincerely,

DAIRYLAND POWER COOPERATIVE

William L Berg

William L. Berg, President & CEO

WLB:JBM:dh
Attachments

cc: William Huffman
NRC Project Mgr.

2002 LACBWR Decommissioning Plan Review

Cover Page — Update revision date.

Page 1-1 — Section 1, Introduction: First paragraph restate, "DPC *intends* to place LACBWR in the SAFSTOR mode . . ." to "DPC *has chosen* to place LACBWR in the SAFSTOR mode . . ." This change reflects the long-standing status of SAFSTOR operation at LACBWR.

Section 1, Introduction: Again, first paragraph restate, "A separate preliminary DECON Plan *is being* submitted . . ." to "A separate preliminary DECON Plan *has been* submitted . . ." This change makes the statement historically correct.

Section 1, Introduction: Second paragraph restate, "The plan at this time *is to store* the fuel . . ." to "The plan at this time *is to continue to store* the fuel . . ." Again, this change reflects the long-standing status of SAFSTOR operation at LACBWR.

Page 1-2 — Section 1.1, Selection of SAFSTOR: Second paragraph, remove word "only" in last sentence reading, "*Only* limited decontamination and dismantling of unused systems can be performed during this period." The word has the effect of further restricting the limited decontamination and dismantling concept.

Page 1-3 — Section 1.1, Selection of SAFSTOR: Second paragraph, delete entire paragraph concerning discussion of a fourth decommissioning alternative. Discussion is not necessary as plans for repowering LACBWR are no longer feasible and are not being considered.

Page 2-4 — Section 2.5.2, Fuel Element Storage Well Leakage: Restate "FESW water level *will be continuously* monitored . . ." to "FESW water level *is continuously* monitored . . ." Change is to positively state the manner of operations at LACBWR.

Same paragraph restate, "The control room level *instrument(s) will also generate* an audible alarm when FESW level decreases . . ." to "The control room level *instrument(s) generate* an audible alarm when FESW level decreases . . ." Change is to positively state the manner of operations at LACBWR.

Page 4-4 — Section 4.2.2, Turbine Building: First paragraph change, "*This equipment includes* the feedwater heaters . . ." to "*This equipment included* the feedwater heaters . . ." Change reflects on-going dismantlement efforts, in that some of the listed equipment has been removed.

Second paragraph remove one of two commas after "storeroom" to correct typographical error.

Page 5-4 Section 5.2.2, Forced Circulation System: Under "System Status" change "The forced circulation pumps are not maintained operational," to "The forced circulation pumps *have been electrically disconnected and* are not maintained operational." Change reflects completion of work under an approved facility change.

Page 5-25 Section 5.2.23, Condensate system and Feedwater Heaters: Under "System Status" remove "*This system has been flushed to reduce radiation levels and then drained.*" Replace with, "*This system has been removed with the exception of three feedwater heaters that remain in place with piping connections removed.*" Change reflects completion of work under an approved facility change.

Page 5-29 Section 5.2.27, 60-Megawatt Generator: Under "System Status" remove, "*The generator casing was filled with nitrogen and the exciter brushes have been removed,*" and replace with "*The main and reserve exciters have been disposed of. The generator rotor has been removed and unconditionally released for reuse.*" Change reflects completion of work under an approved facility change.

Page 5-35 Section 5.2.33.1, Normal AC Distribution: Section title "Normal AC Distribution" change by capitalizing "AC" in title.

In fourth paragraph, change " . . . which supply 120-volt AC to equipment and instrumentation, *excluding that required from a non-interruptible source,*" by removing italicized portion and ending sentence with period after instrumentation. Change reflects completion of work under an approved facility change. Static inverters have been removed; non-interruptible 120-volt AC power is not needed for SAFSTOR conditions and equipment.

Page 5-36 Section 5.2.33.4 120-V Non-Interruptible Buses: Revise paragraphs one, two, and four to indicate equipment removed under approved facility changes and provide descriptions in past tense. The following show complete paragraphs as written with changes made in bold italics.

Paragraph 1: The 120-v Non-Interruptible Buses ***maintained*** a continuous non-interruptible power supply to a portion of the essential plant control circuitry, communications equipment and radiological monitoring equipment.

Paragraph 2: The 120-v Inverter 1A ***was*** designed for 3 KVA output and ***was*** powered by 125-v dc from the Reactor Plant Battery Bank through the Reactor Plant dc Distribution Panel. An automatic transfer switch ***was*** provided ***that would*** transfer the output to an alternate 120-v ac source in the event the inverter or its dc source ***failed.*** The alternate source for

Inverter 1A *was* the Turbine Building 120-v Regulated Bus. Inverter 1A *was* located in the Electrical Equipment Room. ***Inverter 1A has been removed. Its distribution panel is powered from Turbine Building 120-v Regulated Bus and has been renamed 1A 120-VAC Essential Power.***

Paragraph 4: The 120-v Inverter 1C *was* powered by 125-v dc from the Generator Battery Bank through the Generator Plant dc Distribution Auxiliary Panel. An alternate 120-v ac source *was* supplied through a breaker on Turbine Building MCC 1A through a static switch in the inverter. ***Inverter 1C has been removed. Its distribution panel is powered from Turbine Building MCC 1A and has been renamed 1C 120-VAC Essential Power.***

Page 5-37 Section 5.2.33.5, 125-V DC Distribution: Section title "125-V DC Distribution" change by capitalizing "DC" in title.

To the end of paragraph two add the following, "*The Reactor Plant and Diesel Building batteries and chargers have been removed. The Generator Plant Battery and Charger remain as the sole sources of dc power to the 125-v dc distribution system. The once three separate systems have been interconnected by using installed bus tie breakers.*"

In paragraph three, change first sentence, "*For each system, the battery charger* provides the normal dc supply with the *battery* as the reserve supply," to "*For the system, the Generator Plant Battery Charger* provides the normal dc supply with the *Generator Plant Battery* as the reserve supply."

Delete paragraph four, which states, "*The Reactor Plant Battery and Charger have been removed. The Diesel Building 125-v dc bus is supplying the Reactor Plant 125-v dc bus.*" The information is contained and restated in changes described previously. All foregoing changes reflect completion of work under approved facility changes.

Under "System Status" remove second paragraph which states, "*Systems will be evaluated in the future to combine or reduce redundancy of various loads, thereby reducing the number of buses, batteries, battery chargers, inverters, etc.*" Replace with the following, "*The Electrical Power Distribution System will continue to be evaluated to gain further simplification and reliability.*"

Page 6-11 Section 6.6, Schedule: Paragraph four, revise second sentence reading, "*PFS is projecting a startup date of 2002 for the facility.*" Due to licensing delays for PFS this sentence is changed to, "*PFS is projecting a startup date of 2005 for the facility.*"

2002 LACBWR Decommissioning Plan Review

Page 6-15 — Section 6.9.1, Fire Protection Plan: Last sentence of paragraph three contains a typographical error reading, "Compensatory actions and procedures for the impairment or unavailability of fire protection *area* provided." Word "*area*" should be "*are*" and sentence should read, "Compensatory actions and procedures for the impairment or unavailability of fire protection *are* provided."

Page 7-5 — Section 7.4.2, In-Plant Monitoring: In paragraph one, first sentence change " . . . surveys needed to support *maintenance* at the site," to " . . . surveys needed to support *activities* at the site." The more generalized term "activities" is not as restrictive in describing the type of work possibly needing survey support.

Page 8-9 — Section 8.5.4, Counting Room Instrumentation: Remove last sentence stating, "*This equipment will be traceable to NIST standards.*" Replace with, "*Gross alpha / beta counters will be calibrated annually. The HPGe detectors will be calibrated every 2 years.*" Purpose of this change is to update material to current ANSI standards.

Page 8-10 — Section 8.7, Records: Add to first sentence to include mention of QAPD records requirements. Sentence with addition in italics reads as follows: "Records generated in the performance of the radiation protection program will be maintained as required to provide the necessary documentation of the program *and in accordance with the QAPD.*"

Page 9-2 to 9-3 — Section 9.2, Spent Fuel Handling Accident: The curie content remaining as of October 2001 and calculated values for Whole Body Dose and Skin Dose as of October 2001 are updated to October 2002.

Page 9-4 — Section 9.3, Shipping Cask or Heavy Load Drop into FESW: The curie content remaining as of October 2001 and calculated values for Whole Body Dose and Skin Dose as of October 2001 are updated to Oct. 2002.

Page 9-7 — Section 9.7, Loss of Offsite Power: Third paragraph, second sentence stating, "The consequences again are the same as a Loss of FESW Cooling Event, *with the additional complication that some instrumentation will be lost immediately and others after the station batteries are depleted,*" revise to read, "The consequences again are the same as a Loss of FESW Cooling Event. *Some instrumentation will be lost immediately and the rest will be lost if packaged uninterruptible power supplies (UPS) are depleted.*" Comment about lost instrumentation adding a complication is removed because local visual observation remains available at all times and is stated as an alternative in the same paragraph final sentence. Change also reflects completion of work under approved facility changes. All static inverters have been removed. For convenience some instrumentation and equipment have been supplied with UPS backup.

INITIAL SITE CHARACTERIZATION SURVEY FOR SAFSTOR (LAC-TR-138):

Cover Page	Update revision date.
Page 24 to 28	Update curie content stated in pages 24 to 28. These pages of Attachments 1, 2, and 3 have been decay-corrected to October 2002, replacing pages that had been decay-corrected to January 2001. Page 27 has also been revised to reflect completion of work under approved facility changes in that two more stated plant systems are noted as removed. Page 28 has been revised by removing column labeled "*Cs-134*" due to the decay of this nuclide to negligible levels.

LA CROSSE BOILING WATER REACTOR

(LACBWR)

DECOMMISSIONING PLAN

Revised
February 2003

DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
4601 State Road 35
Genoa, WI 54632-8846

1. INTRODUCTION

The Decommissioning Plan describes Dairyland Power Cooperative's (DPC) plans for the future disposition of the La Crosse Boiling Water Reactor (LACBWR). DPC has chosen to place LACBWR in the SAFSTOR mode, so this plan describes the plant's status and provides a safety analysis for the SAFSTOR period. A separate preliminary DECON Plan has been submitted to outline Dairyland Power Cooperative's intention to ultimately decommission the plant and site to radiologically releasable levels and terminate the license in accordance with Nuclear Regulatory Commission (NRC) requirements.

This Decommissioning Plan concentrates on the status of LACBWR while the reactor fuel remains in the Fuel Element Storage Well. There are 333 activated fuel assemblies onsite. The plan at this time is to continue to store the fuel in the existing Fuel Element Storage Well. DPC currently expects the fuel to remain onsite until a federal repository, interim storage facility, or licensed temporary monitored retrievable storage facility is established and ready to receive LACBWR fuel.

1.1 SELECTION OF SAFSTOR

The Nuclear Regulatory Commission (NRC) proposed rule on Decommissioning Criteria for Nuclear Facilities identifies 3 major classifications of decommissioning alternatives. They are DECON, SAFSTOR, and ENTOMB. The proposed rule defines the alternatives as follows:

> **DECON** is the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations.
>
> **SAFSTOR** is the alternative in which the nuclear facility is placed and maintained in such condition that the nuclear facility can be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use.
>
> **ENTOMB** is the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombed structure is appropriately maintained and continued surveillance is carried out until the radioactivity decays to a level permitting unrestricted release of the property. This alternative would be allowable for nuclear facilities contaminated with relatively short-lived radionuclides such that all contaminants would decay to levels permissible for unrestricted use within a period on the order of 100 years.

For a power reactor, the choice is either DECON or SAFSTOR. Due to some of the long-lived isotopes in the reactor vessel and internals, ENTOMB, by itself, is not an allowable alternative under the proposed rule.

The choice between SAFSTOR and DECON must be made based on a variety of factors including availability of fuel and waste disposal, land use, radiation exposure, waste volumes, economics, safety, and availability of experienced personnel. Each alternative has advantages and disadvantages. The best option for a specific plant has to be chosen based on an evaluation of the factors involved.

The overriding factor affecting the decommissioning decision for LACBWR is that a federal repository is not expected to be available for fuel storage for about 20 years. With the fuel in the Fuel Element Storage Well, the only possible decommissioning option is SAFSTOR. Limited decontamination and dismantling of unused systems can be performed during this period.

There are other reasons to choose the SAFSTOR alternative. The majority of piping radioactive contamination is Co-60 (5.27 yr half-life) and Fe-55 (2.7 yr half- life). If the plant is placed in SAFSTOR for 50 years, essentially all the Co-60 and Fe-55 will have decayed to stable elements. Less waste volume will be generated and radiation doses to personnel performing the decontamination and dismantling activities will be significantly lower. Therefore, delayed dismantling supports the ALARA (As Low As Reasonably Achievable) goal. The reduction in dismantling dose exceeds the dose the monitoring crew receives during the SAFSTOR period.

The shutdown of LACBWR occurred before the full funding for DECON was acquired. The SAFSTOR period will permit the accumulation of the full DECON funding. The decommissioning cost estimate is discussed in Section 6.7. The majority of studies show that while the total cost of SAFSTOR with delayed DECON is greater than immediate DECON, the present value is less for the SAFSTOR with delayed DECON option.

The main disadvantage of delayed DECON is that the plant continues to occupy the land during the SAFSTOR period. The land cannot be released for other purposes. DPC also operates a 350 MWe coal-fired power plant on the site. Due to the presence of the coal-fired facility, DPC will continue to occupy and control the site, regardless of the nuclear plant's status. Therefore, the continued commitment of the land to LACBWR during the SAFSTOR period is not a significant disadvantage.

A second disadvantage of delaying the final decommissioning is that the people who operated the plant would not be available for the DECON period. When immediate DECON is selected, some of the experienced plant staff would be available for the dismantling. Their knowledge of plant characteristics and events could be extremely helpful. In the absence of these knowledgeable people, all information has to be obtained from plant records. When SAFSTOR is chosen, efforts must be made to maintain excellent records to compensate for the lack of staff continuity.

The remaining factor to be discussed is safety. As of August 1987, 43 power reactors have been shut down worldwide, 19 of which are in the United States. All 3 methods of decommissioning are being used. Experience has shown that all can be used safely.

1. INTRODUCTION - (cont'd)

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.

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.

eventual 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. In 1993, the FESW pump seals were discovered to be defective and were replaced, which reduced the leak rate to approximately 1 gph. FESW water level is continuously monitored in the control room and verified periodically by local inspection. The control room level instrument(s) 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.

4.2.2 Turbine Building

The general location of the Reactor and Turbine Buildings is shown in Figure 4.3. The Turbine Building contained a major part of the power plant equipment. The turbine-generator was on the main floor. Other equipment was located below the main floor. This equipment included the feedwater heaters, reactor feedwater pumps, air ejector, vacuum pump, full-flow demineralizers, condensate pumps, air compressors, air dryer, oil purifier, service water pumps, component cooling water coolers and pumps, demineralized water system, domestic water heater, turbine oil reservoir, oil tanks and pumps, turbine condenser, unit auxiliary transformer, 2400-volt and 480-volt switchgear, motor control centers, diesel engine-generator sets, emergency storage batteries, inverters and other electrical, pneumatic, mechanical and hydraulic systems and equipment required for a complete power plant. A 30/5-ton capacity, pendant-operated overhead electrical traveling crane spanned the Turbine Building. The crane has access to major equipment items located below the floor through numerous hatches in the main floor. A 40-ton capacity, pendant-operated overhead electric crane spanned the space between turbine building loading dock and Waste Treatment Building.

The Turbine Building also contained the main offices, the Control Room (for both turbine-generator and reactor), locker room facilities, laboratory, shops, counting room, personnel change room, and decontamination facilities, heating, ventilating and air conditioning equipment, rest rooms, storeroom, and space for other plant services. In general, these areas were separated from power plant equipment spaces. The Control Room is on the main floor on the side of the Turbine Building that is adjacent to the Containment Building. The general arrangement of the Containment and Turbine Buildings is shown in Figures 4.3 through 4.5.

4.2.3 Waste Treatment Building and LSA Storage Building

The Waste Treatment Building (WTB) is located to the northeast of the Containment Building. The building contains facilities and equipment for decontamination and the collection, processing, storage, and disposal of low level solid radioactive waste materials in accordance with the Process Control Program.

The grade floor of the Waste Treatment Building contains a shielded compartment which encloses a 320 ft^3 stainless steel spent resin receiving tank with associated resin receiving and transfer equipment. A high integrity disposal liner can be located in the adjacent shielded cubicle.

Adjacent to these shielded resin handling cubicles are two open cubicles, one of which is about 3' above grade. The grade level area contains two back-washable radioactive liquid waste filters, the spent resin liner level indication panel and the spent resin liner final dewatering piping, container, and pumps. The second above-grade area is a decontamination facility, consisting of a steam cleaning booth, a decontamination sink, and heating/ventilation/air conditioning units.

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 have been electrically disconnected and are not maintained operational.

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 removed, with the exception of three feedwater heaters that remain in place with piping connections removed. The Condensate Storage Tank has been left dry.

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 main and reserve exciters have been disposed of. The generator rotor has been removed and unconditionally released for reuse.

5.2.33 Electrical Power Distribution

5.2.33.1 Normal AC Distribution

Oil Circuit Breaker 152R1 (25NB4) supplies the reserve auxiliary transformer located in the LACBWR switchyard.

Air Circuit Breakers 252R1A and 252R1B supply the 2.4-kv Bus 1A and Bus 1B from the 69/2.4-KV reserve transformer.

The 2400/480-volt Auxiliary Transformers 1A and 1B receive their power from the 2400-volt Buses 1A and 1B through Air Circuit Breaker 252AT1A from Bus 1A to Transformer 1A, and through Air Circuit Breaker 252AT1B from Bus 1B to Transformer 1B. The auxiliary transformers supply the 480-volt Buses 1A and 1B through Air Circuit Breaker 452M1A for Bus 1A and through Air Circuit Breaker 452M1B for Bus 1B.

The 480-volt buses supply larger equipment directly. They also supply motor control centers which furnish power to motors and other associated equipment connected to them through their respective breakers, including Motor Control Center (MCC) 120-volt ac Distribution Panels which supply 120-volt ac to equipment and instrumentation.

The regular lighting cabinets are supplied from 480-volt buses 1A and 1B.

5.2.33.2 480-V Essential Buses 1A and 1B

The 480-v Essential Bus 1A Switchgear is normally supplied with electrical power from the 480-v Bus 1A through Breaker 452-52A. In the event of a loss of station power, the 480-v Essential Bus 1A is supplied with electrical power from Emergency Diesel Generator 1A through Breaker 452 EGA. Breakers 452-52A and 452 EGA are electrically interlocked to prevent both sources from supplying the bus.

The 480-v Essential Bus 1B Switchgear is normally supplied with electrical power from 480-v Bus 1B through Breaker 452-52B. In the event of a loss of station power, the 480-v Essential Bus 1B is supplied with electrical power from Diesel Generator 1B through Breaker 452 EGB. Breakers 452-52B and 452 EGB are electrically interlocked to prevent both from supplying the bus.

The 480-v Essential Buses 1A and 1B may be cross-connected through the 480-v Essential Bus Tie Breakers 452 TBA and 452 TBB.

5.2.33.3 Emergency Diesel Generators 1A and 1B

The 1A Diesel Generator set system consists of a 250-kw diesel generator, a day tank fuel supply, a fuel transfer pump, a remote radiator and fan, a 100-kw test load, a local engine instrument panel, a local generator panel, and a remote selector switch and alarms in the Control Room. The Diesel Generator set is located in the emergency generator cubicle which is on the grade floor level adjacent to the Machine Shop.

The function of the 1A Diesel Generator is to supply emergency power to the 480-v Essential Bus 1A which, in turn, supplies power to the Turbine Building MCC 1A, the Turbine Building 120-v Bus, the Turbine Building 120-v Regulated Bus and the feed to the Regulated Bus Auxiliary Panel.

The 1B Diesel Generator System consists of a 400 kw diesel driven generator, a 300-gallon fuel oil day tank, fuel oil transfer system and external remote radiator and fan, a 200 kw fan-cooled test load, a local engine control and instrument cabinet, and remote instrumentation and controls in the Control Room. The diesel generator set is located in the Generator Room of the Diesel Building which is south of the Electrical Penetration Room at elevation 641 feet.

The function of the 1B Diesel Generator is to supply emergency power to the 480-v 1B Essential Bus, which in turn supplies power to the Reactor MCC 1A 480-v Bus, Diesel Building MCC 480-v Bus, and the loads supplied by these MCC.

A feed from 480-v Essential Bus 1B to Genoa #3 Generating Station (G-3) provides G-3 an alternate source of energy to supplement their plant's batteries during emergency shutdown with subsequent plant blackout.

5.2.33.4 <u>120-V Non-Interruptible Buses</u>

The 120-v Non-Interruptible Buses maintained a continuous non-interruptible power supply to a portion of the essential plant control circuitry, communications equipment and radiological monitoring equipment.

The 120-v Inverter 1A was designed for 3 KVA output and was powered by 125-v dc from the Reactor Plant Battery Bank through the Reactor Plant dc Distribution Panel. An automatic transfer switch was provided that would transfer the output to an alternate 120-v ac source in the event the inverter or its dc source failed. The alternate source for Inverter 1A was the Turbine Building 120-v Regulated Bus. The Inverter 1A was located in the Electrical Equipment Room. Inverter 1A has been removed. Its distribution panel is powered from Turbine Building 120-v Regulated Bus and has been renamed 1A 120-V AC Essential Power.

The 120-v Non-Interruptible Bus 1B had the capability of being supplied with power from three sources. The normal main feed power source was supplied by Static Inverter 1B. The 5 KVA 1B Static Inverter was powered by 125-v dc from the Diesel Building Battery Bank through the Diesel Building 125-v dc Distribution Panel. Its alternate source was the Diesel Building MCC 480-v Bus through a static switch. The reserve feed power source was supplied by the Turbine Building 120-v Regulated Bus, through a breaker on TB MCC 1A, that was used when the Static Inverter 1B was out of service. Static Inverter 1B has been removed from service. The Non-Interruptible Bus 1B is now supplied from the Turbine Building 120-v Regulated Bus and has been renamed the Regulated Bus Auxiliary panel.

The 120-v Inverter 1C was powered by 125-v dc from the Generator Battery Bank through the Generator Plant dc Distribution Auxiliary Panel. An alternate 120-v ac source was supplied through a breaker on Turbine Building MCC 1A through a static switch in the inverter. Inverter 1C has been removed. Its distribution panel is powered from Turbine Building MCC 1A and has been renamed 1C 120-V AC Essential Power.

5.2.33.5 125-V DC Distribution

The 125-v dc Distribution Systems supply dc power to all Generator Plant, Reactor Plant, and Diesel Building equipment requiring it.

The 125-v dc Distribution Systems were divided into three separate and independent systems each with its own battery, battery charger, and distribution buses. The buses could be cross-connected but were normally isolated from each other. The Reactor Plant and Diesel Building batteries and chargers have been removed. The Generator Plant Battery and Charger remain as the sole sources of dc power to the 125-v dc distribution system. The once three separate systems have been interconnected by using installed bus tie breakers.

For the system, the Generator Plant Battery Charger provides the normal dc supply with the Generator Plant Battery as the reserve supply. The battery floats on the line maintaining a full charge, and provides emergency dc power in the event of a loss of ac power to the battery charger or failure of the charger.

System Status

The Electrical Power Distribution System is maintained operational and required surveillance tests are performed on the Emergency Diesel Generators and 125-v batteries.

The Electrical Power Distribution System will continue to be evaluated to gain further simplification and reliability.

5.2.34 Post-Accident Sampling Systems

The Post-Accident Sampling Systems (PASS) are designed to permit the removal for analysis of small samples of either Containment Building atmosphere, reactor coolant, or stack gas when normal sample points are inaccessible following an accident. These samples will aid in determining the amount of fuel degradation and the amount of hydrogen buildup in containment. Samples will be removed to the laboratory for analysis.

5.2.34.1 Containment Atmosphere PASS System Description

The Containment Atmosphere Post-Accident Sampling System consists of a vacuum pump which takes a suction on the containment atmosphere at the 714' level. The atmosphere sample is drawn through two solenoid operated isolation valves, a heat exchanger, and moisture trap. Then the sample is discharged to the two in-parallel hydrogen analyzers with preset flowmeters; then either through a bypass line or a remote sample cylinder and back to the containment atmosphere at the 676' level through two solenoid operated isolation valves.

6.6 SCHEDULE

The tentative decommissioning schedule is shown in Figure 6-2. As can be seen, DPC received a possession-only license in August 1987. The LACBWR Decommissioning Plan was approved in August 1991, and the facility entered the SAFSTOR mode.

As discussed in Section 7.2, some modifications are considered beneficial to support the plant in the SAFSTOR condition.

During the SAFSTOR period, DPC expects to ship the activated fuel to a federal repository, interim storage facility, or licensed temporary monitored retrievable storage facility. The timing of this action will be dependent on the availability of these facilities and their schedule for receiving activated fuel. A modification to the Decommissioning Plan will then be submitted to describe the change in plant status and associated activities.

DPC is a part of the consortium of utilities that formed the Private Fuel Storage (PFS) Limited Liability Company (LLC) for the sole purpose of developing a temporary site for the storage of spent nuclear fuel for the industry. PFS is projecting a startup date of 2005 for the facility. Proposals for studies of what is required for LACBWR to ship spent fuel in that time frame are being initiated.

At this time, DPC anticipates the plant will be in SAFSTOR for a 30-50 year period. Prior to the end of the SAFSTOR period, an updated detailed DECON Plan will be submitted. The ultimate plan is to decontaminate the LACBWR facility in accordance with applicable regulations to permit unrestricted access and termination of the license.

- **Respond immediately to fire.** A fire brigade, available at all times, shall respond immediately to all fire emergencies to evaluate fire situations, to extinguish incipient stage fires, and to quickly assess the need for, and then summon, outside assistance. For any situation where a fire should progress beyond the incipient stage, qualified outside fire services shall provide assistance.

- **Suppress fire.** Areas of high fire loading are equipped with automatic reaction-type fire suppression systems or manually initiated fire suppression systems. These installed systems provide immediate fire suppression automatically or provide the means to extinguish fires without fire exposure to personnel manually initiating them. Fire barriers provide containment against the spread of fire between areas and provide protection to personnel responding to fire emergencies.

- **Have available necessary fire protection equipment.** Based on standards of fire protection, manual fire extinguishing equipment is installed in all areas of the LACBWR facility. This availability also requires that the equipment is maintained, inspected, and tested in accordance with established guidelines. Compensatory actions and procedures for the impairment or unavailability of fire protection equipment are provided.

6.9.2 Fire Protection Program

The fire protection program for the LACBWR facility is based on sound engineering practices and established standards. The function of the fire protection program is to provide the mechanisms by which the goals of the fire protection plan are accomplished. The fire protection program utilizes an integrated system of administrative controls, equipment, personnel, tests, and inspections. The fire protection program clearly defines personnel responsibilities. The fire protection program provides the specific means by which the processes of fire prevention and fire protection are implemented. Components of the fire protection program are:

6.9.2.1 Administrative Controls are the primary means by which the objective of fire prevention is accomplished. Administrative controls also ensure that fire protection program document content is maintained relevant to its fire protection function. By controlling ignition sources, combustible materials, and flammable liquids, and by maintaining good housekeeping practices, the probability of fire emergency is reduced. Procedures are routinely reviewed for adequacy and are revised as conditions warrant.

6.9.2.2 Fire Detection System. The LACBWR plant fire detection system is designed to provide heat and smoke detection. A Class B protected premises fire alarm system is installed which uses ionization or thermal-type fire detectors. Detectors cover areas throughout the plant and outlying buildings. The plant fire alarm system control panel is located in the Control Room. Alarms as a result of operation of a protection system or equipment, such as water flowing in a sprinkler system, the detection of smoke, or the detection of heat, are sounded in the Control Room. Alarm response is initiated from the Control Room.

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 activities 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) have been recalibrated to an equivalent Kr-85 energy. 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 in the ODCM.

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

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

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

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. Gross alpha/beta counters will be calibrated annually. The HPGe detectors will be calibrated every two years.

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.

Disposal of all radioactive waste will be in accordance with all pertaining guidelines.

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 and in accordance with the QAPD. 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

The assumptions used in evaluating this event during SAFSTOR were similar to those used in the FESW reracking analyses.[1,2] The fuel inventory calculated for October 1987 was used. The only significant gaseous fission product available for release is Kr-85. The plenum or gap Kr-85 represents about 15% (215.7 Curies) of the total Kr-85 in the fuel assembly. However, for conservatism and commensurate with Reference 1, 30% of the total Kr-85 activity, or 431.4 Curies, is assumed to be released in this accident scenario. (Due to decay, as of October 2002 only 38.6% of the Kr-85 activity remains - 166.7 Curies.)

No credit was taken for decontamination in the FESW water or for containment integrity, so all the activity was assumed to be released into the environment. Meteorologically stable conditions at the Exclusion Area Boundary (1109 ft, 338m) were assumed, with a release duration of 2 hours commensurate with 10 CFR 100 and Regulatory Guides 1.24 and 1.25.

A stack release would be the most probable, but a ground release is not impossible given certain conditions. Therefore, offsite doses were calculated for 3 cases. The first is at the worst receptor location for an elevated release, which is 500m E of the Containment Building. The next case is the dose due to a ground level release at the Exclusion Area Boundary. The maximum offsite dose at the Emergency Planning Zone boundary[3] for a ground level release is also calculated. Adverse meteorology is assumed for all cases.

Elevated Release

Average Kr-85 Release Rate

$$\frac{431.4 \text{ Curies}}{2 \text{ hrs.} \times 3600 \text{ sec/hr}} = 6.00 \text{ E-2 Ci/sec}$$

Worst Case $\frac{X}{Q}$ for 0-2 hours at 500m E = 2.3 E-4 sec/m^3

Kr-85 average concentration at 500m E

$$6.00 \text{ E-2 Ci/sec} \times 2.3 \text{ E-4 sec/m}^3 = 1.38 \text{ E-5 Ci/m}^3$$

Immersion Dose Conversion at 500m E

Kr-85 Gamma Whole Body Dose Factor (Regulatory Guide 1.109)

$$1.61 \text{ E+1} \frac{\text{mRem/yr}}{\mu\text{Ci/m}^3} \times 10^6 \frac{\mu\text{Ci}}{\text{Ci}} \times 1.142 \text{ E-4} \frac{\text{yr}}{\text{hr}} = 1{,}839 \frac{\text{mRem/hr}}{\text{Ci/m}^3}$$

Whole Body Dose at 500m E

$$1839 \frac{\text{mRem/hr}}{\text{Ci/m}^3} \times 1.38 \text{ E-5 Ci/m}^3 \times 2 \text{ hr} = 0.05 \text{ mRem} \quad (\text{as of } 10/02 = 0.02 \text{ mRem})$$

Kr-85 Beta/Gamma Skin Dose Factor (Regulatory Guide 1.109)

$$1.34\ E+3\ \frac{\text{mRem/yr}}{\mu\text{Ci/m}^3}\ x\ \frac{10^6\ \mu\text{Ci}}{\text{Ci}}\ x\ 1.142\ E\text{-}4\ \frac{\text{yr}}{\text{hr}} = 1.53\ E5\ \frac{\text{mRem/hr}}{\text{Ci/m}^3}$$

Skin Dose at 500m E

$$1.53\ E5\ \frac{\text{mRem/hr}}{\text{Ci/m}^3}\ x\ 1.38\ E\text{-}5\ \text{Ci/m}^3\ x\ 2\,\text{hr} = 4.2\ \text{mRem (as of 10/02} = 1.6\ \text{mRem)}$$

Ground Level Release at EAB

Worst Case $\frac{X}{Q}$ for 2 hrs at 338m NE or 338m SSE using Regulatory Guide 1.25

$2.2\ E\text{-}3\ \frac{\text{sec}}{\text{m}^3}$

Whole Body Dose at 338m	Skin Dose at 339m
10/87 = 0.49 mRem	10/87 = 40.4 mRem
10/02 = 0.19 mRem	10/02 = 15.6 mRem

Ground Level Release at Emergency Planning Zone Boundary

Worst Case $\frac{X}{Q}$ for 2 hrs at 100m E

$1.02\ E\text{-}2\ \frac{\text{sec}}{\text{m}^3}$

Whole Body Dose at 100m E	Skin Dose at 100m E
10/87 = 2.25 mRem	10/87 = 187 mRem
10/02 = 0.87 mRem	10/02 = 72.2 mRem

As can be seen, the estimated maximum whole body dose is more than a factor of 11,000 below the 10 CFR 100 dose limit of 25 Rem (25,000 mRem) to the whole body within a 2-hour period.

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 (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. (Due to decay, as of Oct. 2002 only 38.6% of the Kr-85 activity remains – 13,815 Curies.)

Elevated Release

Whole Body Dose at 500m E	Skin Dose at 500m E
10/87 = 4.2 mRem	10/87 = 350 mRem
10/02 = 1.6 mRem	10/02 = 135.2 mRem

Ground Level Release at EAB

Whole Body Dose at 338m	Skin Dose at 338m
10/87 = 40.2 mRem	10/87 = 3.34 Rem
10/02 = 15.5 mRem	10/02 = 1.29 Rem

Ground Level Release at Emergency Planning Zone Boundary

Whole Body Dose at 100m E	Skin Dose at 100m E
10/87 = 186 mRem	10/87 = 15.6 Rem
10/02 = 71.9 mRem	10/02 = 6.0 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).

If an HPSW Diesel and 1B Emergency Diesel Generator start, FESW cooling can be provided. If 1A Emergency Diesel Generator (EDG) starts, but 1B does not, adequate cooling can be provided only if the essential buses are tied together.

If one or more EDG's start, but neither HPSW diesel starts, no ultimate heat sink for the FESW would be available. The consequences would be the same as in the Loss of FESW Cooling Event (Section 9.4).

If neither EDG can be started, neither FESW or CCW pump can run. The consequences again are the same as a Loss of FESW Cooling Event. Some instrumentation will be lost immediately and the rest will be lost if packaged uninterruptible power supplies (UPS) are depleted. The operator would have to check the FESW locally periodically.

As discussed in Section 9.4, the fuel pool heatup test conducted in 1993 indicated that the temperature of the pool water would stabilize at less than boiling. Therefore, no immediate action needs to be taken and sufficient time is available to take corrective actions to restore power.

9.8 SEISMIC EVENT

This accident postulates that a design basis earthquake occurs. The magnitude of the seismic 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 4-7). The major concern of the previous evaluation was to safely shut down the plant and maintain adequate core cooling to prevent fuel damage. The focus now is to prevent damage to the fuel stored in the Fuel Element Storage Well.

Seismic analysis has shown the Containment Building structure, LACBWR stack and Genoa Unit 3 stack are capable of withstanding the worst postulated seismic event at the LACBWR site. Reference 1 documented that the storage well, itself, the racks and the bottom-entry line between the check valves and the storage well can withstand the postulated loads.

The potential consequences of most interest due to a seismic event could include loss of all offsite and onsite power and a break in the FESW System piping. This event, therefore, can be considered as a combination of a Loss of Power Event (Section 9.7) and FESW Line Break (Section 9.5). As with these individual events, considerable time is available for response to a seismic event, with the FESW System pipe break requiring the earlier response. Access to the break location may be more difficult following a seismic event due to failure of other equipment in the plant. The time available, though, should be more than sufficient to initiate mitigating actions. (Refer to Section 9.5).

LAC-TR-138

LACBWR

INITIAL

SITE CHARACTERIZATION SURVEY

FOR SAFSTOR

By:

Larry Nelson
Health and Safety Supervisor

October 1995

Revised: February 2003

Dairyland Power Cooperative
3200 East Avenue South
La Crosse, WI 54601

ATTACHMENT 1

SPENT FUEL RADIOACTIVITY INVENTORY

Decay-Corrected to October 2002

Radionuclide	*Half Life (Years)*	*Activity (Curies)*	*Radionuclide*	*Half Life (Years)*	*(Curies)*
Ce-144	7.801 E-1	5.37	Sr-90	2.770 E + 1	7.93E5
Cs-137	3.014 E+1	1.29	Pu-241	1.440 E+1	5.60E5
Ru-106	1.008 E+0	60.1	Fe-55	2.700 E+0	1.19E4
Cs-134	2.070 E+0	2.36E3	Ni-59	8.000 E+4	2.87E2
Kr-85	1.072 E+1	4.47	Tc-99	2.120 E+5	2.76E2
Ag-110m	6.990 E-1	0.05	Sb-125	2.760 E+0	6.73
Co-60	5.270 E+0	9.19E3	Eu-155	4.960 E+0	21.4
Pm-147	2.620 E+0	8.35E2	U-234	2.440 E+5	63.7
Ni-63	1.000 E+2	3.20E4	Am-243	7.380 E+3	63.0
Am-241	4.329 E+2	1.44E4	Cd-113m	1.359 E+1	8.39
Pu-238	8.774 E+1	1.12E4	Nb-94	2.000 E+4	15.9
Pu-239	2.410 E+4	8.83E3	Cs-135	3.000 E+6	14.0
Pu-240	6.550 E+3	7.15E3	U-238	4.470 E+9	12.2
Eu-154	8.750 E+0	1.25E3	Pu-242	3.760 E+5	8.58
Cm-244	1.812 E+1	2.05E3	U-236	2.340 E+7	6.32
H-3	1.226 E+1	2.39E2	Sn-121m	7.600 E+1	3.88
Eu-152	1.360 E+1	2.41E2	Np-237	2.140 E+6	2.19
Am-242m	1.505 E+2	4.58E2	U-235	7.040 E+8	1.89
			Sm-151	9.316 E+1	1.35
			Sn-126	1.000 E+5	0.70
			Se-79	6.500 E+4	0.55
			I-129	1.570 E+7	0.39
			Zr-93	1.500 E+6	0.11

Total Activity = 2.69 E6 Curies

ATTACHMENT 2

CORE INTERNAL/RX COMPONENT RADIONUCLIDE INVENTORY – OCTOBER 2002

Components	Estimated Curie Content: Co-60	Fe-55	Ni-63	Other Nuclides $T_{1/2} > 5y$	Total
In Reactor					
Fuel Shrouds (72 Zr, 8 SS)	3,158	1,416	1,220	8	5,802
Control Rods (29)	698	108	737	8	1,551
Core Vertical Posts (52)	181	13	57	2	253
Core Lateral Support Structure	1,301	481	695	4	2,481
Steam Separators (16)	4,776	1,766	2,551	15	9,108
Thermal Shield	206	76	111	0.5	394
Pressure Vessel	50	23	8	--	81
Core Support Structure	922	341	493	3	1,759
Horizontal Grid Bars (7)	25	9	13	--	47
Incore Monitor Guide Tubes	44	4	504	3	555
Total	11,361	4,237	6,389	43.5	22,031
In FESW					
Fuel Shrouds (24 SS)	1,952	336	2,152	13	4,453
Fuel Shrouds (73 Zr)	131	23	86	2	242
Control Rods (10)	494	53	821	9	1,377
Start-up Sources (2)	454	51	141	2	448
Total	3,031	463	3,200	26	6,720

ATTACHMENT 3

PLANT SYSTEMS INTERNAL RADIONUCLIDE INVENTORY - OCTOBER 2002

Plant System	Nuclide Activity, in µCi				System Total µCi Content
	Fe-55	Alpha	Co-60	Cs-137	
CB Ventilation	36	--	229	121	386
Offgas - upstream of filters	*SYSTEM*	*REMOVED*			
Offgas - downstream of filters	*SYSTEM*	*REMOVED*			
TB drains	381	40	2,428	3,556	6,405
CB drains	851	3	5,427	1,707	7,988
TB Waste Water	81	7	514	85	687
CB Waste Water	4,704	79	29,992	1,636	36,411
Main Steam	5,824	290	37,133		43,247
Turbine	21	2	133	142	298
Primary Purification	1,994	12	12,711		14,717
Emergency Core Spray	*SYSTEM*	*REMOVED*			
Overhead Storage Tank	291	34	1,857	555	2,737
Seal Inject	36	4	229	39	308

ATTACHMENT 3

PLANT SYSTEMS INTERNAL RADIONUCLIDE INVENTORY – OCTOBER 2002 - (cont'd)

Plant System	Nuclide Activity, in µCi				System Total µCi Content
	Fe-55	Alpha	Co-60	Mn-54	
Decay Heat	2,240	490	14,282		17,012
Boron Inject	*SYSTEM*	*REMOVED*			
Reactor Coolant PASS	*SYSTEM*	*REMOVED*			
Alternate Core Spray	448	94	2,856		3,398
Shutdown Condenser	*SYSTEM*	*REMOVED*			
Control Rod Drive Effluent	3,360	720	21,423		25,503
Forced Circulation	33,601	7,000	214,227	3	254,828
Reactor Vessel and Internals	56,002	12,000	357,044	5	425,051
Condensate after beds & Feedwater	*SYSTEM*	*REMOVED*			
Condensate to beds	*SYSTEM*	*REMOVED*			

ATTACHMENT 3

PLANT SYSTEMS INTERNAL RADIONUCLIDE INVENTORY – OCTOBER 2002 - (cont'd)

Plant System	Nuclide Activity, in µCi					System Total µCi Content
	Fe-55	Alpha	Co-60	Mn-54	Cs-137	
Fuel Element Storage Well System	19,041	390	121,395			140,826
Fuel Element Storage Well - all but floor	29	5	186		3,272	3,492
Fuel Element Storage Well floor	582,416	7,600	3,713,261	3	29,161	4,332,441
Resin lines	2,912	100	18,566			21,578
Main Condenser	246,407	8,500	1,570,995	22		1,825,924