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September 12, 1994
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U.S. Nuclear Regulatory Commission
Attention: Mr. Robert C. Pierson, Chief
Licensing Branch
Division of Fuel Cycle Safety and Safeguards, NMSS
Washington, D.C. 20555

License No. SNM-1227
Docket No. 70-1257

Dear Mr. Pierson:

Subject: **Additional Information in Support of Siemens Power Corporation's License Renewal Application**

Reference: **Letter, M. Adams to L. J. Maas, "License Renewal - Request for Additional Information (TAC No. L21656)," dated June 14, 1994**

Enclosed herewith are Siemens Power Corporation's (SPC's) responses to the NRC staff's requests for additional information regarding SPC's August 1992 license renewal application. The responses are in the form of specific answers to requests as well as revised license application pages, where applicable. In addition, enclosed for your information as requested, are copies of:

1. Chapter 2, "Radiation Protection Standards" from SPC's Safety Manual, EMF-30;
2. The "1990 ALARA Committee Report", EMF-91-198; and
3. "The ALARA Report" for 1992, EMF-93-091(P).

The 1992 ALARA report is a proprietary document and an affidavit attesting to that fact is enclosed.

Two copies of the following license application pages are enclosed as referenced in the responses to specific requests (changes are indicated by vertical lines in the right margins):

Chapter 1	-	Pages 1-1 and 1-7 through 1-10
Chapter 2	-	Pages 2-6 and 2-11 through 2-23
Chapter 3	-	Pages 3-2 and 3-6
Chapter 4	-	Pages 4-1 through 4-14 (complete revised chapter)

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Chapter 5	-	Pages 5-1 through 5-6 and 5-11
Chapter 6	-	Pages 6-3 and 6-4
Chapter 9	-	Pages 9-1, 9-3 and 9-8
Chapter 10	-	Pages 10-3 through 10-56 and 10-88
Chapter 12	-	Pages 12-1 through 12-13 plus Appendix B (complete revised chapter)
Chapter 13	-	Pages 13-1 and 13-2
Chapter 14	-	Pages 14-1 through 14-28 (complete revised chapter)
Chapter 15	-	Page 15-30

If you have questions requiring this submittal of information, please call me at (509) 375-8663.

Very truly yours,

JBE

James B. Edgar
Staff Engineer, Licensing

JBE/cf

Attachments

c w/o incl: C. A. Hooker
NRC Region IV
Walnut Creek Field Office

Lagoons 1 and 2 are used as receivers of ammonia-bearing solutions from the conversion area with a low-level of uranium and is the feed lagoon for the ammonia recovery (AR) process. They have impervious floating covers to contain the ammonia fumes.

Lagoon 3 is a storage lagoon for high uranium content wastes and serves as the feed lagoon to the LUR Facility.

Lagoon 4 is a storage lagoon for low uranium content waste from the LUR process. Lagoon 4 also serves as the feed lagoon for LUR waste to the AR Facility.

Lagoon 5A is a storage lagoon for waste streams from the AR Facility and miscellaneous low uranium, low ammonia chemical wastes. Disposal of waste from Lagoon 5A to the city sewer is accomplished after treatment by ion exchange to remove residual uranium (see Section 10.4.3). The waste sewering rate is automatically controlled by a microprocessor via a flow measuring and control system. The sewered chemical waste is volume proportionally sampled. The chemical waste is monitored for uranium and chemical content and sewering rate is controlled based on waste composition so as to remain within discard limits.

Lagoon 5B is currently used to store high uranium content waste to be treated for uranium recovery. Once emptied, this lagoon will be used as a batching lagoon in conjunction with Lagoon 5A to receive AR Facility waste for metered discharge to the city sewer.

The sand pit is used as a storage pit for sand and sludge that has been removed from the liquid storage lagoons during cleanup over the years of operation.

The solids leach pit is used for decontamination of sand. The process is described in detail in Section 10.4.4.

Periodically, liquid waste solutions are transferred from one lagoon to another for accountability, volume control or maintenance purposes. A permanently mounted pump with interconnecting piping enables solution to be pumped from any lagoon to any other lagoon and also allows recirculation within any lagoon.

10.4.2 Ammonia Recovery (AR) Description

The AR process is housed in a 1635 ft^2 insulated steel structure located north of Lagoon 1 (see Figure II-10.1). The structure is designed to withstand UBC Zone II seismic loading and 20 lb/ft^2 windward pressure. An equipment arrangement is shown on Figure II-10.28. The Engineering Flow Diagram is presented on Figure II-10.29. A brief description of the major equipment pieces is given in Table II-10.1. The building also houses the Lagoon 5A IX Process (see Section 10.4.3).

The unneutralized low uranium content liquid process waste from the feed lagoons (Lagoon 1 or Lagoon 2) is transferred to the feed tank which provides approximately one hour surge capacity. Process waste from the LUR operation can be added to the feed tank and processed with the conversion process waste. Sodium hydroxide is added to the feed tank to replace the ammonium in the ammonium salts, and to keep the pH high to reduce corrosion. The feed tank is maintained under a slight vacuum by venting through a scrubber.Feed solution is pumped via a flow control system and an energy recovery heat exchanger to the ammonia stripper. The heat exchanger is provided to reduce energy requirements for the process by using the hot stripper bottoms to preheat the feed solution.

The ammonia stripping column provides for removal of ammonia from the waste solution by countercurrent contact with steam and is designed to produce 20 to 30 wt% ammonia product solution and waste effluent at less than 100 ppm ammonia. The bottoms from the stripper are pumped to the designated waste treatment batching lagoon (5A or 5B) or recycled back to the feed tank, or the feed lagoon, depending on its ammonia concentration, temperature, and pH.

The air purge system on the pneumatic instrument lines is designed to prevent backup of process fluids in the event of excessive system pressure. A 50 psig rupture disk is provided at the top of the column to prevent overpressurization of the system. The pressure relief vents to the atmosphere through the tower roof.

The condensables from the stripper overheads are removed in a downdraft condenser and are routed to the distillate tank. An automated deionized water injection system is provided to improve ammonia removal efficiency and to control the ammonia hydroxide concentration.

A scrubber is provided to remove ammonia from the process vessel offgas. The scrubber bottoms are routed to the feed tank. The scrubbed offgas is vented to the atmosphere via the building exhaust fan and stack.

The control system is an electronic digital microprocessor system. The console can access process information and display it on the CRT. In case of transmitter failure, the processors will adjust to a safe value that can keep the process from going too far out-of-control. Deviations from set points are alarmed when they surpass their predetermined limits.

A steam boiler provides a maximum of 3000 lb/hr of steam to the AR process. Boiler pressure control is maintained by SCR's driven from pressure instrumentation. Steam header pressure instrumentation is provided to shut down the process and alarm on low and high steam pressure.

A 28,000-gallon, aboveground sodium hydroxide storage tank is provided to supply the AR process. The tank is insulated and heated with a 5 kW heater to maintain the caustic temperature above 65°F. All exterior piping is heat-traced and insulated. A safety shower is provided at the load-in facilities. Operation of the NaOH storage system is monitored and controlled at the control room.

A 28,000-gallon, aboveground storage tank is provided to store NH_4OH product from the AR process. Facilities are provided to load out excess ammonium hydroxide for sale offsite. The NH_4OH used for recycle to the process is transferred to either of two 10,000-gallon, ammonium hydroxide storage tanks.

A concrete spill containment structure is provided for the outside bulk sodium hydroxide and product ammonium hydroxide storage tanks. The structure is designed to contain chemicals from a ruptured storage tank.

The building exhaust system consists of a two-speed fan, temperature controls, an ammonia monitor and stack. The exhaust fan is normally run on low speed (approximately 1700 ft^3/min). The fan is switched to high speed (approximately 5000 ft^3/min) if the building exhaust temperature exceeds 110°F. The building exhaust air ammonia monitoring system is set to alarm locally and in the Line 2 Control Room.

The AR Facility fire detection and alarm system has been tied into the existing plant systems.

Criticality in the AR system is not deemed credible due to the extremely low concentration of uranium. In addition, the feed tank and stripping column were designed for solids to flush through the system. Nevertheless, the system is inspected quarterly for signs of buildup of uranium solids. The plant criticality detection and alarm system also covers the AR Facility.

10.4.3 Lagoon 5A IX Process

The Lagoon 5A ion exchange system is located in an addition to the Ammonia Recovery Facility (ARF) Building. The addition is 25' x 27' x 20' high. It is a pre-engineered metal building located on a concrete slab. A plan view of the addition is shown in Figure II-10.28. The equipment arrangement is shown in Figure II-10.29b. The building is insulated and designed to withstand Uniform Building Code Zone II seismic loading and a 20 lb/sq. ft. wind. The floor is sealed and caulked to be leak tight. The floor slopes toward the sump area and has a sill or curb for leak containment except for the doorway which is protected by a trench sloped to drain to the main sump. The process equipment is located in the sump area which has a 4 inch recessed floor. The sump pumps to Lagoon 3. Control is automatic, but can be controlled manually. The sump is designed to collect minor leaks of lagoon solutions containing uranium and sodium and ammonium to collect minor leaks of lagoon solutions containing uranium and sodium and ammonium sulfates, fluorides and nitrates and ion exchange reagents such as sulfuric acid, sodium hydroxide, and water. The sump and floor areas are inspected annually for leaks. Those areas are normally dry, leaks are repaired as soon as practical.

Lagoon 5A waste solutions scheduled for discharge to the city sewer may be routed through the ion exchange (IX) process located in the ARF Building to further reduce the uranium content. The Lagoon 5A IX Process consists of two sand filters and an ion exchange column and associated auxiliary equipment. The process flow is shown in Figure II-10.29a. Lagoon 5A solution is pumped from the lagoon through the primary filter located at the lagoon pump out area to remove small particles and suspended solids. The solution then is pumped through the polishing filter in the ARF Building and to the adjacent IX column at a typical rate of 20 gallons per minute. Passage through the column reduces the uranium concentration by a factor of about eight or more. The uranium held up on the column is eluted from the column and transferred to Lagoon 3 for later uranium recovery. Lagoon 4 solution may be used as an eluting solution. Other reagents such as carbonate solutions may be used. The regeneration cycle of the resin uses sodium hydroxide and sulfuric acid which are available at the facility. These are discharged from the resin to Lagoon 5A. The polishing filter is backflushed to Lagoon 3. The Lagoon 5A filter is backflushed to Lagoon 5A. The media of the sand filters is expected to last indefinitely and the resin is expected to last at least five years. If needed, the resin can be disposed of by incineration at SWUR.

Typical uranium concentrations of Lagoon 5A solutions fed to the IX column are 1-2 ppm and corresponding effluent concentrations are 0.1-0.2 ppm. During the loading cycle from 500,000 to 1,000,000 gallons of waste solution are passed through the column to load from 4-8 kilograms of uranium on the resin column.

The basis for criticality safety is concentration control. The uranium concentration in any part of the system is maintained at less than 50% of the minimum critical concentration. The highest uranium concentration in the system is that of the loaded ion exchange resin. Typical uranium concentrations of the resin just before elution are less than 10% of the minimum critical concentration. A Criticality Safety Analysis has shown that all parts of the system are subcritical even under abnormal conditions of the transfer of uranium bearing lagoon solids to the first sand filter or saturation of the ion exchange resin with uranium. The facility is covered by the existing criticality accident detection and alarm system.

The system is monitored for uranium buildup by sampling the solid phase of Lagoon 5A semiannually and analyzing for uranium. The sand filters and resin bed are also sampled and analyzed for uranium semiannually. In addition, the resin is inherently safe since it saturates with uranium at less than 140 gU/ℓ. Buildup of uranium on the column is monitored by process control and accountability samples.

For fire detection there are rate-of-rise/fixed temperature detectors in the ceiling. These detectors set off alarms locally, at the Central Guard Station, and the Richland City Fire Department. The ion exchange room has a hand-held fire extinguisher. There is a two-hour rated fire wall between the original building and the new addition and a similar fire wall between the outside storage area for sulfuric acid and the building housing the ion exchange system.

There are no gaseous or particulate releases since all the radioactive materials are in liquid form in closed vessels or in large double lined lagoons. The release of radioactive materials from process equipment is prevented since all vessels and associated piping are designed to withstand a pressure of at least 100 psig versus the maximum pump discharge pressure of 38 psig. Radiation work shall be controlled through the Radiation Work Permit System. All operations shall be conducted within the ALARA concept.

The environmental impact of the ion exchange process for treating Lagoon 5A solution is judged to be insignificant. The equipment is located in a building within the restricted area which is committed to industrial use. The equipment is located in an area specifically designed to contain any spills or leaks. There are no gaseous effluents or increases in the quantities of radioactive waste generated. All underground transfer lines entering and leaving the new facility are completely double-encased (inner pipe surrounded by a sealed secondary plastic containment shell), with electronic leak detection systems that alarm locally and in the conversion Line 2 control room. The primary pipes are tested hydrostatically annually and the secondary pipes biennially. The process generates small quantities of additional chemical wastes, but this is more than offset by the positive environmental impact of reducing the quantities of uranium discharged to the Richland city landfill.

10.4.4 <u>Lagoon Uranium Recovery (LUR) Facility Description</u>

The LUR Facility is provided to recover LEU from stored high uranium content liquid chemical wastes (see Section 10.4.1). Following uranium recovery, the waste is treated for ammonia removal (see Section 10.4.2), then disposed to the municipal sewer.

The LUR Facility is located adjacent to Lagoon 4 as shown on Figure II-10.1. The equipment consists of six process vessels, one chemical makeup vessel and associated pumps, piping and filters. A brief description of the major equipment is given in Table II-10.2 and the equipment layout is depicted in Figure II-10.30. The equipment is not housed, but is partially covered. The process equipment is not freeze-protected and is, therefore, shut down and winterized during cold weather.

A process flow diagram for the uranium recovery system is presented in Figure II-10.31. Approximately 5000 gallons of high uranium content waste is pumped into each of the two precipitators. The uranium is precipitated from solution by addition of a reductant