EXHIBIT B

Prairie Island Nuclear Generating Plant

License Amendment Request - Dated December 21, 1984

Proposed changes to the Technical Specifications
Appendix A of Operating Licenses DPR-42 and 60.

Exhibit B consists of revised pages of Appendix A Technical Specifications as listed below:

Pages

TS.3.8.1
TS.3.8.2
TS.3.8.2a (deleted)
TS.3.8.3
TS.3.8.4
TS.3.8.5 (new page)
TS.5.6.1
TS.5.6.2
TS.5.6.3 (deleted)

3.8 REFUELING AND FUEL HANDLING

Applicability

Applies to operating limitations during fuel-handling and refueling operations.

Objectives

To ensure that no incident could occur during fuel handling and refueling operations that would affect public health and safety.

Specification

A. During refueling operations the following conditions shall be satisfied:

1. The equipment hatch and at least one door in each personnel air lock shall be closed. In addition, at least one isolation valve shall be operable or locked closed in each line which penetrates the containment and provides a direct path from containment atmosphere to the outside.

2. Radiation levels in fuel handling areas, the containment and the spent fuel storage pool areas shall be monitored continuously.

3. The core subcritical neutron flux shall be continuously monitored by at least two neutron monitors, each with continuous visual indication in the control room and one with audible indication in the containment, which are in service whenever core geometry is being changed. When core geometry is not being changed, at least one neutron flux monitor shall be in service.

4. During reactor vessel head removal and while loading and unloading fuel from the reactor, the minimum boron concentration of 2000 ppm shall be maintained in the reactor coolant system. The required boron concentration shall be verified by chemical analysis daily.

5. During movement of fuel assemblies or control rods out of the reactor vessel, at least 23 feet of water shall be maintained above the reactor vessel flange. The required water level shall be verified prior to moving fuel assemblies or control rods and at least once every day while the cavity is flooded.

6. At least one residual heat removal pump shall be operable and running. The pump may be shutdown for up to one hour to facilitate movement of fuel or core components.

7. If the water level above the top of the reactor vessel flange is less than 20 feet, except for control rod latching and unlatching operations, both residual heat removal loops shall be operable.

8. If Specification 3.8.A.6 or 3.8.A.7 cannot be satisfied, all fuel handling operations in containment shall be suspended, the containment, integrity requirements of Specification 3.8.A.1 shall be satisfied, and no reduction in reactor coolant boron concentration shall be made.

9. Direct communication between the control room and the operating floor of the containment shall be available whenever changes in core geometry are taking place.

10. No movement of irradiated fuel in the reactor shall be made until the reactor has been subcritical for at least 100 hours.

11. The radiation monitors which initiate isolation of the Containment Purge System shall be tested and verified to be operable immediately prior to a refueling operation.

B. During fuel handling operations, the following conditions shall be satisfied:

1. Prior to introducing a spent fuel shipping cask into the spent fuel pool area:

   a. A minimum boron concentration of 1800 ppm shall be maintained in spent fuel pools No. 1 and 2. The required boron concentration shall be verified by chemical analysis daily while use of the cask continues, and

   b. A cask impact limiter determined to be capable of absorbing the impact energy of a cask drop or a crash pad capable of absorbing the impact energy of a cask drop shall be in place, and

   c. Crane interlocks and mechanical stops limiting travel to the approved load path shall be determined to be operable, and

   d. Fuel in the small pool (pool No. 1) shall have been discharged from a reactor for at least 5 years.

2. Prior to spent fuel handling in the auxiliary building, tests shall be made to determine the operability of the spent fuel pool special ventilation system including the radiation monitors in the normal ventilation system that actuate the special system and isolate the normal systems.

3. Prior to fuel handling operations, fuel-handling cranes shall be load-tested for operability of limit switches, interlocks, and alarms.

4. When the spent fuel cask contains one or more fuel assemblies, it will not be suspended more than 30 feet above any surface unless the fuel has decayed more than 90 days.

5. No more than 45 recently discharged assemblies shall be located in the small pool (pool No. 1).

C. If any of the specified conditions in 3.8.A or 3.8.B above are not met, refueling or fuel-handling operations shall cease. Work shall be initiated to correct the violated conditions so that the specifications are met, and no operations which may increase the reactivity of the core shall be performed.

D. Spent Fuel Pool Special Ventilation System

1. Except as specified in Specification 3.8.D.3 below, both trains of the Spent Fuel Pool Special Ventilation System and the diesel generators required for their operation shall be operable at all times.

2. a. The results of in-place DOP and halogenated hydrocarbon tests at design flows on HEPA filters and charcoal adsorber banks respectively shall show $\geq 99\%$ DOP removal for particles having a mean diameter of 0.7 microns and $\geq 99\%$ halogenated hydrocarbon removal.

   b. The results of laboratory carbon sample analysis shall show $\geq 90\%$ radioactive methyl iodide removal efficiency (130°C, 95% RH).

   c. The Spent Fuel Pool Special Ventilation System fans shall operate within ±10% of 5200 cfm per train.

3. From and after the date that one train of the Spent Fuel Pool Special Ventilation System is made or found inoperable for any reason, fuel handling operations are permissible only during the succeeding seven days (unless such train is made operable) provided that the redundant train is verified to be operable daily.

4. If the conditions for operability of the Spent Fuel Pool Special Ventilation System cannot be met, fuel handling operations in the Auxiliary Building shall be terminated immediately.

Basis

The equipment and general procedures to be utilized during refueling are discussed in the FSAR. Detailed instructions, the precautions specified above, and the design of the fuel handling equipment incorporating built-in interlocks and safety features, provide assurance that no incident could occur during the refueling operations that would result in a hazard to public health and safety.[1] Whenever changes are not being made in core geometry, one flux monitor is sufficient. This permits maintenance of the instrumentation. Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition. The residual heat removal pump is used to maintain a uniform boron concentration.

The shutdown margin indicated in A.4. above will keep the core subcritical, even if all control rods were withdrawn from the core. During refueling, the reactor refueling cavity is filled with approximately 275,000 gallons of borated water. The boron concentration of this water is sufficient to maintain the reactor subcritical by approximately 10% k/k in the cold condition with all rods inserted, and will also maintain the core subcritical even if no control rods were inserted into the reactor.[2] Periodic checks of refueling water boron concentration insure that proper shutdown margin is maintained. A.9. above allows the control room operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

No movement of fuel in the reactor is permitted until the reactor has been subcritical for at least 100 hours to permit decay of the fission products in the fuel. The delay time is consistent with the fuel handling accident analysis.[3]

The spent fuel assemblies will be loaded into the spent fuel cask after sufficient decay of fission products. While inserting and withdrawing the cask into pool No.1, the cask will be suspended above the bottom of the pool up to a maximum of 42 feet. The consequences of potential load drops have been evaluated in accordance with NUREG-0612[6]. Following is a discussion of the basis for the limitations which resulted from that evaluation.

The cask will not be inserted into the pool until all fuel stored in the pool has been discharged from the reactor a minimum of 5 years. Supporting analysis indicated that fuel stored in the pool for a period as short as 50 days would allow sufficient decay of the fission products such that their release would result in off-site doses less than 25% of the 10CFR Part 100 guidelines. The five year decay period was selected in following the general principle that spent fuel with the longest decay time would result in the least off-site doses in the event of an accident, while providing the plant operational flexibility. The cask will not be inserted or withdrawn from the pool unless a minimum boron concentration of 1800 ppm is present. The 1800 ppm will ensure that if fuel is crushed by a cask drop, k_{eff} will be less than or equal to 0.95. The cask will not be inserted or withdrawn from the pool unless a cask impact limiter, crash pad, or combination thereof is in place with the capability to absorb energy of a cask drop such that no sigificant amount of water leakage results from pool structural damage. This is to ensure that at no time will water level drop below the top of the spent fuel stored in the pool. In loading the cask into a carrier, there is a potential drop of 66 feet[5]. The cask will not be loaded onto the carrier for shipment prior to a 3-month storage period. At this time, the radioactivity has decayed so that a release of fission products from all fuel assemblies in the cask would result in off-site doses less than 10 CFR Part 100. It is assumed, for this dose analysis that 12 assemblies rupture after storage for 90 days. Other assumptions are the same as those used in the dropped fuel assembly accident in the SER, Section 15. The resultant doses at the site boundary are 94 Rems to the thyroid and 1 Rem whole body.

The number of recently discharged assemblies in Pool No. 1 has been limited to 45 to provide assurance that in the event of loss of pool cooling capability, at least eight hours are available under worst case conditions to make repairs until the onset of boiling.

The Spent Fuel Pool Special Ventilation System[4] is a safeguards system which maintains a negative pressure in the spent fuel enclosure upon detection of high area radiation. The Spent Fuel Pool Normal Ventilation system is automatically isolated and exhaust air is drawn through filter modules containing a roughing filter, particulate filter, and a charcoal filter before discharge to the environment via one of the Shield Building exhaust stacks. Two completely redundant trains are provided. The exhaust fan and filter of each train are shared with the corresponding train of the Containment In-service Purge System. High efficiency particulate absolute (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers in each SFPSVS filter train. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The in-place test results should indicate a HEPA filter leakage of less than 1% through DOP testing and a charcoal adsorber leakage of less than 1% through halogenated hydrocarbon testing. The laboratory carbon sample test results should indicate a radioactive methyl iodide removal efficiency of at least 90% under test conditions which are more severe than accident conditions. The satisfactory completion of these periodic tests combined with the qualification testing conducted on new filters and adsorber provide a high level of assurance that the emergency air treatment systems will perform as predicted in the accident analyses.

During movement of irradiated fuel assemblies or control rods, a water level of 23 feet is maintained to provide sufficient shielding.

The water level may be lowered to the top of the RCCA drive shafts for latching and unlatching. The basis for this allowance is (1) the refueling cavity pool has sufficient level to allow time to initiate repairs or emergency procedures to cool the core, (2) during latching and unlatching the level is closely monitored because the activity uses this level as a reference point, (3) the time spent at this level is minimal.

<u>References</u>

(1) FSAR Section 9.5.2
(2) FSAR Table 3.2.1-1
(3) FSAR Section 14.2.1
(4) FSAR Section 9.6
(5) FSAR Page 9.5-20a
(6) Exhibit C, NSP License Amendment Request Dated December 21, 1984.

5.6 FUEL HANDLING

A. Criticality Consideration

The new and spent fuel pit structures are designed to withstand the anticipated earthquake loadings as Class I (seismic) structures. The spent fuel pit has a stainless steel liner to ensure against loss of water.[1]

The new and spent fuel storage racks are designed so that it is impossible to insert assemblies in other than the prescribed locations. The fuel is stored vertically in a array with the center-to-center distance between assemblies sufficient to assure k_{eff} $\leq$0.95 even if unborated water were used to fill the pit. In addition, fuel in the storage pool shall have a U-235 loading of $\leq$39.0 grams of U-235 per axial centimeter of fuel assembly (average).

The criticality considerations as they relate to the dropping of a spent fuel cask (i.e., heavy load) drop onto the racks has been evaluated. The maximum K_{eff} has been calculated to be 0.949 at a water/UO_2 ratio of a 2.0 with a boron concentration of 1800 ppm.

B. Spent Fuel Storage Structure

The spent fuel storage pool is enclosed with a reinforced concrete building having 12-to 18-inch thick walls and roof.[1] The pool and pool enclosure are Class I (seismic) structures that afford protection against loss of integrity from postulated tornado missiles. The storage compartments and the fuel transfer canal are connected by fuel transfer slots that can be closed off with pneumatically sealed gates. The bottoms of the slots are above the tops of the active fuel in the fuel assemblies which will be stored vertically in specially constructed racks.

The spent fuel pool has a reinforced concrete bottom slab nearly 6 feet thick and has been designed to minimize loss of water due to a dropped cask accident. In addition, the spent fuel cask will have an impact limiter attached or a crash pad will be in place in the pool which will have the capability to absorb energy of impact due to a cask drop. This will result in no structural damage taking place to the pool which would result in significant leakage from the pool. Piping to the pool is arranged so that failure of any pipe cannot drain the pool below the tops of the stored fuel assemblies.

C. Fuel Handling

The fuel handling system provides the means of transporting and handling fuel from the time it reaches the plant in an unirradiated condition until it leaves after post-irradiation cooling. The system consists of the refueling cavity, the fuel transfer system, the spent fuel storage pit, and the spent fuel cask transfer system.

Major components of the fuel handling system are the manipulation crane, the spent fuel pool bridge, the auxiliary building crane, the fuel transfer system, the spent fuel storage racks, the spent fuel cask, and the rod cluster control changing fixture. The reactor vessel stud tensioner, the reactor vessel head lifting device, and the reactor internals lifting device are used for preparing the reactor for refueling and for assembling the reactor after refueling.

Upon arrival in the storage pit, spent fuel will be removed from the transfer system and placed, one assembly at a time, in storage racks using a long-handle manual tool suspended from the spent fuel pit bridge crane. After sufficient decay, the fuel will be loaded into shipping casks for removal from the site. The casks will be handled by the auxiliary building crane.

The load drop consequences of a spent fuel cask for Prairie Island have been evaluated. It is not possible, due to physical constraints, for a cask to be dropped into the large pool (pool no. 2). A load path has been defined which provides for safe movement of the cask. Travel interlocks and mechanical stops prevent cask movement outside of this path. The only safety-related equipment that can be impacted directly during a cask drop along this path is the fuel stored in the small pool (pool no. 1). The consequences of this drop have been evaluated and found to meet the NRC Staff criteria contained in NUREG-0612 if at least 50 days have elapsed since reactor shutdown for fission gas release considerations and the pool water contains at least 1800 ppm boron for criticality considerations. While 50 days was determined adequate, a minimum decay period of 5 years has been incorporated into these technical specifications to provide additional margin in meeting the criteria specified in NUREG-0612 for fission gas releases, while not restricting the plant's operational flexibility. A cask impact limiter or crash pad prevents significant structural damage to the pool floor.

The spent fuel cask will be lowered 66 feet from the auxiliary building to the railroad car for offsite transportation. Specification 3.8 will limit this loading operation so that if the cask drops 66 feet, there will not be a significant release of fission products from the fuel in the cask.

D. Spent Fuel Storage Capacity

The spent fuel storage facility is a two-compartment pool that, if completely filled with fuel storage racks, provides up to 1582 storage locations. The southeast corner of the small pool (pool No. 1) also serves as the cask lay down area. During times when the cask is being used, four racks are removed from the small pool. With the four storage racks in the southeast corner of pool 1 removed, a total of 1386 storage locations are provided. To allow insertion of a shipping cask, total storage is limited to 1386 assemblies, not including those assemblies which can be returned to the reactor.

Reference
(1) FSAR, Section 9.