Attachment 1

DUKE POWER COMPANY
POWER BUILDING
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VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

December 27, 1978

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. W. Reid, Chief
Operating Reactors Branch #4

Re: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

The Oconee Nuclear Station utilizes polishing demineralizers (the powdex system) for the control of impurities which might exist in the secondary system water. This system is described in FSAR Section 10.2.6. The combination of ion exchange and filtration afforded by these demineralizers also results in the removal of radioactive material which could be present in the secondary system (e.g. due to any primary-to-secondary system leakage). Since the powdered resins are not chemically regenerated for repeated use but rather are replaced with fresh resins upon exhaustion, the consideration of resin disposal must be addressed.

The normal disposal of the powdered resins is accoumplished by backwashing the resins from the filter elements to the powdex sump in the Turbine Building and then to one of two chemical treatment ponds. The resin is allowed to settle to the bottom of the ponds and the excess water is released from the station site, as necessary, in accordance with applicable criteria. As stated in FSAR Section 10.2.7, provisions were also made in the initial Oconee design for the transferring of backwashed resins to the radioactive waste disposal system should they contain "radioactive material." However, the level at which the resins should be considered "radioactive" was not defined.

A station procedure is used to control the powdex transfer evolution. Prior to the backwash of a powdex resin cell, the decision is made where to direct the mixture. The procedure utilized for this process considers the following:

a. The magnitude and duration of recent steam generator leaks
b. Hotwell activity levels
c. Individual powdex cell throughput data
d. Cell radiation readings
e. Prior individual cell resin activity

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When it is expected that the resin will have significant activity, it is pumped to a tank and, after most of the water is decanted, the resin is sent to the solidification system for ultimate offsite disposal.

In letters dated December 2, 1976 and August 4, 1977 the results of studies to determine allowable activity levels were provided. The inventory limits were established based on considerations of the potential offsite doses resulting from routine releases from the basins and from accidental release of all isotopes in the basins. Table 1 of the August 4, 1977 letter provided a compilation of the more limiting inventory between the routine and accidental release studies. These limits were applied to the two chemical treatment ponds collectively, and not individually.

The first identifiable activity was detected in August 1975. In, January 1977, an incident occurred in which a large amount of radioactive material was transferred to the chemical treatment ponds. This was done in order to minimize the effects offsite due to secondary system activity.

My letter dated June 9, 1978 provided a complete summary of all inputs to and releases from the chemical treatment ponds. The following table summarizes the inventories of significant isotopes in the chemical treatment ponds:

| Isotope | January 1977 Input (CI) | April 30, 1978 Inventory (Ci) | October 31, 1978 Inventory (Ci) |
|---|---|---|---|
| $Cs^{134}$ | 5.69 E-1 | 3.1 E-1 | 2.8 E-1 |
| $Cs^{137}$ | 9.80 E-1 | 8.01 E-1 | 7.92 E-1 |
| $Co^{58}$ | 1.6 E-3 | 6.42 E-4 | 1.0 E-3 |
| $Co^{60}$ | .483 E-3 | 6.4 E-3 | 6 E-3 |
| $Mn^{54}$ | 1.31 E-2 | 8.74 E-3 | 6 E-3 |
| $I^{131}$ | 8.54 | 8.0 E-5 | < 1 E-6 |

This inventory is computed from measured inputs and releases and known decay constants for each isotope. Comparison of actual pond water samples with the computed pond inventory indicates that greater than 95% of the pond activity is in the sediment. The analyses associated with the chemical treatment ponds assume that the activity is uniformly distributed throughout the pond liquid and are thus extremely conservative.

My letter of April 27, 1978 revised the isotopic limits contained in the earlier letters. The previous limits were based partly on allowing the convenience of a continuous release from the pond without a significant impact on overall station release of activity. Continuous releases from the ponds have been stopped and the ponds are now released in a controlled manner with the

activity being accounted for and added to the normal station liquid releases. The new limits are based only on the accidental release of the entire pond inventory. Operation of the chemical treatment ponds in the described manner assures the health and safety of the public and the environment. As can be seen from the above table, the cesium activity from the January 1977 incident contributes significantly to the current cesium pond inventory. For example, the activity due to $Cs^{137}$ from the January 1977 input is over 95% of the current pond inventory and now represents the most limiting case. The alternative to transferring this activity to the ponds was to increase the amount of activity released to the environment. At the time of the incident, the decision was made to minimize the release to the environment at the expense of adding activity to the ponds. As can be seen, with the administrative controls in effect now, the pond activity has not significantly increased and has in fact decreased for most isotopes. All other detected isotopes have activities less than 0.001 μCi.

A possible alternative to the current method of operation of transferring low activity resin to the chemical treatment ponds and high activity resin to the storage tank for subsequent shipment as solid waste is to solidify all the resin as solid waste. This alternative is unacceptable for several reasons. The difference between shipping all resin with detectable activity and all above a reasonable limit which has been derived to produce a negligible offsite impact, is large in terms of both cost and utilization of commercial burial grounds. About 250 batches of powdex per year are generated. With the current inventory limit on the ponds, only a fraction of this material need be considered solid radioactive waste. If the shipment criteria is simple detectability, essentially all resin will be considered solid radioactive waste. Adoption of an inventory limit, which is low in comparison with station releases and even lower in potential environmental impact, saves on the order $10^4$ $ft^3$ per year of solid waste to be shipped to a commercial burial ground. The cost to solidify and transport waste to Barnwell is approximately $30 per cubic foot which results in an annual cost to ship all contaminated resin to Barnwell, South Carolina from Oconee in excess of $250,000. The costs associated with the transport of solidified resin to the other currently available burial sites, Beatty, Nevada and Hanford, Washington, would be significantly higher. The maintenance of the chemical treatment ponds with very low levels of activity is the better alternative.

It is important to note again that approximately 95% of the $Cs^{137}$ activity in the pond is due to the January 1977 incident. Routine inputs to the pond have not significantly increased the overall activity of the chemical treatment ponds and it is not expected that the inventory limit will be reached for many years.

The ultimate disposition of the radioactive resin has not yet been determined. Alternatives include offsite burial and maintaining the waste onsite. This will be resolved prior to reaching the inventory limits or, more likely at the final decommissioning of the Oconee station. It is expected that the costs associated with decommissioning of the chemical treatment ponds will be insignificant in comparison to the total costs of station decommissioning.

The current operation of the chemical treatment ponds and powdex resin control is capable of protecting the environment. However, a system modification is in the design process to allow greater control of the transfer of the powdex resin. This modification will provide tanks which will allow the resin to be held and sampled prior to transfer to the chemical treatment ponds. It is expected that this system will be operational in late 1983 and be part of an improved radioactive waste management system.

In recent discussions, the NRC staff has indicated the desire to have a technical specification proposed to control the activity inventory of the chemical treatment ponds. The chemical treatment ponds are a portion of the entire radiological effluent disposal system. As such, it is intended to propose a technical specification to cover the chemical treatment ponds at the same time as the radiological effluent technical specifications are proposed in early 1979. In the interim, operations associated with resin transfer and the chemical treatment ponds, are sufficiently controlled by station procedures.

Attachment 1 summarizes the procedure by which the processing of radioactive spent powdex resin will be controlled. It is expected that this procedure will be formally implemented by January 19, 1979.

Very truly yours,

William O. Parker, Jr.

RLG:scs

Attachment 1
Oconee Nuclear Station
Chemical Treatment Ponds

1. The quantity of radioactive material in the Chemical Treatment Ponds (CTP) shall be limited so that, for all radionuclides identified, excluding noble gases, the sum of the ratios of activity to the limits in 10CFR20, Appendix B shall not exceed $1.7 \times 10^{-5}$, * ie, Table II, column 2

2. After a primary to secondary leak is detected, the initial batch of used powdex resin shall not be transferred to the CTP. No batch of used powdex resin shall be transferred to the CTP unless the sum of the ratios of activity of the preceeding batch from any powdex cell in the same unit contained less than 0.1% of the above established limits.

3. If the radionuclide inventories per batches transferred, averaged over the previous 13-week period, exceed 0.01% of the pond radionuclide inventory limit, then a report of the occurrence will be submitted to the NRC. Radioactive decay of previous batch activity may be considered.

$$\sum_i \left| \frac{A_i}{C_i} \right| < 1.7 \times 10^{-5}$$

where $A_i$ = pond inventory limit (Curies) for radionuclide "i".

$C_i$ = 10 CFR 20 Appendix B, Table II, Column 2, concentration for radionuclide "i".

* Clarification added after telephone conversation agreement with Duke Power (Bob Gill, 1/16/1979)

Attachment 2

Surveillance Requirement for Control of CTP Radioactivity

1. A cumulative inventory (decay corrected) or the total radioactivity by individual nuclides discharged to the CTP shall be maintained and updated at least monthly. Radioactivity input into the CTP shall be accounted for. A representative sample of the CTP water and basin bottoms shall be collected semi-annually and analyzed for Fe-55, Sr-90 and gamma isotopic. The cumulative inventory, quantities discharged, and results of the sample analysis shall be reported in the semi-annual effluent report. A composite sample of the discharge from the oil collection basin shall be analyzed weekly by gamma spectra analysis and quarterly for Fe-55,and Sr-90. The results in terms of the total quantity of the individual radionuclides released to the environment shall be included in the semi-annual effluent report.

2. The turbine building sump shall be continuously monitored for radioactivity to a sensitivity of $1 \times 10^{-6}$ $\mu$Ci/ml water. The monitor shall be set to alarm in the control room at a concentration of greater than $5 \times 10^{-6}$ $\mu$Ci/ml. The monitor shall be calibrated at least once per 18 months and a functional test daily. With the monitor inoperable and the turbine building sump operating a continuous discharge mode, representative grab samples will be taken every 4 hours and analyzed for gross beta, gamma. With the monitors inoperable and the turbine building sump operating in a batch discharge mode, a representative grab sample of the sump shall be analyzed for gross beta, gamma before discharge.