NRC FORM 195 (2-76) U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NUMBER 50-269/270/287

FILE NUMBER

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

TO: Mr Rusche	FROM: Duke Power Co Charlotte, NC W O Parker Jr	DATE OF DOCUMENT 12-2-76 DATE RECEIVED 12-6-76
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DESCRIPTION

Ltr w/attchments.....requesting that ultimate disposal of material with a maximum inventory (as shown in attch 1)be permitted on site.....

PLANT NAME: Oconee 1-3

ENCLOSURE

DO NOT REMOVE

ACKNOWLEDGED

FOR ACTION/INFORMATION 12-8-76 ehf

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NRC FORM 195 (2-76)

DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

December 2, 1976

Mr. Benard C. Rusche
Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

Dear Mr. Rusche:

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 contaminants which could occur 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 then be addressed.

The normal disposal of the powdered resins is accomplished by backwashing the resins from the filter elements to a sump in the Turbine Building and then to one of two wastewater collection basins. The resin is allowed to settle to the bottom of the basins 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 very small primary-to-secondary leak was experienced on Oconee Unit 1 in August, 1975 of the order of 0.1 gallons/day. This introduced a small, but measurable, quantity of activity into the powdered resins. The resulting water-resin mixture considered as a liquid discharge was within the limits of 10CFR20.106 for release to the unrestricted areas. Also, the resin considered as a solid was approximately equivalent to the quantities permitted for on-site disposal pursuant to 10CFR20.304. Therefore, the resins were disposed of in the normal manner to the wastewater collection basin.

A study has subsequently been performed to further evaluate the acceptability of disposal of such resins in the wastewater collection basins. It is our finding that the disposal of low level radioactive resins to the collection basin is an acceptable disposal option, with high level radioactive resins being disposed of off site at an authorized burial facility.

In order to determine the differentiation between high and low level radioactive resins, the following criteria were applied to determine the upper limit of low level:

1. The amount of radioactivity expected to be routinely released should be less than 10 percent of the station's Appendix I limits (i.e., 0.9 mrem whole body and 3 mrem organ doses).

2. An incident in which the contents of the wastewater collection basins are released results in off-site doses below 10CFR20 limits (i.e., 500 mrem).

The assumptions utilized and the methods employed in this analysis are indicated in Attachment 1. The results of this analysis have identified inventory limits (by isotope) which should be imposed upon the basins in order to assure that the above criteria are met. These limits are also given in Attachment 1.

Design procurement and installation of equipment is in progress which will permit the holdup of backwashed resins for sampling in order that a decision may be made as to the disposal of each batch of resins. If the activity of the resins is such that its discharge to the wastewater collection basin would be consistent with the attached inventory limits, the batch would be transferred to the wastewater collection basin. If the activity does not meet these criteria, the resin will be shipped off site for burial. A running inventory of the basins will be maintained. This will assure that normal releases from the basin remain a small fraction of the Appendix I limits and assure that the doses due to the unlikely release of all activity are acceptable.

In conjunction with the above, it is hereby requested that pursuant to the provisions of 10CFR20, §20.302, ultimate disposal of material with a maximum inventory as shown in Attachment 1 be permitted on site. This disposal would be by burial to a minimum depth of four feet at such time as the waste water collection basins are no longer of use.

Very truly yours,

William O Parker Jr

William O. Parker, Jr.

MST:vr
Attachments

ATTACHMENT 1

Wastewater Collection Basin Inventory Limits

The Oconee Nuclear Station chemical waste system is composed of three basins. Two of these are designated wastewater collection basins and can be operated in a manner analogous to closed tanks, i.e., filled, drained or isolated, in order to control chemical effluents. The third basin is an oil collection basin which cannot be controlled. The Oconee powdex resins are normally discharged to one of the wastewater collection basins to permit the resin to settle out. This study was performed to establish acceptable inventory limits for radioisotopes in the wastewater collection basins in order to permit the discharge of low level radioactive resins to the basins. Considerations in establishing the inventory limits are potential off-site doses resulting from routine releases from the basins and from simultaneous release of all activity in the basins.

For routine releases from the basin, the objective is to limit the potential dose contribution from this source to 10% of the station's 10CFR50 Appendix I guidelines, i.e., 0.9 mrem whole body/yr.-site and 3.0 mrem organ/yr.-site. In establishing inventory limits to meet these criteria, the following assumptions were employed:

1. All radioactivity released to the wastewater collection basin is released to the Keowee River. That is, all activity on the resin is released.

2. The dose receptor annually obtains all water from the Clemson water intake.

3. The dose receptor annually obtains all fish from the Keowee River at the site boundary.

4. Mixing ratio at the site boundary is 6.6×10^{-5}.

5. Mixing ratio at the Clemson water intake is 1.8×10^{-5}.

6. Continuous discharge of radioactive mixture to the wastewater collection basin is (365 powdex discharges/year) (15,000 gal/discharge)/(52560 min/year) = 10.4 gpm.

The dose model described in Regulatory Guide 1.109 was used in this calculation. The equation

$$D = \frac{(1100)\ (Q)\ (DCF)}{F} [(M_1)(BA)(U_f) + (M_2)(U_w)],$$

Where:
- D = annual dose, mrem/yr
- Q = radioactive discharge to pond, Ci/yr
- DCF = dose conversion factor, mrem/pCi ingested
- F = discharge flowrate to pond, ft^3/sec
- M_1 = mixing ratio at site boundary
- BA = bioaccumulation factor for freshwater fish, $\frac{pCi/kg}{pCi/l}$
- U_f = fish consumption, kg/yr
- M_2 = mixing ratio at Clemson water intake
- U_w = water consumption, l/yr
- 1100 = conversion factor, pCi-yr ft^3/Ci-l-sec

was used in solving for the limiting release rate for each isotope to assure that the guideline 10% of 10CFR50, Appendix I is not exceeded.

In consideration of the situation in which all activity in the basins is released, the objective to be met in establishing the inventory limit was the 10CFR20 dose limit of 500 mrem/yr. The assumptions employed in this analysis were:

1. All radioactivity normally released over one year is discharged to the wastewater collection basin at one time.

2. After this discharge occurs, the wastewater collection basin dam fails followed by the failure of the oil collection basin dam.

3. 100% of the Cesium and 30% of all other isotopes in the basin are released. (These assumptions are the result of tests performed on the retention of radioactivity on powdex resins.)

4. Dose receptor obtains 1 day's consumption of water from the Keowee River at the site boundary as the radioactive slug passes.

5. The mixing ratio at the site boundary is 0.213.

6. Since aquatic biota are exposed for an extremely short period of time, only the drinking water pathway is of concern.

7. For isotopes with half lives greater than 250 days, the basin activity was a 40 year buildup with decay being the only loss mode.

There are three postulated accidents: (1) either one of the wastewater collection basins' dam breaks, all water flows to oil collection pond where it is held; (2) oil collection pond dam breaks, all water flows to the river; and (3) wastewater collection basin dam breaks followed by collection pond dam break, all water flows to river. In all cases, a dam "break" is considered to be the instantaneous removal of a 50 ft. section of the dam. In case 1, if wastewater collection basin #1 fails, the flow is 3600 cfs for 50 seconds, while for wastewater collection basin #2 the flow is 900 cfs for 220 seconds. For dose calculations, wastewater collection basin #2 was used due to its lower dilution factor. The flowrate for case #2 is 2009 cfs for 160 seconds, while for case #3 the flowrate would be 7950 cfs for 65 seconds. In all cases, no credit was taken for soil absorption or any intermediate damming. The dose consequences were found to be the greatest for accident case #3. Assumption number 2 results from this analysis.

Using the dose equation

$$D = \frac{(4.09 \times 10^5)\ (Q)\ (DCF)}{F}\ MUF,$$

Where: D = dose, mrem
Q = radioactive release, Ci
DCF = dose conversion factor, mrem/pCi ingested
F = discharge flowrate to pond, ft^3/sec
M = accident mixing ratio at site boundary

U = water consumption, l/day
f = isotope release fraction
4.09×10^5 = conversion factor, pCi - d - ft^3/Ci - ℓ - sec

the activity levels in the wastewater collection basin were calculated to assure that the 500 mrem criterion is met.

The attached Table 1 is a compilation of the more limiting inventory between the routine and accidental release studies. As an added conservatism, these limits are to be applied to the two waste water collection basins collectively, and not individually.

If the sum of the ratios of the activity present in the basin for each isotope to its respective isotopic limit is less than 1, it can be stated that the objectives of normal and accidental releases have been satisfied. Therefore it is considered that disposal of these low activity radioactive resins will not affect the health and safety of the public.

TABLE 1

Proposed Radionuclide Limits
on Retention Pond

Isotope	Limit - Ci
CR 51	3.2 (2)
Mn 54+	7.9
Fe 59*	6.3
Co 57*	4.6 (1)
Co 58*	1.4 (1)
Co 60+	7.3 (-1)
Sr 89	2.3 (-1)
Sr 90+	7.0 (-4)
Sr 91	7.6
Zr 95*	7.0
Zr 97	2.1
Nb 95	7.1 (-2)
Nb 97	3.1 (1)
Mo 99*	2.2 (1)
Ru 103*	1.0 (1)
Te 129m	1.9
Te 131m	1.3
I 130*	7.6 (-1)
I 131*	2.3 (-2)
I 132*	3.0
I 133*	7.0 (-2)
I 135*	1.4
Cs 134	5.6 (-2)
Cs 136	3.7 (-1)
Cs 137	9.5 (-2)
Ba 140*	5.0
La 140*	2.3
Ce 143*	4.6
W 187	1.3

*Accident dose limiting criterion
+40 year buildup accident dose limiting criterion