FROM:
Duke Power Company
Charlotte, North Carolina 28
A. C. Thies

TO:
Dr. Peter A. Morris

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ENCLOSURES:
Revision No. 1 to Supplemental Environmental Report consisting of revised pages 19, 21, 68 and Table 5...

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November 2, 1971

Dr. Peter A. Morris, Director
Division of Reactor Licensing
Atomic Energy Commission
7920 Norfolk Avenue
Bethesda, Maryland

Re: Oconee Units 1, 2, and 3
Supplemental Environmental Report
Docket Nos. 50-269, -270, and -287

Dear Dr. Morris:

Duke Power Company is submitting herewith Revision No. 1 to its Supplemental Environmental Report for the Oconee Nuclear Station. Three hundred copies of the Supplemental Environmental Report were submitted with our letter of October 18, 1971 in support of Duke Power Company's Application for Licenses for the Oconee Nuclear Station which is under construction pursuant to Provisional Construction Permits CPPR-33, -34, and -35 issued by the Commission on November 6, 1967.

Please insert revised pages 19, 21, 68, and Table 5 as replacements for existing pages in the 300 copies of the document entitled, "Supplement to Environmental Quality Features of Keowee-Toxaway Project," and dated October, 1971. Please note that vertical lines in each margin and the revision number in the left margin identify portions revised unless otherwise noted at the bottom of the page.

Having been duly sworn, I hereby certify that I am a Senior Vice President of Duke Power Company; that I am authorized on the

LB

part of said company to sign and file this revision; and that all matters set forth therein are true and correct to the best of my knowledge, information, and belief.

By A C Thies
Senior Vice President

ATTEST:

John C. Goodman, Jr.
Assistant Secretary

A. C. THIES has subscribed and sworn to the above statement before me, a Notary Public in and for the State of North Carolina and County of Mecklenburg, this 2nd day of November, 1971.

Lucille O. Johnston
Notary Public

My Commission Expires:

March 16, 1975

Superseded per Rev No 1 dtd 11-2-71

period at 435 gpd during which time all fission and corrosion products are allowed to decay.

6. Specific activities are shown as a total of "Reactor Coolant Coolant System" and "Liquid Wastes" discharged to and diluted by the Keowee Hydro Plant tailrace flows of 30 CFS for a minimum leakage and 1100 CFS for average tailrace flow. Fractions of MPC for yearly discharge at the average tailrace flow are also shown.

7. Tritium values shown are based on a 2.75 μc/ml specific activity level for the total quantity of liquid discharged as defined in FSAR Table 11.1a. No holdup time or removal is considered for tritium.

It is possible that trace quantities of solid elements, such as cesium, molybdenum, and yttrium can get into the reactor coolant system. The analysis of Section 11.1.1.3.1 of the Oconee FSAR assumed conservatively a zero removal efficiency for molybdenum and yttrium and 90 percent removal efficiency for cesium. It has since been determined, however, that removal efficiencies of at least 90 percent could be attained for cesium, molybdenum, and yttrium.

Letdown reactor coolant is sent to the bleed holdup tank. Depending on its activity the contents of the bleed holdup tank may then be sent to the miscellaneous waste holdup tank, high activity waste tank, or the coolant treatment evaporator. Waste in the first two of these is held up for decay and/or processed by the evaporator. Liquid wastes may be sent to the low activity waste tank from the miscellaneous waste holdup tank and high activity tank. Other liquid wastes such as cooler drains, floor drains, pump vents (including the turbine room sump drain), etc, drain to the low activity, high activity or miscellaneous waste tanks depending on their potential activity. Inputs to the low activity waste tank are filtered through a filter of approximately 40 microns and can be discharged to the Keowee tailrace after monitoring.

The liquid waste discharged is sampled for gross beta-gamma activity and/or isotopic activity concentrations. The frequency of these isotopic determinations may be found in the Oconee FSAR, Section 15, Table 4.1-3. While no further sampling is required by the Technical Specifications, there will be operating procedures for alpha activity measurements in the waste discharge.

Low level gaseous waste activity is vented. The gaseous waste vents are straight vertical cylinders which have a 5 foot, 11-3/8 inch inside diameter exit. The top of the stacks are at an elevation of 995.9 feet above sea level (220.9 feet above the ground elevation at the plant and approximately 9 feet above the highest building in the area). The location of vents for each unit is shown in Figure 1-8 of the Oconee FSAR. Figure 2-5 of the FSAR indicates relative elevations. Figures 5 and 17 show the plan view of the buildings near the stacks giving their shape and roof heights.

The effluent velocity from the stack is 2140 feet per minute. The stack flow is composed of 52,000 SCFM of exhausted ventilation air from the Auxiliary Building, 32 SCFM from the waste gas system, and 60 SCFM/unit (design) from the air ejectors. Intermittently, 50,000 SCFM will be discharged from the Reactor Building purge system. Normal discharge temperature will be 95°F.

Table 6 is a list of all radionuclides which may be emitted up the stack and the total amount released of each (in curies). Gaseous fission products were calculated assuming plant operation with one percent fuel defects for one year and a holdup of 20 days, except for the Reactor Building purge. The one percent fuel defects is a maximum design condition and is not expected for normal operation. The 20-day holdup is the minimum allowable by Technical Specification 3.9.3.6 of the Oconee FSAR. The design calculations of Section 11 of the Oconee FSAR list data on gaseous releases based on the assumption of no holdup. Also included in the table is a breakdown on the sources of the radionuclides emitted. Section 3.9.3.1 of the Technical Specification specifies the maximum gaseous release rate allowable.

The values listed in Table 6 are an annual average composite since certain gaseous releases are intermittent while others are continuous. Auxiliary Building ventilation is a continuous release. The Reactor Building purge is an intermittent release as is the release of the waste gas decay tanks.

One mechanism of waste gas production is fuel failure or cladding defects. The model used to generate design basis reactor coolant fission product inventories is discussed at length in the Oconee FSAR Section 11.1.1.3. The AEC/DRL question 6.7, dated April 18, 1967, and Duke's answer to the question included in Supplement 2 of the Oconee Preliminary Safety Analysis Report deals with the subject of radioactive gas buildup in the reactor coolant and can be consulted for further detail. A Babcock & Wilcox computer code calculates the reactor coolant activity level as a function of time and the equations used in this code are presented in the Oconee Preliminary Safety Analysis Report.

Charcoal is used in filters at the Oconee Nuclear Station to limit releases. The following is a list of the filters utilizing charcoal, the type of charcoal used and the flow rate through the filter:

1. Reactor Building Purge Filters
   Mine Safety Applicances 85851 Carbon
   40 to 45 ft/min

2. Penetration Room Filters
   American Air Filter Barneby Cheny 727 Carbon
   40 to 45 ft/min

3. Reactor Building Hydrogen Purge Filters
   Barneby Cheny 727 Carbon
   40 to 45 ft/min

4. Waste Gas Filters
   Barneby Cheny 727 Carbon
   40 to 45 ft/min

5. Control Room Air Conditioning
   MSA 85851 Carbon
   40 to 45 ft/min

Any filters in the gas discharge systems that become radioactive will be taken to a drumming station and packaged for off-site disposal.

Table 11-1a of the Oconee FSAR tabulates predicted amounts of solid radioactive waste to be produced at the Oconee Nuclear Station. The plant should produce approximately 350 cubic feet per year of demineralizer resin (with activity of $6x10^5$ curies/yr) and 2500 cubic feet per year of evaporator bottoms (with activity of $2x10^5$ curies/yr). It is expected that one-hundred 55-gallon drums of low level contaminated solid wastes will be produced annually from each unit. Solid radioactive wastes will be packaged and shipped to licensed disposal facilities by licensed waste handling contractors.

For normal operation there will be no smoke or chemicals discharged to the atmosphere. The only possible source is an auxiliary space heating boiler, which will be used only when Unit 1 is down for refueling and for startup prior to operation of Units 2 and 3. The emissions will be the usual products of combustion from the use of #2 fuel oil. The auxiliary boiler will not be used when Units 2 and/or 3 are available to supply this steam.

SOIL CONSERVATION

Duke's new construction activities often involve large scale land clearing and earth excavation operations. For years it has been company practice to restore grass and tree cover to such disturbed areas in early stages of construction to reduce erosion and downstream siltration. Roadway banks, earth borrow pits, slopes of dams, banks of canal and other earth structures are thus provided with vegetation cover and restored to a stable condition and pleasing appearance.

Duke Power's comprehensive, scientifically-managed forestry program plays a vital part in the preservation and restoration of the Piedmont-Carolina's environment. The company land surrounding Lake Keowee that is not devoted to recreation or other purposes is under a continuous forestry management program. Any open or idle land has been or will shortly be planted with trees. The woodlands are operated under a sustained yield concept where the mature timber stands are harvested and the harvested areas prepared and replanted with trees suitable to the site. These young forests supply more oxygen to the atmosphere than the mature and overmature trees that are being replaced. If a stand of trees is left to grow too long, it becomes decadent and stagnant, consuming more oxygen than it releases.

In Duke's timber harvesting program the protection of the soil from erosion is of primary importance. Care is taken in locating the logging road system so as to keep the streams free of silt. Following the logging operations, precautions are taken to correct any possible sources of erosion. Water turnouts are built into the logging roads and skid trails. These roads then are seeded in perennial grasses and/or lespedeza.

In addition to this comprehensive forestry program, Duke has underway a watershed management program. To make sure the land for this program is definitely separated from the land for utility purposes, Duke has transferred it to a wholly-owned subsidiary, Crescent Land and Timber Corporation. Crescent implements the policies of watershed management by planting about 400,000 seedling trees per year at the Keowee-Toxaway Project. Besides providing soil stability and erosion control, each acre of planted southern pine returns between two and three tons of organic matter to the soil each year.

HISTORICAL SALVAGE

During preliminary investigation of the Keowee-Toxaway project it became apparent to Duke Power Company that the Keowee basin contained but consequences shown require coolant activity prior to event) and "I" (not likely to occur but consequences are presented from one event in one year during the life of the plant).

In order to put the consequences of these accidents in perspective, the resulting dose shown in Table 18 would be in addition to the naturally occurring background radioactivity. This background radioactivity at Oconee has been measured and found to be about 130 mrem per year. Even the largest value shown in Table 17, 2.1×10^{-2} mrem, would only increase the exposure to 130.021 mrem. This increase is insignificant and leads to the conclusion that none of the accidents examined endanger the health and safety of the general public.

REFERENCES

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(6) Jansma, J D; Secondary Effects of Upstream Watershed Development; Unpublished doctoral dissertation; Okalhoma State University; p 68.

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TABLE 5

ESTIMATED ANNUAL RELEASES BY ISOTOPE FROM THREE UNITS

Corrosion Products, Normal Operation, No Fuel Defects

Isotope	Annual Release uc	Specific Activities in Liquid Waste Discharge uc/ml: Dilution by Hydro Plant Leakage Only (30 CFS)	Dilution by Average Hydro Plant Flow (1100 CFS)	Fraction of MPC in Waste Discharge with Average Hydro Plant Flow
Co58	4.91×10^{2}	1.84×10^{-10}	5.02×10^{-12}	5.02×10^{-8}
Co60	2.74×10^{2}	1.02×10^{-10}	2.79×10^{-12}	5.57×10^{-8}
Cr51	7.89×10^{1}	2.96×10^{-11}	8.06×10^{-13}	4.03×10^{-10}
Mn54	9.62×10^{0}	3.60×10^{-12}	9.82×10^{-14}	9.82×10^{-10}
Fe59	9.22×10^{0}	3.45×10^{-12}	9.41×10^{-14}	1.57×10^{-9}
Zr95	6.13×10^{2}	2.29×10^{-10}	6.26×10^{-12}	1.04×10^{-8}

Add to Corrosion Products for 1% Fuel Defects in One Unit

Isotope	Annual Release uc	Dilution by Hydro Plant Leakage Only (30 CFS)	Dilution by Average Hydro Plant Flow (1100 CFS)	Fraction of MPC in Waste Discharge with Average Hydro Plant Flow
Rb88	3.86×10^{-3}	1.44×10^{-15}	3.94×10^{-17}	1.31×10^{-11}
Sr89	8.57×10^{1}	3.20×10^{-11}	8.73×10^{-13}	2.91×10^{-7}
Sr90	8.88×10^{0}	3.32×10^{-12}	9.05×10^{-14}	3.02×10^{-7}
Sr91	6.03×10^{0}	2.26×10^{-12}	6.16×10^{-14}	8.80×10^{-10}
Sr92	6.68×10^{-1}	2.50×10^{-13}	6.81×10^{-15}	9.73×10^{-11}
I 131	2.23×10^{3}	8.34×10^{-10}	2.27×10^{-11}	7.57×10^{-5}
I 132	1.40×10^{2}	5.23×10^{-11}	1.42×10^{-12}	1.78×10^{-7}
I 133	5.62×10^{2}	2.72×10^{-10}	7.43×10^{-12}	7.43×10^{-6}
I 134	7.29×10^{-1}	2.73×10^{-13}	7.44×10^{-15}	3.72×10^{-10}
I 135	1.97×10^{2}	3.40×10^{-11}	2.02×10^{-12}	5.08×10^{-7}
Cs136	1.15×10^{2}	4.29×10^{-11}	1.17×10^{-12}	1.30×10^{-8}
Cs137	1.32×10^{3}	4.92×10^{-10}	1.34×10^{-11}	6.70×10^{-7}
Cs138	5.42×10^{-1}	2.03×10^{-13}	5.54×10^{-15}	1.85×10^{-9}
Mo99	8.78×10^{4}	3.29×10^{-8}	8.98×10^{-10}	4.49×10^{-6}
Ba139	7.08×10^{0}	2.65×10^{-12}	7.23×10^{-14}	2.41×10^{-8}
Ba140	1.83×10^{2}	6.83×10^{-11}	1.87×10^{-12}	6.21×10^{-8}
La140	4.18×10^{1}	2.42×10^{-11}	4.28×10^{-13}	2.14×10^{-8}
Y 90	8.43×10^{3}	3.15×10^{-9}	8.61×10^{-11}	4.30×10^{-6}
Y 91	3.88×10^{3}	1.45×10^{-9}	3.96×10^{-11}	1.32×10^{-6}
Ce144	1.26×10^{0}	4.70×10^{-12}	1.28×10^{-13}	1.28×10^{-8}
H3	1.2×10^{10}	4.5×10^{-14}	1.23×10^{-15}	4.1×10^{-13}

TABLE 6

OCONEE 1

DESIGN CONDITION ANNUAL RELEASED RADIONUCLIDES (CURIES)**

Isotope	Lifetime Shim Bleed	Startup Expansion & Dilution	Reactor Building Purge	Tank Venting	Total
Kr85m			2.5×10^{-1}		2.5×10^{-1}
Kr85	5.3×10^{3}	1.1×10^{4}	1.7×10^{2}	1.0×10^{3}	1.7×10^{4} *
Kr87			4.0×10^{-2}		4.0×10^{-2}
Kr88			2.9×10^{-1}		2.9×10^{-1}
Xe131m	4.0×10^{2}	6.3×10^{2}	2.0×10^{1}	9.3×10^{1}	1.1×10^{3}
Xe133m	3.7×10^{0}	2.0×10^{0}	6.0×10^{0}	2.9×10^{-1}	1.2×10^{1}
Xe133	1.0×10^{4}	1.2×10^{4}	1.2×10^{3}	1.8×10^{3}	2.5×10^{4}
Xe135m			9.3×10^{-3}		9.3×10^{-3}
Xe135			2.3×10^{0}		2.3×10^{0}
Xe138			4.0×10^{-3}		4.0×10^{-3}
TOTAL	1.6×10^{4}	2.3×10^{4}	1.4×10^{3}	2.0×10^{3}	4.3×10^{4}

"Lifetime Shim Bleed" is all the gas from 14,600 ft^3 of reactor coolant(1) decayed for 20 days.
"Startup Expansion & Dilution" is all the gas from 29,600(2) ft^3 of reactor coolant(1) decayed for 20 days prior to and 7 days during release.
"Reactor Building Purge" is all the gas from a 10 gal/day(3) reactor coolant(1) decayed during a 30 day buildup.
"Tank Venting" is an appropriate fraction of all the gas in the reactor coolant system determined from Henry's Law and decayed during discharge for 7 days after 20 days holdup.

(1) See FSAR Table 11-3 (200 day values used)

(2) See FSAR Table 11-1a

(3) FSAR Section 11.1.2.5.2

* Note that Kr85 activity is not constant as assumed, and in fact only about 2.6×10^3 curies/year are leaked into the reactor coolant with 1% fuel defects.

** Assuming one percent failed fuel.