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50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
TUCKER,H.B. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director
STOLZ,J.F. Licensing Branch 4

SUBJECT: Application to amend Licenses DPR-38,DPR-47 & DPR-55 to permit onsite disposal of low level radwaste in 3-ft trenches.No license fee required.

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DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

May 29, 1984

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

Attention: Mr. John F. Stolz, Chief
Licensing Branch No. 4

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

Dear Sir:

Pursuant to 10 CFR 20 §20.302, please find attached an application for the disposal of very low-level radioactive waste. Duke Power Company hereby requests NRC approval of the proposed disposal method described in the attached application.

This application proposes to bury slightly contaminated sand in trenches to be covered with approximately three (3) feet of uncontaminated soil. The proposed burial site is to be located within the company controlled area.

Based on an initial review, Duke has determined that no license fees are warranted. Duke is requesting approval for an action, pursuant to a regulation, for which acceptability appears to have been previously established. Duke Power requests that the NRC review and consider this request in a timely manner.

Very truly yours,

H. B. Tucker

Hal B. Tucker

PFG/php

Attachment

cc: Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Ms. Helen Nicolaras
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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cc: Mr. R. A. Birkel
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. K. N. Jabbour
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

OCONEE NUCLEAR STATION
APPLICATION FOR THE APPROVAL TO DISPOSE OF
VERY LOW-LEVEL RADIOACTIVE WASTE

1.0 Purpose

Pursuant to 10CFR20, §20.302 Duke Power Company requests NRC Approval of the proposed method for the disposal of sandblasting decon media contaminated at very low-levels of radioactivity. This application addresses the specific information requested in §20.302.

2.0 Waste Description

One of the decontamination methods used at Duke Power Company's Oconee Nuclear Station is ABRASIVE BLASTING. Abrasive blasting makes use of a large variety of abrasives (such as sand) with velocity, shape, and size of the abrasive influencing surface-removal characteristics. The radioactivity concentrations of sandblasting decon media has been determined to be very low. The radionuclides and average concentrations obtained from six samples of the decon media were identified as follows:

Radionuclide	Average Concentration (PCi/gm)	% Abundance
MN-54	6.34 E-01	1.19
CO-60	1.24 E+00	2.31
CS-134	1.49 E+01	27.97
CS-137	3.65 E+01	68.53

The sample analysis reports are provided in Appendix 1

The volume of waste being generated per year is projected to range from 300 to 1500 cubic feet. At present, Oconee has accumulated approximately 400 cubic feet on site.

3.0 Proposed Disposal Method

These abrasive media (sand) are currently packed in 55 gallon drums and stored in the radwaste storage area on site. The proposed disposal procedures are as follows:

3.1 Transportation Procedure

- The 55 gallon drums (each drum only half full) will be transported by vehicle to the disposal site.
- The preparation and shipment of radioactive waste will be in accordance with station Health Physics procedures and station directives.

3.2 Disposal Procedure

- During the burial process access to the proposed burial site will be controlled.
- The waste (sand) will be poured into a 7 to 12 foot deep trench at the proposed burial site and covered with approximately 3 feet of uncontaminated soil.
- The workers handling the waste drums will be properly dressed in accordance with station Health Physics procedures and station directives.

3.3 Administration Procedure

- The waste volume of each drum will be properly weighed and documented.
- For each batch of waste generated, a composite sample from different containers will be taken for radiological analysis, and results will be documented.
- The total waste volume and radioactivity inventories will be documented, and the total accumulating dose will be periodically evaluated.

4.0 Evaluation of Environmental Impact

4.1 Proposed Site Characteristics

4.1.1 Topography

The proposed burial site is located about 1000 feet east from Oconee Nuclear Station outside the security fence but within company controlled area. Figure 1 indicates the proposed burial site location. The dimension of this burial site is about 7 feet to 12 feet deep, 30 to 50 feet wide and about 70 feet long. Oconee FSAR Figure 2.1-1 through 2.1-4 illustrates the topography in various detail from within 1 mile to within 50 miles of the site. There are no industry, commercial, institutional, recreational or residential structures within the Oconee site boundary. There will be no impact on topography in this area by the proposed method of disposal.

4.1.2 Geology

The ground surface residual soil consists of a variable thickness of soil underlain by partially weathered rock. The residual soils primarily are silty sands or sandy silts. The rock is a granitic gneiss that contains the interlayered biotite-hornblende gneiss. The fill soils classify primarily as micaceous silty sands which include clay layers of low to moderate plasticity. There will be

no impact on geology in this area by the proposed method of disposal. For more geological information see the Oconee FSAR, Volume 1, Section 2.5.1.

4.2 Area Characteristics

4.2.1 Meteorology

Western South Carolina is far south of major storm tracks but experiences higher precipitation amounts than the east coast due to its location in the lee of the Appalachian Mountains. A semipermanent belt of high pressure usually influences the regional climate. During the fall season, the area has a high probability of experiencing atmospheric stagnation. The topography in the vicinity of the site is hilly and the local air flow is influenced to some extent by the contour of the lake. The prevailing winds are divided between the southwest and northeast quadrants due to the lake orientation and large scale pressure effects. There will be no impact on meteorology in this area by the proposed method of disposal. For more meteorological information, see the Oconee FSAR, Volume 1, Section 2.3.

4.2.2 Hydrological Characteristics

The hydrological characteristics in the site vicinity are detailed in the Oconee FSAR, Section 2.4 titled Hydrologic Engineering.

4.3 Water Usage

4.3.1 Ground Water Usage

Preliminary Studies indicate that groundwater in this area should continue to migrate downslope through the saprolite soil on a slightly steeper gradient in a southeasterly direction toward the Keowee River base datum. Oconee FSAR, Section 2.4.7 discusses area and regional groundwater conditions. Oconee FSAR, Section 2.4.7.2.1 details groundwater uses in the general area. There will be no impact on groundwater usage by the proposed method of disposal.

4.3.2 Surface Water Usage

Subsurface water is typical of Piedmont area. The top of the zone of saturation, or water table, follows the topography, but is deeper in the uplands and more shallow in valley bottoms. It migrates through the pores of the weathered rock, where the feldspars have disintegrated and left intersticial spaces between the quartz grains. Additional water is contained in the deeper fractures and joints below the sound rock line. The water table is not

stationary, but fluctuates continually as a reflection seasonal precipitation. Surface water users in the Oconee area are detailed in the Oconee FSAR in Section 2.4.1.2. There will be no impact on surface water usage by the proposed method of disposal. For more information, see the Oconee FSAR, Volume 1, Sections 2.4 and 2.5.

4.4 Nearby Facilities

There are no railroads, pipelines, industrial or military facilities within five miles of the Oconee site. There are no other potentially affected facilities in the vicinity of the proposed burial site.

4.5 Radiological Impact

The annual dose rate to the total body for a person continuously occupying the area is estimated to be 0.26 mrem/yr and if only occupied for 2000 hours during the year the estimated whole body dose would be 0.06 mrem. The actual occupancy time of the proposed burial site is expected to be significantly less than 2000 hours per year. Detailed calculations of dose rate estimation is included in Appendix 2.

5.0 Radiation Protection

The operational procedure to minimize the risk of unexpected or hazardous exposures will follow the guidelines provided by System Health Physics Manual and station directives on radiation exposure control and radioactive material control. All radioactive-waste release and disposal operations will be performed under the technical guidance and review of the Station Health Physicist.

6.0 Evaluation of Overall Benefit

These decon media if packaged and disposed of as radioactive waste will be at a cost of approximately $17,000, and use nearly twice the space of actual waste volume in licensed radioactive material burial site due to radioactive waste packaging requirements. Considering the generation rate of this type of material (300 to 1500 cubic feet per year), the total cost saving could range from $13,000 to $64,000 per year and saving burial site space from 600 to 3,000 cubic feet per year. The annual dose rates for both public and worker are much less than 1 mrem/yr considering that they continuously occupy the proposed burial sites.

APPENDIX:

(1) Decon Sand Sample Analysis Results

(2) Annual Dose Rate Estimations

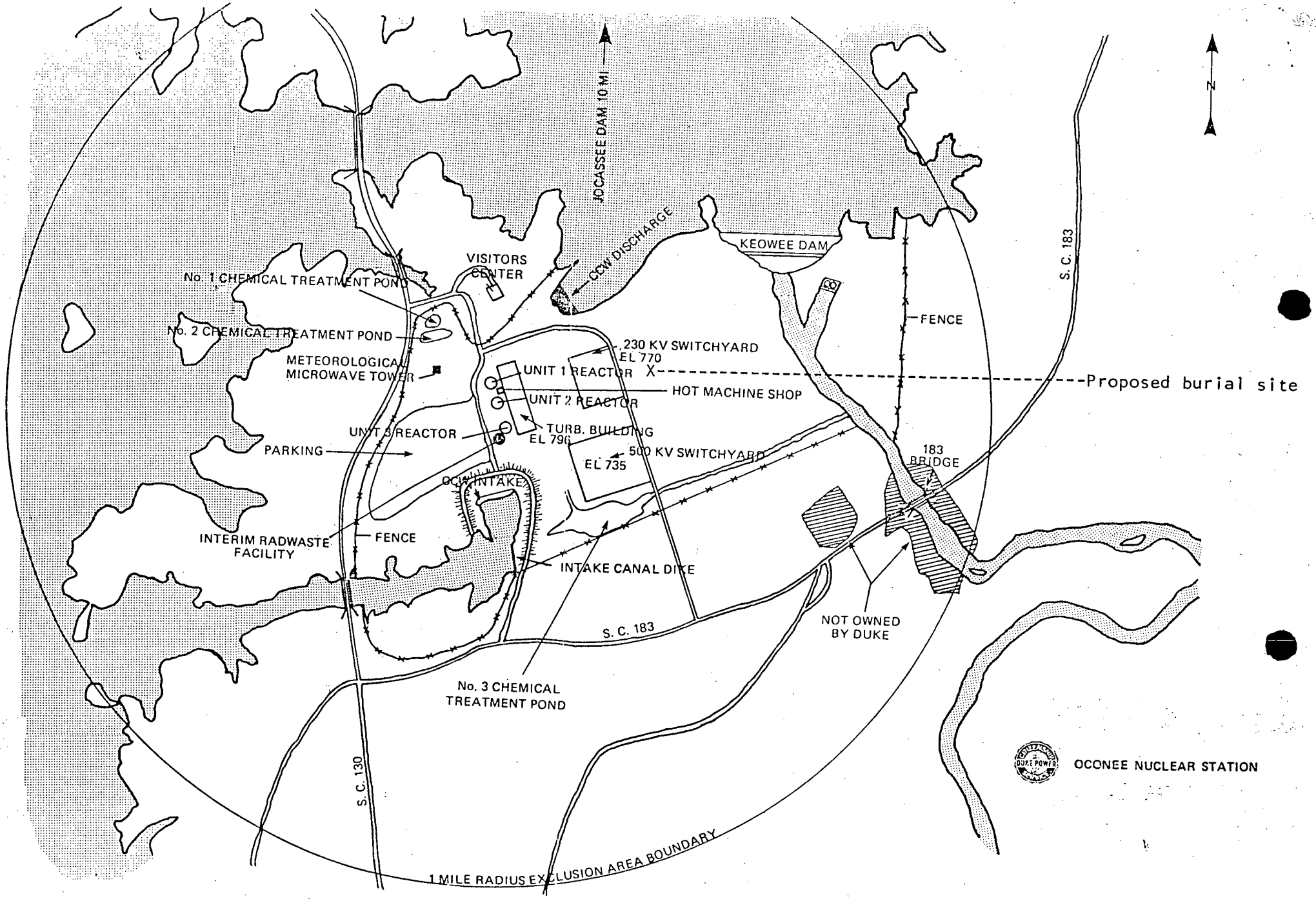

FIGURE 1 PROPOSED BURIAL SITE LOCATION

APPENDIX 1

Decon Sand Sample Analysis Results

APPENDIX 1

27

7 FEB 1983 8:48:33 AM
ENVIRONMENTAL RADIOLOGICAL LABORATORY
SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE - SANDBLAST DECON WASTE
TYPE: ~~LIQUID~~ SOLID
COLLECTION DATE(S): 1/15/83
QUANTITY: 1.18
UNITS: ~~LITERS~~ Kilograms Dry

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	* 4.84E 2	± 3.3E 2	
MN-54	1.59E 2	± 3.4E 1	
FE-59	* 3.00E 1	± 7.9E 1	LTL > LLD
CO-58	1.84E 2	± 4.2E 1	
CO-60	1.02E 3	± 6.0E 1	
ZN-65	* -4.04E 1	± 6.6E 1	LTL > LLD
ZR-95	1.88E 2	± 8.0E 1	
NB-95	* 7.25E 1	± 5.4E 1	LTL > LLD
I-131	* 7.41E 1	± 2.4E 2	LTL > LLD
CS-134	4.55E 3	± 7.9E 1	
CS-137	1.35E 4	± 1.6E 2	
BALA-140	* 8.22E 1	± 8.4E 1	LTL > LLD
CD-109	2.75E 4	± 1.4E 3	
SB-122	6.85E 4	± 4.6E 3	
UR-SER	4.68E 3	± 1.2E 2	
AC-SER	1.45E 3	± 2.7E 2	
TH-SER	2.50E 3	± 7.8E 1	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65×SIGMA

COMMENT:

BY: [signature]

REVIEWED BY: Jim Isaacson DATE: 2-7-83

APPENDIX 1

144

6 JUL 1983 9:25:27 AM
ENVIRONMENTAL RADIOLOGICAL LABORATORY
SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE : SANDBLAST DECON SAMPLE #5
TYPE: ~~LIQUID~~ SOLID
COLLECTION DATE(S): 5/31/83
QUANTITY: 1.16
UNITS: ~~LITERS~~ KILOGRAMS

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	*-1.57E 2	± 4.4E 2	
MN-54	7.75E 2	± 9.4E 1	
FE-59	*-2.82E 1	± 1.2E 2	LTL > LLD
CO-58	* 8.91E 1	± 8.1E 1	LTL > LLD
CO-60	1.19E 3	± 9.7E 1	
ZN-65	* 1.57E 2	± 1.3E 2	LTL > LLD
ZR-95	* 1.19E 1	± 1.8E 2	LTL > LLD
NB-95	* 1.05E 2	± 1.4E 2	LTL > LLD
I-131	*-9.08E 2	± 1.9E 3	LTL > LLD
CS-134	1.74E 4	± 3.0E 2	
CS-137	4.12E 4	± 4.7E 2	
BALA-140	* 0.00E 0	± 1.8E 2	LTL > LLD
TH-SER	8.47E 2	± 1.5E 2	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65*SIGMA

COMMENT:

BY:

REVIEWED BY: Jim Isaacson DATE: 7/7/83

APPENDIX 1

143

6 JUL 1983 9:24:17 AM
ENVIRONMENTAL RADIOLOGICAL LABORATORY
SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE : SANDBLAST DECON SAMPLE #4
TYPE: ~~LIQUID~~ and SOLIDS
COLLECTION DATE(S): 5/31/83
QUANTITY: 1.13
UNITS: ~~LITERS~~ and KILOGRAMS

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	* 3.21E 2	± 5.1E 2	
MN-54	5.43E 2	± 9.1E 1	
FE-59	* 1.44E 2	± 1.5E 2	LTL > LLD
CO-58	*-2.81E 1	± 8.0E 1	LTL > LLD
CO-60	1.14E 3	± 9.4E 1	
ZN-65	*-1.47E 1	± 1.2E 2	LTL > LLD
ZR-95	*-3.65E 1	± 1.6E 2	LTL > LLD
NB-95	* 8.93E 1	± 1.3E 2	LTL > LLD
I-131	* 7.54E 2	± 1.7E 3	LTL > LLD
CS-134	1.56E 4	± 2.8E 2	
CS-137	3.59E 4	± 4.3E 2	
BALA-140	* 5.21E 1	± 2.3E 2	LTL > LLD
TH-SER	1.13E 3	± 1.3E 2	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65*SIGMA

COMMENT: _____

BY: _____

REVIEWED BY: _____ DATE: 7/7/83

APPENDIX 1

142

6 JUL 1983 9:17:44 AM
ENVIRONMENTAL RADIOLOGICAL LABORATORY
SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE : SANDBLAST DECON SAMPLE #3
TYPE: ~~LIQUID~~ SOLID
COLLECTION DATE(S): 5/31/83
QUANTITY: 1.05
UNITS: ~~LITERS~~ KILOGRAMS

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	* 8.63E 1	± 5.1E 2	
MN-54	1.04E 3	± 1.1E 2	
FE-59	*-9.31E 1	± 1.6E 2	LTL > LLD
CO-58	* 3.02E 1	± 9.8E 1	LTL > LLD
CO-60	1.40E 3	± 1.1E 2	
ZN-65	*-3.15E 1	± 1.4E 2	LTL > LLD
ZR-95	* 1.31E 1	± 2.1E 2	LTL > LLD
NB-95	3.49E 2	± 1.4E 2	
I-131	* 2.14E 3	± 2.4E 3	LTL > LLD
CS-134	3.04E 4	± 4.0E 2	
CS-137	6.66E 4	± 6.1E 2	
BALA-140	* 5.59E 1	± 3.0E 2	LTL > LLD
TH-SER	1.43E 3	± 1.7E 2	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65*SIGMA

COMMENT: _____

BY: _____

REVIEWED BY: _____ DATE: 7/7/83

APPENDIX 1

141

6 JUL 1983 9:16:32 AM
ENVIRONMENTAL RADIOLOGICAL LABORATORY
SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE : SANDBLAST DECON SAMPLE #2
TYPE: ~~LIQUID~~ SOLID
COLLECTION DATE(S): 5/31/83

QUANTITY: 1.24
UNITS: ~~LITERS~~ KILOGRAMS

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	*-1.46E 2	± 3.9E 2	
MN-54	5.04E 2	± 8.4E 1	
FE-59	* 1.58E 2	± 1.4E 2	LTL > LLD
CO-58	* 6.38E 0	± 7.2E 1	LTL > LLD
CO-60	9.69E 2	± 9.9E 1	
ZN-65	*-2.66E 1	± 1.2E 2	LTL > LLD
ZR-95	* 5.53E 1	± 1.5E 2	LTL > LLD
NB-95	2.92E 2	± 1.3E 2	
I-131	*-4.02E 1	± 1.5E 3	LTL > LLD
CS-134	9.45E 3	± 1.9E 2	
CS-137	2.60E 4	± 3.6E 2	
BALA-140	* 1.42E 2	± 2.3E 2	LTL > LLD
UR-SER	1.37E 3	± 1.5E 2	
TH-SER	1.06E 3	± 1.2E 2	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65*SIGMA

COMMENT: _____

BY: CWK

REVIEWED BY: Jim Isaacson DATE: 7/7/83

APPENDIX 1

140 6 JUL 1983 9:15:20 AM

ENVIRONMENTAL RADIOLOGICAL LABORATORY

SAMPLE ANALYSES REPORT

OCONEE SPECIAL SAMPLE : SANDBLAST DECON SAMPLE #1

TYPE: ~~LIQUID~~ SOLID

COLLECTION DATE(S): 5/31/83

QUANTITY: 1.17

UNITS: ~~LITERS~~ KILOGRAMS

RADIONUCLIDE	ACTIVITY(PCI/UT)	SIGMA(PCI/UT)	
GAMMA SPEC			
K-40	* 6.19E 2	± 5.2E 2	
MN-54	7.85E 2	± 9.6E 1	
FE-59	* 2.78E 1	± 1.8E 2	LTL > LLD
CO-58	2.23E 2	± 8.7E 1	
CO-60	1.72E 3	± 1.1E 2	
ZN-65	* 0.00E 0	± 1.3E 2	LTL > LLD
ZR-95	* 1.88E 2	± 1.7E 2	LTL > LLD
NB-95	* 6.02E 1	± 1.3E 2	LTL > LLD
I-131	* 8.51E 1	± 1.7E 3	LTL > LLD
CS-134	1.22E 4	± 2.2E 2	
CS-137	3.57E 4	± 4.2E 2	
BALA-140	* 5.00E 1	± 2.1E 2	LTL > LLD
UR-SER	3.60E 3	± 2.0E 2	
TH-SER	1.57E 3	± 1.5E 2	

* NET ACTIVITY < CRITICAL LEVEL. LESS-THAN LEVEL = ACTIVITY + 1.65*SIGMA

COMMENT:

BY: [signature]

REVIEWED BY: Jim Isaacson DATE: 7/7/83

APPENDIX 2

Annual Dose Rate Estimations

ANNUAL DOSE RATE ESTIMATIONS

Waste Description: Oconee Sandblast Decon Media Waste

Waste Volume: 400 cubic feet

Radionuclides & Concentration:

MN-54	0.634 PCi/gm
CO-60	1.24 PCi/gm
CS-134	14.9 PCi/gm
CS-137	36.5 PCi/gm

Cover Soil: Approximately 3 feet

Consider that waste will be buried as semi-infinite source

Cover with 3 feet uncontaminated soil.

1) Dose rate on surface of semi-infinite source

$$D = \tfrac{1}{2}\sum_i A_i \times \bar{E}_i \times \left(2.22 \frac{\text{dis.}}{\text{PCi-min}}\right) \times \left(60 \frac{\text{min}}{\text{hr}}\right) \times \left(1.602 \times 10^{-6} \frac{\text{erg}}{\text{Mev}}\right) \times \left(\frac{1}{100 \text{ erg/g-rad}}\right)$$

Where D = Dose rate at surface in mr/hr

A_i = Radionuclide "i" Concentration in PCi/gm

$\bar{E}_i$ = Radionuclide "i" effective energy in Mev

$$D = \tfrac{1}{2}[(0.63 \times 0.835) + (1.24 \times 2.62) + (14.9 \times 1.76) + (0.81 \times 36.5)] \frac{\text{PCi-Mev}}{\text{gm-dis}}$$

$$\times \left(133.2 \frac{\text{dis.}}{\text{PCi-hr}}\right) \times \left(1.602 \times 10^{-6} \frac{\text{eregs}}{\text{Mev}}\right) \times \left(\frac{1}{100 \text{ ergs/gm-rad}}\right)$$

$\therefore D = 0.0635$ (mr/hr)

2) For attenuation, convert 3 feet soil (density $\cong$ 1.9 g/cm^3) to equivalent concrete thickness (density $\cong$ 2.3 g/cm^3).

Equivalent concrete thickness = $\frac{1.9 \text{ g/cm}^3}{2.3 \text{ g/cm}^3} \times 36" = 29.7"$

From Radiological Hand Book, transmission factor "B" through concrete

29.7" of gamma rays from CO-60 is equal to approximately 0.0005.
∴ Dose rate = 0.06 mr/hr x 0.0005 = 3×10^{-5} mr/hr.

3) Annual dose rate estimation
∴ Dose = (3×10^{-5} mr/hr) x (8760 hr/yr) x (1 mrem/mrad) = 0.26 mrem/yr.

For 2000 hr/yr continuously exposure
∴ Dose = (3×10^{-5} mr/hr) x (2000 hr/yr) x (1 mrem/mrad) = 0.06 mrem/yr.