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AUTH.NAME AUTHOR AFFILIATION
MOYER,J.W. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
AUTRY,V.R. South Carolina, State of

SUBJECT: Requests approval of application for on-site disposal of very low-level radioactive waste in RSEP,Unit 1 ash pond.

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CP&L

Carolina Power & Light Company
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Robinson File: 12510D
13520B
13020D
Serial: RNP-RA/98-0032

MAR 06 1998

Mr. Virgil R. Autry, Director
Division of Radioactive Waste Management
Bureau of Solid and Hazardous Waste
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

H. B. ROBINSON STEAM ELECTRIC PLANT
VERY LOW-LEVEL RADIOACTIVE WASTE MATERIAL
REQUEST FOR DISPOSAL

Dear Mr. Autry:

The purpose of this letter is to request South Carolina Department of Health and Environmental Control (SCDHEC) approval of an application for on-site disposal of very low-level radioactive waste. The application proposes disposal of this material in the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 1 ash pond. Carolina Power & Light (CP&L) Company requests State of South Carolina approval of the proposal in accordance with the provisions of 10 CFR 150.31, "Requirements for Agreement State Regulation of Byproduct Material."

This application specifically requests approval to dispose of boiler chemical metal cleaning wastes that are contaminated at very low levels with Cobalt-60. The proposed method of disposal would be to transfer the waste to the HBRSEP, Unit No. 1 on-site ash pond. Disposal of the waste in the manner proposed rather than transporting it to the radioactive waste storage facility in Barnwell, South Carolina, would result in no significant risk to public health and safety and would considerably reduce disposal costs and preserve disposal site space at Barnwell, South Carolina, for higher level radioactive wastes.

NLIO

The on-site ash pond is permitted to receive chemical metal cleaning wastes as provided under National Pollutant Discharge Elimination System (NPDES) Permit No. SC0002925, Internal Outfalls 005, "Ash Transport System and the Wastewater Regulated at Internal Outfall 007," and 007, "Chemical Metal Cleaning Wastes to the Ash Handling System."

If you have any questions regarding the information provided, please contact Mr. H. K. Chernoff of my staff.

Very truly yours,

J. W. Moyer
Plant General Manager

AHS/ahs
Enclosure
c: Mr. L. A. Reyes, Regional Administrator, USNRC, Region II
Mr. J. W. Shea, USNRC Project Manager, HBRSEP
Mr. B. B. Desai, USNRC Resident Inspector, HBRSEP
USNRC Document Control Desk

bc:

Ms. L. I. Cooper
Mr. R. J. Geiger
Mr. W. L. Gilbert
Mr. F. T. Holt
Mr. P. B. Snead
Mr. B. C. White (w/o)
Vault
File

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT
APPLICATION FOR APPROVAL TO DISPOSE OF
WASTES WITH MINIMAL LEVELS OF RADIOACTIVITY

CAROLINA POWER & LIGHT COMPANY
APPLICATION FOR APPROVAL TO DISPOSE
OF WASTES WITH MINIMAL LEVELS OF RADIOACTIVITY

1.0 INTRODUCTION

Carolina Power & Light (CP&L) Company requests approval, in accordance with the provisions of 10 CFR 150.31, "Requirements for Agreement State Regulation of Byproduct Material," of the method proposed herein for the disposal of chemical metal cleaning wastes from the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 1 boiler estimated to contain less than 0.063 mCi of Cobalt-60 (Co-60).

CP&L proposes to dispose of this waste on-site in the ash pond during a boiler cleaning in April and May 1998. Disposal of chemical metal cleaning wastes from Unit No. 1 in the ash pond is provided for under National Pollutant Discharge Elimination System (NPDES) Permit No. SC0002925, Internal Outfalls 005 & 007. This waste may contain low levels of Co-60 and this application addresses specific information requested in 10 CFR 20.2002. This application is similar to one approved by South Carolina Department of Health and Environmental Control in September of 1991.

2.0 WASTE STREAM DESCRIPTION

Chemical cleaning of fossil-fueled boilers of the Unit No. 1 type is performed every 4-7 years to maintain boiler integrity and efficiency. The Unit No. 1 boiler was last cleaned in 1991. The primary waste stream will consist of approximately 25,000 gallons of inhibited Ammonium Citrate solution along with 25,000 gallons of rinse water. The waste stream will be collected in tanks on the north side of the plant and sampled for radioactivity during the process. A total activity of less than 0.063 mCi of Co-60 is anticipated since this is the amount of activity that was encountered during the 1991 evolution. There is a small possibility that the resultant waste will not show any radioactivity. If no activity is measured in the waste then the waste will be evaporated in the Unit No. 1 boiler. If activity is measured in the waste then the waste will be pumped to the ash pond pending your approval of this proposal.

2.1 PROPERTIES OF THE PHYSICAL PRIMARY WASTE

The waste stream will be an aqueous suspension at a temperature of approximately 70 degrees Celsius and a volume of approximately 50,000 gallons. The slurry will be piped directly to the on-site ash pond where the suspension will continue to stabilize in the ash matrix in the conditions of the ash pond.

2.2 CHEMICAL PROPERTIES OF THE WASTE

The Boiler Chemical Cleaning Waste (BCCW) will consist primarily of diluted (1.0 weight percent) Ammonium Citrate solution containing smaller amounts of ammonium bifluoride, and an inhibitor to prevent attack of the base metal. Dissolution of the boiler tube deposits will result in the release primarily of iron with significantly smaller amounts of copper, zinc, nickel, calcium, magnesium, aluminum, and silica. The principle metal components of Ammonium Citrate BCCW have been determined in an EPRI-sponsored study of boiler cleanings (Ref. 1). The results are found in Table 1.

CAROLINA POWER & LIGHT COMPANY
APPLICATION FOR APPROVAL TO DISPOSE OF WASTES WITH MINIMAL LEVELS OF RADIOACTIVITY

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TABLE 1
COMPOSITION OF BCCW DRAIN AND COMBINED BOILER FEED

		Combined Boiler Feed [a]	
ANALYTE	**RAW WASTE**	**TEST 1**	**TEST 2**
	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)
Aluminum	1.6	6.64	4.26
Antimony	0.56	0.362	0.303
Arsenic	ND[b]	ND	ND
Barium	0.47	0.24	0.156
Beryllium	ND	ND	ND
Cadmium	ND	0.032	0.0215
Calcium	11	5.8	3.95
Chromium	7.6	4.25	3.09
Cobalt	1.4	0.665	0.51
Copper	1.6	50.2	48.3
Iron	5400	3410	2470
Lead	1.2	0.81	0.50
Magnesium	2.2	2.74	2.06
Manganese	38	23.7	17.4
Mercury	ND	ND	ND
Molybdenum	1	1.38	1.36
Nickel	240	151.7	111.6
Potassium	ND	ND	ND
Selenium	ND	ND	ND
Silicon	10	4.1	ND
Silver	0.25	0.0285	0.026
Sodium	70	45.4	28.6
Thallium	0.39	0.304	0.235
Vanadium	1	0.241	0.2
Zinc	85	54.5	37.6
Acidity (as $CaCO_3$)	<1	<1	<1
Alkalinity (as $CaCO_3$)	10000	5900	4700
Ammonia (as N)	4600	2600	1800
Chloride	<50	NA[c]	NA
COD	15000	8500	6400
Fluoride	<25	NA	NA
Nitrate	<50	NA	NA
Nitrite	<50	NA	NA
pH (Field)	9.25	8.75	8.85
Sulfate	<250	NA	NA
TOC	7600	4000	3100
TDS	12600	11000	5700

[a] Spent cleaning solution plus first rinse
[b] ND = Not Detected, below analytical detection limit
[c] NA = Not Analyzed

2.2. CHEMICAL PROPERTIES OF THE WASTE: (Continued)

Trace amounts of eight heavy metals, which at specified levels may constitute hazardous wastes (Ref. 2), have been reported in previous cleanings. The observed concentrations of the metals in the Ammonium Citrate boiler cleaning wastes of 1991 are compared to EPA's maximum concentrations for the characteristic of extraction procedure (EP) toxicity in Table 2.

TABLE 2
HAZARDOUS WASTE CONTAMINANTS IN AMMONIUM CITRATE BCCW

ELEMENT	OBSERVED CONC. RINSE SOLUTION (ppm)	EP TOXICITY MAX. CONC. (ppm) (Ref. 2)
Arsenic	0.23	5.0
Barium	0.026	100.0
Cadmium	0.76	1.0
Chromium	0.44	5.0
Lead	1.8	5.0
Mercury	<0.0002	0.2
Selenium	<0.010	1.0
Silver	0.04	5.0

The solutions generated from the boiler cleaning in 1991 showed that all the above heavy metal concentrations were well below the EP Toxicity Concentration.

2.3 RADIOLOGICAL PROPERTIES OF THE WASTE

During the Unit No. 1 boiler cleaning in 1991, Co-60 was identified as the sole isotope in the waste stream. The highest activity detected in the waste stream was Co-60 at 5.471E-7 uCi/ml. Since this activity was removed in 1991 during the third cleaning after the contaminating event and the source of contamination has been eliminated, 5.471E-7 uCi/ml should represent the upper limit of Co-60 activity during the proposed 1998 cleaning.

3.0 DESCRIPTION OF THE PROPOSED DISPOSAL METHOD

The recirculation technique of boiler cleaning will be employed using an inhibited Ammonium Citrate solution. When analytical tests of the solvent indicate that the iron and copper levels in solution have stopped increasing, the boiler will be drained. The Ammonium Citrate solution containing iron, copper, and other metal hydroxides will be transferred by jet pumps through the existing coal ash sluice piping to the ash pond. The suspension of metal hydroxides will settle out on the ash pond bottom and be covered by subsequent transfers of coal ash slurries when the boiler is returned to service.

3.1 WASTE GENERATION AND METHOD OF DISPOSAL

The recirculation technique will require 25,000 gallons of inhibited 3.0 percent Ammonium Citrate solution at a temperature of approximately 120° C. Unit No. 1 is a controlled circulation boiler and the boiler circulating pumps will be operated to positively and uniformly distribute the solvent. The boiler tube deposits which are primarily iron, zinc, nickel, silicon oxides, and elemental copper are gradually solubilized or otherwise loosened by hot Ammonium Citrate.

3.1 WASTE GENERATION AND METHOD OF DISPOSAL (Continued)

Each hour following the circulation of solvent, a sample will be withdrawn for chemical analyses. At the end of the cleaning process, 1 liter samples will be analyzed by Germanium detectors for the presence of Co-60 and other gamma emitting radionuclides. If the total Co-60 activity is determined to be greater than twice the estimated activity (i.e., > 0.13 mCi) a revised radiological assessment will be provided to the State of South Carolina within 45 days.

The suspended metals are expected to settle to the bottom of the ash pond and remain insoluble due to slightly alkaline pH of the environment.

Upon returning Unit No. 1 to service, subsequent slurries of coal ash will cover the deposited BCCW layer and further reduce the potential radiological consequences of the trapped Co-60.

3.2 DISPOSAL SITE LOCATION

The ash pond is a 54-acre preserve (at the 265-foot MSL) located within the H. B Robinson Steam Electric Plant owner-controlled area but outside of the exclusion zone. The pond lies about 1.25 miles northwest of the plant. The projected coal consumption of Unit No. 1 in 1998 is 312,170 tons (Ref. 6). Assuming a 14 percent ash content and 275 days of operation, approximately 159 tons of bottom and fly ash would be sluiced to the ash pond each day of operation.

The location of the ash pond with respect to the plant and Lake Robinson are shown in the map in Figure 1.

3.3 HYDROLOGICAL CHARACTERISTICS OF THE SITE

The H. B. Robinson Steam Electric Plant, Unit No. 2 Updated Final Safety Analysis Report (UFSAR) (Ref. 7) provides considerable detail on the hydrology of the site. The pertinent factors which apply to this request are:

1. Flooding of the site and the ash pond area by lake water cannot occur because the plant grade is above the maximum lake level which can be maintained by the dam and appurtenant structures. The transport of ash pond sediment to Lake Robinson is highly unlikely even during heavy rains and flooding because eight feet of freeboard is normally maintained in the ash pond.
2. The piezometric surface of the upper aquifer at the plant site (Figure 2) shows that the groundwater flow is toward Lake Robinson.
3. Lake Robinson is not used for drinking water.
4. Groundwater moves toward the ash pond from it's north side and ultimately towards Lake Robinson. The shortest route of travel for groundwater from the ash pond to Lake Robinson is from the dam to the lagoon and is estimated to take 45 days. The longest route is estimated to take 9 years and 10 months.
5. All domestic water usage in the vicinity of the plant is artesian in origin.
6. On-site at the H. B. Robinson Steam Electric Plant, drinking water is provided by the Darlington County Water system.
7. The conclusion, therefore, is that the leaching of Co-60 into ground water or it's release into surface water would not be a route of exposure for either the public or plant workers.

4.0. EVALUATION OF THE RADIOLOGICAL IMPACTS OF WASTE DISPOSAL

The most significant hazard associated with this proposed transfer is from thermally hot diluted Ammonium Citrate being pumped under pressure. CP&L will ensure that adequate procedures and safety precautions are followed by plant and contractor personnel to conform with the established corporate standards. Safety and coordination meetings between Company and contractor personnel will cover such issues as the nature of the chemical and radiological hazards, and required protective clothing and equipment. Posted and roped areas, the use of rain gear and goggles, and the ready availability of running water for the dilution of leaked solvent should minimize the impact.

The public health and safety consequences of the proposed alternate means of disposal were evaluated according to the methodology provided in Regulatory Guide 1.109 (Ref. 8) and using conservative assumptions. However, only reasonable exposure conditions were considered. For example, since Lake Robinson/Black Creek are not sources of drinking water (Ref. 7), this pathway was not considered nor was aerial resuspension of $Co(OH)_2$ because the ash sluice line normally delivers a slurry volume of approximately 1.5 million gallons per day of operation (Ref. 6) which would cover the deposits.

4.1 ANNUAL DOSE FOR EXTERNAL IRRADIATION FROM A UNIFORMLY CONTAMINATED GROUND PLANE

Calculations were made to estimate the potential dose rate at the closest point of approach to the source produced from a release of 63 uCi of Co-60 during the boiler cleaning process. Assuming the activity precipitates symmetrically around the discharge point in an area of $100m^2$, these calculations indicate that the maximum dose rate at the edge of the ash pond levee 30 meters from the discharge point will be less than 6.0E-5 mrem/hr. The actual dose rate is expected to be less because of the shielding afforded by the 159 tons per day of ash deposits which will cover the contaminated cleaning waste during subsequent normal operation of the unit.

Based on these calculations a teenager spending 67 hours per year (Ref. 8) on the levee would receive a maximum annual dose of 0.004 mrem.

4.2 DOSE TO THE INADVERTANT INTRUDER

10 CFR 61 (Ref. 9) defines an "inadvertent intruder" as a person who might occupy the disposal site after closure and engage in normal activities such as agriculture, dwelling construction, or other pursuits in which the person might be unknowingly exposed to radiation from the waste. The expiration date for the H. B. Robinson Steam Electric Plant, Unit No. 2 license is July 31, 2010. In the intervening 12 years, approximately 80 percent of the Co-60 transferred to the ash pond will have decayed. Additionally, the activities associated with ash pond reclamation would bury the source even deeper. Therefore, the hazard to an inadvertent intruder is expected to be negligible.

4.3 DOSE TO WORKERS DUE TO THE INHALATION OF CONTAMINATED ACID AEROSOLS

During the estimated eight hours needed to fill, soak, and drain the boiler, leakage of the contaminated cleaning solution through seals and valves is unlikely. At 15° C saturated air contains 12.832g of H_2O per M^3. Taking a conservative approach and assuming that the moisture content of the air is entirely the BCCW solution containing 5.47E-7 uCi/ml Co-60, the resultant radionuclide concentrations would be only 3% of the effluent concentration limit specified in 10 CFR 20, Appendix B, Table 2 (10). Further if all the inhaled activity is retained, then 1.55E-6 uCi/M^3 would be deposited in the lung.

During an 8-hour work period, an adult male performing light work has a total inhaled volume of 13.9 M^3 resulting in a lung deposition of 2.15E-5 uCi of Co-60. Averaging this intake over the year, the inhalation dose factors provided in Regulatory Guide 1.109, Table E-7, indicate that the lung is the most highly exposed organ and that the dose commitment to the worker under extreme conditions mentioned is only 0.02 mrem.

4.4 RELATIONSHIP OF ESTIMATED CO-60 ACTIVITY TO 10 CFR 20, APPENDIX B LEVELS (10)

To place the radiological hazard of the BCCW in perspective, it may be useful to consider the implication of an inadvertent release of the entire volume to the discharge canal. The minimum flow in the discharge canal is 160,000 gallons per minute (gpm); the boiler volume could drain in as little as two hours. The 200 gpm of BCCW diluted by the discharge canal flow would result in maximum concentrations of 6.8E-10 uCi/ml for Co-60 before further dilution by the lake volume. These values are several orders of magnitude less than the allowable concentrations in unrestricted areas (Ref. 10).

4.5 DOSE DUE TO FISH CONSUMPTION TO A MEMBER OF THE GENERAL POPULATION

Neither Lake Robinson nor Black Creek waters are used for water supplies. However, if the 25,000 gallons of acid cleaning solution were directly injected into Lake Robinson, bioaccumulation in fish might occur.

Regulatory Guide 1.109 assumes that the concentration of radionuclides in aquatic foods are directly related to the concentrations in the water and provides a general equation for the dose due to the ingestion of aquatic foods. Assuming the minimum volume of the lake is 1.328E9 ft^3 (Ref. 7), a diluted activity of 1.7E-12 uCi/ml Co-60 would result during the year. The annual dose to the gastrointestinal-lower large intestine (GI-LLI) of an adult consuming 6.9 kilograms of fish (Ref. 8) would be only 2.4E-5 mrem/year.

4.6 DOSE FROM LIQUID PATHWAY TO ADULT WORKER ON-SITE

Gamma spectroscopy of the EP leachates from the metal hydroxide precipitates produced by neutralization of the BCCW showed that an average of approximately 40 percent of the Co-60 may migrate into groundwater. The highest leachate activity was 5.47E-7 uCi/ml for Co-60. However, since the source of the on-site drinking water comes from the Darlington County water system, exposure of workers from migrating nuclides is not a concern nor is the potential contamination of off-site artesian wells. A hydrologic test program has been conducted to evaluate groundwater conditions in the vicinity of the site (Ref. 7). The general flow lines indicate that groundwater moves towards the ash pond from its north side and ultimately toward Lake Robinson. The travel time along a 3,500 foot route from the ash pond to the discharge canal is estimated to take 9 years and 10 months or nearly two half-lives for Co-60. The implication is that with decay and dilution if the nuclide were to eventually reach off-site artesian wells, the activity would be very low.

4.7 MICELLANEOUS CONSIDERATIONS

In the period of 1983-1985, Carolina Power & Light Company received NRC approval of three 10 CFR 20.2002 requests (Ref. 11-13) and, in 1985, 1988, and 1991 approval from the State of South Carolina (Ref. 14-16) for the transfer of slightly contaminated soils, sediments and boiler cleaning waste to the H. B. Robinson ash pond. The activity of transferred materials, based on previous cleanings, ranged from 0.063-75 mCi and was predominately Co-60. These approvals involved Co-60 activities many times greater than that expected in the BCCW that will be generated this time.

5.0 SUMMARY

The previous has demonstrated that even with the application of conservative assumptions, the public health implications associated with the proposed disposal of the BCCW in the ash pond are unlikely to result in exposure exceeding a few percent of the annual background radiation dose.

REFERENCES

1. EPRI TR-101095, Boiler Chemical Cleaning Waste Management Manual, (Prepared by Radian Corporation) August, 1992.

2. U. S. Environmental Protection Agency, 40 CFR 261, Identification and Listing of Hazardous Waste.

3 Pijck, J., Radiochemistry of Chromium, National Academy of Sciences, Nuclear Science Series NAS-NS-3007 (Rev. 1964).

4. Bate, L. C., and G. W. Leddicotte, The Radiochemistry of Cobalt, National Academy of Sciences, Nuclear Science Series NAS-NS-3041 (1961).

5. Leckie, J. O., et al., Absorption/Coprecipitation of Trace Elements From Water With Iron Oxyhydroxide, EPRI CS-1513, 1980.

6. Personnel Communication with Wellie Gilbert, CP&L.

7. H. B. Robinson Steam Electric Plant, Unit No. 2 Updated Final Safety Analysis Report (UFSAR), Amendment No. 5, July 21, 1987.

8. U.S.N.R.C. Regulatory Guide 1.109, Calculation of Annual Doses to Man From Routine Release of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, October 1977.

9. U.S.N.R.C. Licensing Requirements for Land Disposal of Radwaste, 10 CFR 61. December 1982.

10 U.S.N.R.C. Standards for Protection Against Radiation, 10 CFR 20, January 1, 1997.

11. Letter from S. A. Varga, NRC, To E. E. Utley, Carolina Power & Light Company, February 18, 1983.

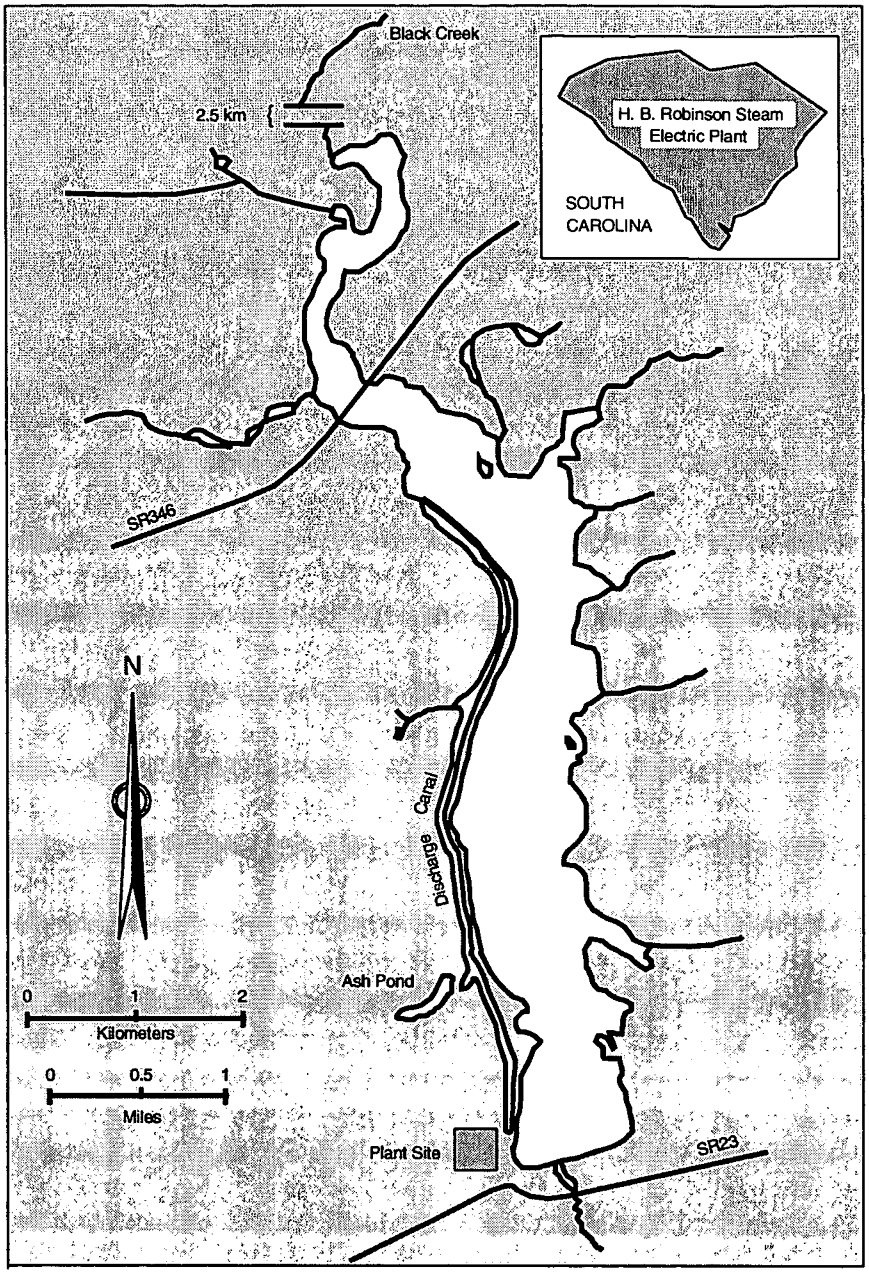
12. Letter from S. A. Varga, NRC, To E. E. Utley, Carolina Power & Light Company, November 8, 1984.

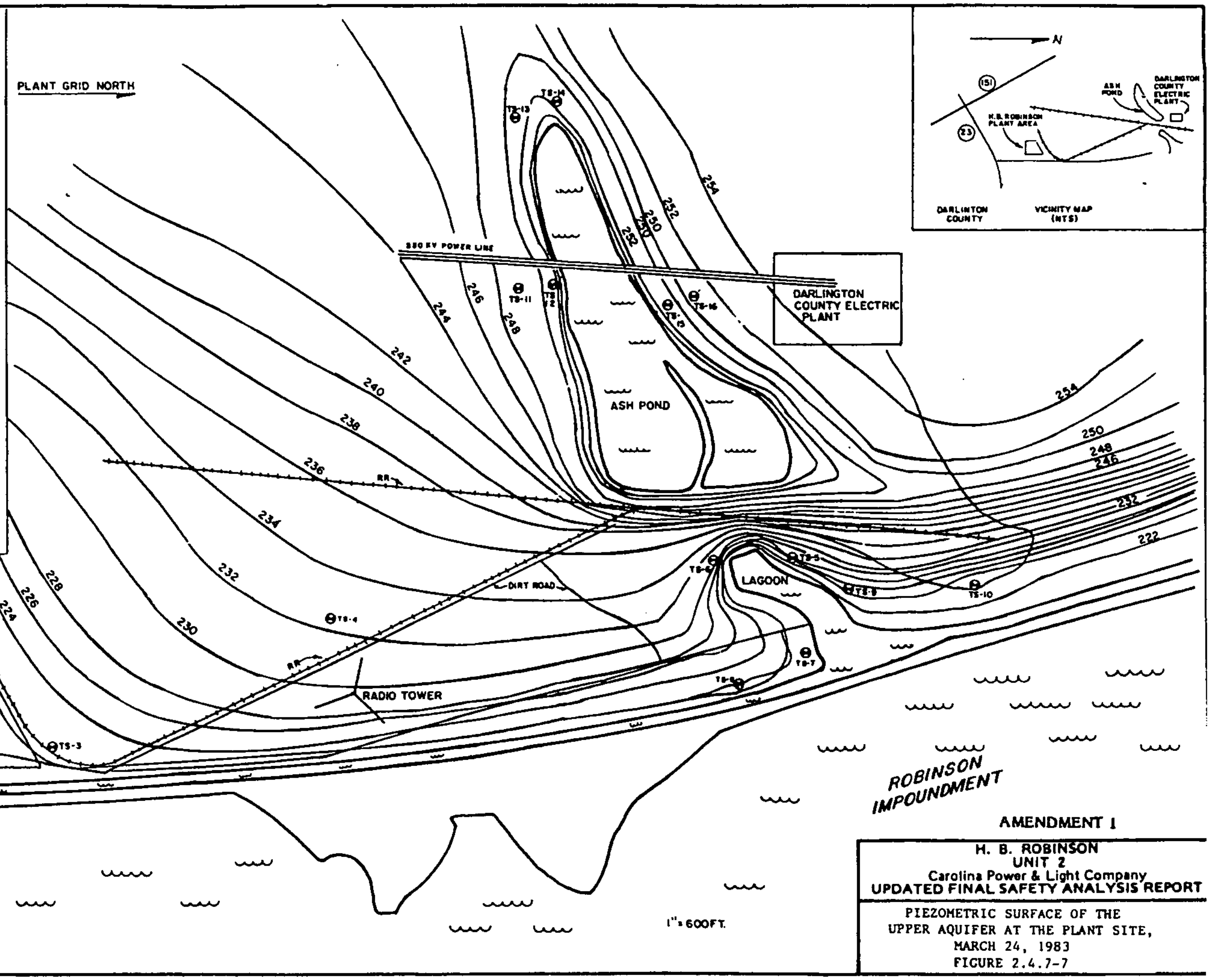
13. Letter from S. A. Varga, NRC, To E. E. Utley, Carolina Power & Light Company, March 20, 1985.

14. Letter from H. G. Shealy, State of South Carolina, to G. P. Beatty, Carolina Power & Light Company, March 19, 1985.

15. Letter from H. G. Shealy, State of South Carolina, to G. P. Beatty, Carolina Power & Light Company, April 14, 1988.

16. Letter from V. R. Autry, State of South Carolina, to C. R. Dietz, Carolina Power & Light Company, September 16, 1991.


Black Creek
2.5 km
H. B. Robinson Steam Electric Plant
SOUTH CAROLINA
SR346
N
Canal
Discharge
Ash Pond
0 1 2
Kilometers
0 0.5 1
Miles
Plant Site
SR23



GRID COORDINATES

DESCR.	NORTH	EAST	ELEV.°
TS-1A	[illegible]4.51	1476.02	227.75
TS-1B	[illegible].35	1475.85	227.50
TS-2A	478.14	1548.95	228.70
TS-2B	476.28	1542.63	228.78
TS-2C	479.10	1535.32	228.85
TS-3A	1856.79	1507.14	243.16
TS-3B	1864.65	1503.27	242.55
TS-4A	3559.77	715.65	249.01
TS-4B	3555.48	712.13	249.29
TS-5A	60[illegible].72	1133.43	246.49
TS-5B	60[illegible].97	1125.23	247.12
TS-6A	586[illegible].17	362.52	245.54
TS-6B	5870.53	359.96	245.45
TS-7A	64[illegible].00	936.98	232.94
TS-7B	64[illegible]9.62	930.24	232.95
TS-7C	64[illegible]6.13	929.32	232.57
TS-8A	6332.13	347.48	244.48
TS-8B	634[illegible].11	351.37	244.49
TS-8C	6348.55	356.02	244.86
TS-9A	6676.93	653.89	242.91
TS-9B	666[illegible].48	652.75	243.23
TS-9C	666[illegible].66	648.17	242.89
TS-10A	7433.40	534.29	239.09
TS-10B	7442.56	537.66	238.85
TS-11A	4722.97	-1339.77	277.12
TS-11B	4723.50	-1332.13	277.75
TS-12A	4936.71	-1358.68	264.46
TS-12B	4935.96	-1353.01	264.54
TS-13A	4692.25	-2394.25	270.08
TS-13B	4686.54	-2393.02	269.01
TS-13C	4680.59	-2392.25	269.42
TS-14A	496[illegible].42	-2504.43	259.46
TS-14B	4956.80	-2502.23	259.59
TS-14C	4968.52	-2503.05	259.92
TS-15A	56[illegible].64	-1229.59	264.86
TS-15B	56[illegible]4.97	-1224.36	265.32
TS-16A	5789.47	-1227.13	272.01
TS-16B	5783.70	-1274.56	271.99
TS-17A	2[illegible]4.54	1182.38	230.15
TS-17B	2[illegible]5.50	1188.30	229.88
TS-18A	528.04	1317.11	228.42
TS-18B	5[illegible]4.23	1312.05	228.23

° ELEV. AT TOP OF PVC ON PIEZOMETERS AND TOP OF STEEL PIPE ON WELLS.

AMENDMENT 1

H. B. ROBINSON
UNIT 2
Carolina Power & Light Company
UPDATED FINAL SAFETY ANALYSIS REPORT

PIEZOMETRIC SURFACE OF THE UPPER AQUIFER AT THE PLANT SITE, MARCH 24, 1983
FIGURE 2.4.7-7