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ENCLOSURES: Appendix A consist of:
Responses to Agency comments on the DES for H.B. Robinson Unit #2.

ACKNOWLEDGED

(43 cys encl rec'd)

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PLANT NAME: H.B. Robinson

FOR ACTION/INFORMATION 9-19-73 JB

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Carolina Power & Light Company

September 18, 1973

RECEIVED SEP 19 1973

Mr. John F. O'Leary
Directorate of Licensing
Office of Regulation
U. S. Atomic Energy Commission
Washington, D. C. 20545

RE: DOCKET NO. 50-261

Dear Mr. O'Leary:

On August 28, 1973, Mr. William H. Regan, Jr., Chief, Environmental Projects Branch 4, transmitted to Carolina Power & Light Company the comments on the H. B. Robinson Unit No. 2 Draft Environmental Statement from the Environmental Protection Agency, the Department of Health, Education and Welfare, and the State of North Carolina. Mr. Regan requested that the Company submit any responses deemed appropriate by September 14, 1973. We have reviewed these comments, and due to their extensive nature, we feel that the September 14 schedule will not allow us to respond in a manner amenable to the needs of your staff in preparing the Final Environmental Statement. We will submit our responses to comments from the Environmental Protection Agency, the Department of Health, Education and Welfare, and the State of North Carolina by September 24, 1973.

Although the Company would prefer to respond to all agency comments in one submittal, we are enclosing at this time as Appendix A to this letter, three original and forty additional copies of our responses to previous agency comments which were transmitted to us by Mr. Regan on July 11, 1973. We would be glad to discuss our responses with your staff.

Yours very truly,

J. A. Jones
Executive Vice President

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Enclosures

7042

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

APPENDIX A

RESPONSE TO STATE AND FEDERAL AGENCY COMMENTS ON THE DRAFT ENVIRONMENTAL STATEMENT

REFERENCE LETTERS

1. Letter from U. S. Department of the Interior, dated July 6, 1973.
2. Letter from State of North Carolina, dated June 29, 1973.
3. Letter from County of Darlington, South Carolina, dated June 8, 1973.
4. Letter from Department of Commerce, dated June 5, 1973.
5. Letter from Department of Transportation, dated June 5, 1973.
6. Letter from South Carolina State Commission of Forestry, dated April 27, 1973.
7. Letter from Department of the Army, dated May 7, 1973.
8. Letter from County of Darlington, South Carolina dated June 4, 1973.
9. Letter from U. S. Department of Agriculture, dated May 2, 1973.
10. Letter from the Darlington County Development Board, dated June 5, 1973.
11. Letter from State of South Carolina, dated June 6, 1973.
12. Letter from State of South Carolina Water Resources Commission, dated June 8, 1973.
13. Letter from Federal Power Commission, dated June 21, 1973.
14. Letter from Department of Agriculture, dated June 26, 1973.

Comment:

"We recommend that the final impact statement and the conditions to the continuation of Facility Operating License be modified to require a monitoring system that would insure that the impacts of the plant on the aquatic life of Lake Robinson and Black Creek are sufficiently quantified." (Reference 1, page 1)

CP&L Response:

Thermal data are available on Lake Robinson prior to the operation of both Units 1 and 2. A limited amount of chemical data are also available. The fishes of the lake were surveyed in 1968 by the South Carolina Wildlife and Marine Resources Department. By no means, though, does this imply that a complete preoperational ecological study was undertaken, but that preoperational qualitative and quantitative data are available.

An operational monitoring program was initiated in Lake Robinson in April 1973, to qualitatively and quantitatively examine the key biotic and abiotic components and their major interactions in the lake ecosystem. Such action was taken to satisfy the commitments made by the applicant in the Environmental Report.

In addition, a fish impingement study has been undertaken to assess the effect of fish impingement on the traveling intake screens.

A complete discussion of the Lake Robinson Ecological Monitoring Program will be submitted to the AEC with the H. B. Robinson Environmental Technical Specifications.

Comment:

"However, the statement does not reflect that an interdisciplinary investigation of the development area by professionals was done. If such an investigation was done, the final environmental statement should so reflect. If it was not done, the extent to which cultural resources have been lost or damaged due to the construction of the plant and associated transmission facilities will remain undetermined since the plant is essentially constructed, except for cleanup operations." (Reference 1, page 1)

CP&L Response:

Prior to the construction of Unit 1, no detailed investigation of cultural resources was conducted beyond the determination that there were no obvious cultural resources in the affected area.

It was during the construction of Unit 1 that a site was prepared for the construction of Unit 2 at a future date. Thus, when construction began on Unit 2, the area was already developed, and no investigation as to the effects on cultural resources was performed.

Subsequent to the start of operation, Mr. Charles E. Lee, State Historic Preservation Officer for the State of South Carolina, has indicated that no interference with historic properties had occurred in the area.

Comment:

"The temperatures of Black Creek at the lake inlet are subject to diurnal and day to day fluctuations of a wider range than at the outlet and thus spot measurements would have to be numerous and randomly distributed during the day to result in reliable averages." (Reference 1, page 3)

CP&L Response:

Temperatures of Black Creek at the lake inlet and at the outlet have been randomly monitored each week since 1960, and a monitoring system was installed in the creek just below the dam in 1960 to continuously report average hourly temperatures. In addition, an upstream monitoring station was established in 1964 at U. S. 1 in order to continuously record temperatures at the inlet.

The daily water temperature fluctuations of Black Creek upstream of the lake have been small. The average daily temperature fluctuation during the winter months has been approximately 2.7°F. The average daily temperature fluctuation during the summer months has been approximately 1.9°F.

Comment:

"With respect to average annual temperature difference, the lake outlet temperature may be somewhat elevated, but the degree of elevation does not depend on the magnitude of solar radiation." (Reference 1, page 4)

CP&L Response:

Several meteorological factors affect surface temperatures in lakes. Of these, solar radiation is by far the most significant, contributing from 400 - 2800 Btu/sq.ft./day (Edinger and Geyer, 1965). Thus, surface temperatures in Lake Robinson are strongly influenced by solar radiation.

This fact is substantiated by data collected in October of 1962, when neither unit was in operation and no thermal discharge was being made. The average difference in temperature between lake inflow and outflow during this period of zero plant heat input to the lake was 7.8°F. In addition, temperature data from 1959 and 1960 after impoundment, and prior to the start-up of the first unit, also support this concept:

	Month	Average Temperature at lake inflow Black Creek and US 1	Average Temperature at lake outflow Black Creek and SC 23	$\Delta\bar{t}$	Number of Measurements
1959	April	61.1	64.4	3.3	8
	May	66.9	73.0	6.1	9
	June	68.9	77.1	8.2	9
	July	72.4	81.2	8.8	9
	August	74.0	82.0	8.0	8
	September	77.9	86.5	8.6	8
	October	62.8	69.2	6.4	9
	November	51.9	58.4	6.5	7
	December	45.0	47.3	2.3	9
1960	January	44.6	48.2	3.6	8
	February	44.4	47.4	3.0	7
	March	45.8	45.6	- 0.2	6
	April	61.1	63.1	2.0	8

Edinger, John E. and John C. Geyer, Cooling Water Studies for Edison Electric Institute, The Johns Hopkins University, Baltimore, Maryland, 1965.

Comment:

"It should be emphasized that the draft statement does not contain sufficient information from which to determine: (1) the temperature differences of Black Creek at the point of inlet and outlet of Lake Robinson prior to the lake's construction, (2) the average temperature difference between lake inlet and outlet while neither unit is operating, and (3) the incremental temperature difference due to operation of Unit No. 2. These quantities could be determined by analytical models based on an adequate body of field data, including water discharge and temperatures as well as meteorological data." (Reference 1, page 4)

CP&L Response:

(1) Twice monthly water chemistry samples of Black Creek were taken over a two-year period prior to impoundment. During sampling, water temperatures were recorded, but only limited upstream and downstream data are available on the same date for comparison of temperature rise. These data are indicated below:

Date	U. S. 1	S. C. 39*	Δt
October 2, 1957	59°	59°	0
October 22, 1957	59°	59°	0
November 6, 1957	59°	59°	0
November 22, 1957	54°	56°	2°
December 4, 1957	50°	50°	0
December 15, 1957	45°	47°	2°

(2) In October 1962, neither unit was in operation. During this period, the average temperature difference between inlet and outlet was

*S.C. 39 - located approximately 1.8 miles downstream of Lake Robinson dam.

7.8°F. In addition, a complete temperature profile of the lake was taken on October 8 and 25. This data, in addition to vertical and horizontal temperatures along four transects through the lake, included important meteorological and hydrological data.

(3) Lake inflow and outflow temperatures; plant intake and condenser outlet temperatures; and plant operational data have been monitored weekly since 1960. Continuous data has been collected at the lake outflow since 1960, and upstream of the lake since 1964. Complete temperature profiles of the entire lake were collected in September, October, and November 1962; July 1963; February 1964; and September 1971 through September 1972 (excluding October 1971, May 1972, and August 1972). Meteorological data are included. In addition, streamflows above and below the lake have been monitored by the USGS since 1959.

From these data the following temperature difference due to the operation of Units 1 and 2 have been calculated:

<u>April 1959 - March 1960 (neither unit operating)</u>

Average S.C. 23 temperature	65.0°
Average U.S. 1 temperature	59.6°
Influence due to natural conditions	5.4° Δt

<u>Twelve Month Period Unit 1 Operating</u>

Average S.C. 23 temperature	64.1°
Average U.S. 1 temperature	59.1°
Influence due to natural and plant operation	5.0° Δt

1972 (Units 1 and 2 Operating)

Average S.C. 23 temperature	68.8°
Average U.S. 1 temperature	59.1°
Influence due to natural conditions and Unit 2*	9.7° Δt
Influence due to natural and Unit 2	9.7° Δt
Influence due to natural	5.4° Δt
Influence due to Unit 2	4.3° Δt

* Preceeding data indicate Unit 1 has insignificant effect on temperatures.

Comment:

"Data and figures presented in the section titled, "Thermal Discharge to Lake Robinson," which begins on pages 3 - 17 evidently represent four arbitrarily selected days in 1971 and 1972. These data have limited value without knowledge of the meteorological conditions that existed prior to and on the sampling dates. This section should also include lake isotherms and temperature profiles for maximum summer and winter critical conditions." (Reference 1, page 4)

CP&L Response:

Complete temperature profiles are available for Lake Robinson for the months of September 1971 through September 1972, excluding November 1971, May 1972, and August 1972. These data (temperature, surface to bottom, every 200 feet along four transects) include various meteorological, physical and plant operating conditions. Maximum summer and winter critical periods are covered during this period.

Comment:

"Also, the thermal conditions when the reservoir is full and when it is at maximum drawdown should be analyzed along with a discussion of the probability of such occurrences and the time of the year that they are expected to occur. This is important since, in most cases, significant adverse impacts on aquatic life occur during abnormal conditions." (Reference 1, page 4)

CP&L Response:

The lake is designed for a 10-foot drawdown; however, as pointed out in the Draft Environmental Statement (p. 2-14); "The water level of Lake Robinson fluctuates very little. . . . From October, 1970, to September, 1972, the maximum monthly change was 1.4 feet (November, 1970) and the minimum monthly change was 0.2 feet."

These 1970-72 lake level fluctuations are typical of those that have occurred since impoundment of the lake.

The analysis of anticipated temperatures and evaporative losses as discussed and included in the Environmental Report were performed with the assumption that the lake would be drawndown to this minimum level.

Comment:

"The use of wells and the well field should be clarified as to whether they are Class 1 structures, whether the well construction and operation have been analyzed to validate the ability of the wells to produce water supplies in the event of earthquakes or other emergencies, and whether the well field system has been analyzed in terms of the effects on plant structures of potential ground subsidence from long-term groundwater withdrawal." (Reference 1, page 5)

CP&L Response:

The wells at the H. B. Robinson Plant are not Class 1 structures and CP&L is not aware that it is possible to construct a Class 1 well. Wells are not analyzed to insure operation during earthquakes or other plant emergencies due to the fact that the water needed for normal and emergency use comes from storage tanks (refueling water storage, clean water storage, and condensate storage) which are Class 1 structures, not directly from the wells. Thus, it is not necessary that the wells be Class 1, since the tanks are designed for adequate storage.

CP&L is not aware that subsidence of the ground is a problem related to long term groundwater use. No analysis of this type is required.

Comment:

"Heat Dissipation System: The draft statement discusses the effects of the heated discharge on Lake Robinson and presents detailed temperature measurements of the lake made on a number of days in 1971 and 1972 (table 2.3; figures 3.10 through 3.12). The data shown would have more meaning if it were accompanied by antecedent Black Creek flow and powerplant heat load discharge. For example, figure 3.12a shows a temperature of only 11 degrees Fahrenheit between intake and discharge, indicating that the powerplants were operating at a fraction of capacity. The same figure does not support the claim (p. 3-7) that the heated discharge affects only the upper 10 to 15 feet of water, beneath which water temperatures would remain near those expected in the absence of heated effluent. Actually, figure 3.12b shows that stratification, which would be expected in July, does occur at the upstream end of the reservoir where surface temperatures are above 84 degrees Fahrenheit and bottom temperatures of 77 degrees Fahrenheit. Downstream, in the deepest part of the reservoir where stratification should be most pronounced in an unaffected lake in July, figure 3.12b shows uniform temperatures at all depths of 81 to 89 degrees Fahrenheit. This is a clear indication that except for the extreme upper end of the reservoir the heated discharge affects the lake at all depths. This should be expected as the intake structure is designed to draw water from relative deeper lake layers." (Reference 1, page 5)

CP&L Response:

(1) Figure 3.12a is only an attempt to show surface temperatures in Lake Robinson and does not indicate the temperature rises that were occurring across the condensers. On this day there was a water temperature drop of approximately 8°F from the plant to the

point where the canal discharges into the lake. This and the 11°F drop through the lake accounts for the roughly 19° F condenser rise that occurs at near full load conditions. On this day Unit 1 was producing 167 megawatts, Unit 2 was producing 635 megawatts. The inlet temperature for both units was 82°F. The outlet temperature for Unit 1 was 101°, and the outlet temperature for Unit 2 was 100°F.

(2) There is no evidence that the heated discharge affects the lake at all depths. Only at Transects E and F in the vicinity of the discharge does the temperatures in excess of 84°F extend below 10 - 15 feet in depth.

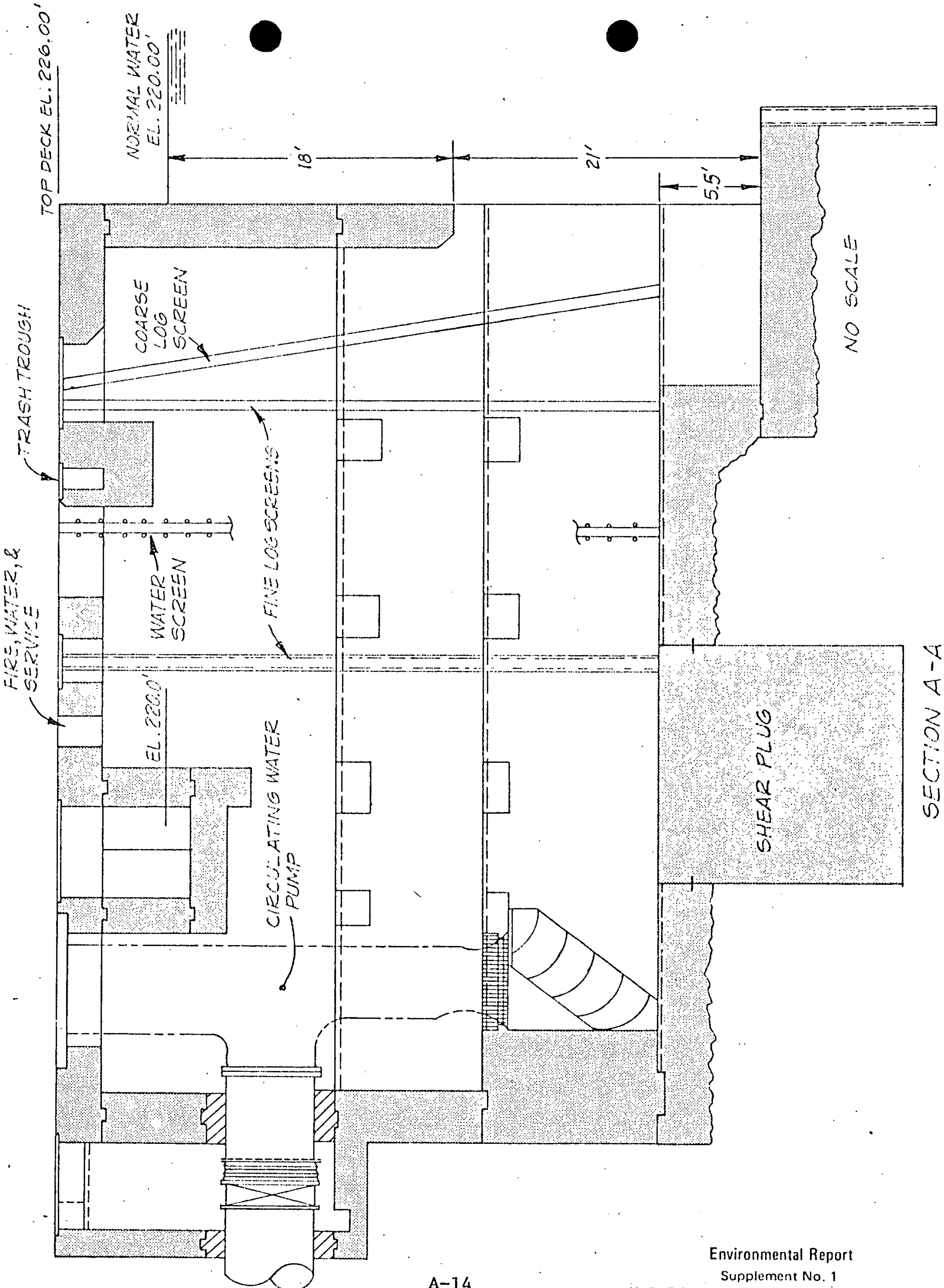
The calculated average natural lake equilibrium temperature for Lake Robinson in July is 84°F. On this particular day, it is estimated that with no temperature input into the lake, surface temperature would be 81°F.

Comment:

"We suggest that the scale be added to Figure 3.5 to better define the depths from which water is drawn." (Reference 1, page 5)

CP&L Response:

The revised figure is attached.



Environmental Report
Supplement No. 1
H. B. ROBINSON STEAM ELECTRIC PLANT
UNIT NO. 2
INTAKE STRUCTURE
Figure 3.4 a–1a

Comment:

"The estimated maximum extensions of the 85 degree Fahrenheit and 90 degree Fahrenheit isotherms, shown in Figure 5.3, appear to be similar to those shown in Figure 3.12a, measured on July 14, 1972, which show a condition when the heated discharge apparently was much less than the maximum. There is no indication that antecedent Black Creek flow and meteorological conditions were such as to produce maximum temperature effects on the lake at that time. Thus, we believe that the estimates of maximum extension of the 85 degree and 90 degree Fahrenheit isothersm shown must be questioned and appear to substantially underestimate the maximum probable extent of heating." (Reference 1, pages 5 and 6)

CP&L Response:

The predicted isotherms in Figure 5.3 are those of the AEC Staff. CP&L had previously provided Lake Robinson temperature data (Figure No. 3.6-2 in the Environmental Report) that showed the 85°F surface isotherm to extend further toward the south end of the lake. The plant on this day was operating essentially at full load. Again, the environmental monitoring program now underway will provide additional data to describe temperatures in Lake Robinson.

Comment:

"Solid radioactive waste is discussed on pages 3-26, 3-35, and 5-21. These wastes will consist of evaporator concentrates, spent exchange resins, air filters, and other solids. The statement does not provide information on the total anticipated volumes of these wastes, except for indicating that three-to-six 55-gallon drums are expected to be filled per week and that about 1,000 drums of solid waste will be generated in an unspecified period of time. There is no data on the radionuclides that will be present, or on their physical and chemical states, and concentrations in the various kinds of wastes. We believe that this data should be included in the final environmental statement." (Reference 1, page 6)

CP&L Response:

The annual averages of solid waste shipped based on 27 months of operating experience are listed below:

a. 678 55-gallon drums containing an average of 28 mCi of mixed fission products, tritium and activation products per drum.

b. 200 Cu. Ft. of resins containing an average of 27 mCi/ft^3 of mixed fission products and activation products.

c. 92 ventilation filters, 4 ft^3 each, containing an average of 0.1 mCi per filter of mixed activation products.

The radionuclides expected to be present in solid waste are listed in Table 3.7-4 of the Carolina Power & Light Company Environmental Report for H. B. Robinson Unit No. 2. Radionuclides actually identified in recent analyses are given below with typical concentrations:

a. Resins:

Co-57	4.75×10^{-2}	µCi/ml
Co-58	6.55×10^{-2}	µCi/ml
Co-60	3.20×10^{-2}	µCi/ml
Cs-134	1.80×10^{-2}	µCi/ml
Cs-137	2.30×10^{-2}	µCi/ml
Mn-54	2.93×10^{-2}	µCi/ml

b. Evaporator Bottoms: Concentrations prior to mixing with solidifying agents in drumming operation.

Co-58	1.06×10^{-2}	µCi/ml
Co-60	1.05×10^{-2}	µCi/ml
Cs-134	4.39×10^{-3}	µCi/ml
Cs-137	6.03×10^{-3}	µCi/ml
I-131	1.99×10^{-3}	µCi/ml
Mn-54	2.04×10^{-3}	µCi/ml
Na-24	4.04×10^{-3}	µCi/ml

The physical state of radionuclides in solid drummed wastes is solid. Radionuclides in resins are present in ionic states tied to the resin bead molecules with some small number present in the slurry solution in ionic states. Activation products are generally present in the form of small solid particles.

The chemical forms in which these radionuclides predominantly appear are as follows:

a. Activation products (such as Co, Mn, Fe, Cr) - as oxides or hydroxides.

b. Heavy metal fission products (such as Sr, Ba, La, Cs) - as borates, fluorides, hydroxides.

c. Noble gases (such as Kr, Xe) - as monatomic gases.

Comment:

"Aquatic Impacts: This section, beginning on page 5-13, does not adequately discuss the effects of plant operations on reservoir biota. This lack of an adequate discussion is apparently due to a lack of preoperational and postoperational data. However, we believe that it could be substantially improved by presenting an analysis of thermal patterns to include the probability of occurrence and duration of lake temperature above 90 degrees Fahrenheit and the areas of the lake subjected to temperatures and the biological significance of these areas to overall reservoir productivity. The final statement should also discuss the effects of elevated temperatures and decreases in dissolved oxygen to the development, growth, and survival of phytoplankton, aquatic invertebrates, fish eggs, larval and adult fish.

The importance of macroinvertebrate organisms to reservoir productivity should also be discussed in this section. The draft statement indicates that there may be a major reduction in macroinvertebrate populations at water temperatures near 90 degrees Fahrenheit. We suggest that the final statement discuss the possible effects of this reduction in invertebrate populations on higher trophic-level organisms. The statement should also evaluate more quantitatively the losses of plankton, fish eggs, and larval fish by entrainment. As indicated in the draft, the total condenser cooling water flow rate is about three times the average flow through the reservoir. Recycling of reservoir waters and the resulting destruction of entrained larval fish, fish eggs, and other organisms could result in a severe reduction in reservoir productivity."
(Reference 1, page 7)

CP&L Response:

Complete preoperational data is not available. An operational ecological monitoring program, though, has been initiated and will include

reporting of thermal patterns on a monthly basis. This includes the sampling of temperatures during periods of maximum temperature stress (summer). Such studies, conducted concurrently with biological sampling should indicate the effect of temperature stress on overall reservoir productivity.

Dissolved oxygen concentrations will also be monitored and compared with thermal conditions and with the productivity of the biotic communities since high temperatures are generally associated with a reduction in dissolved oxygen concentration.

The monitoring program has been designed to investigate the effects of plant operation on the various trophic levels of the lake ecosystem, both quantitatively and qualitatively. Thus, all of the areas of concern as indicated by the Department of the Interior will be investigated.

Preliminary fisheries investigations indicate that no pelagic spawning species are present in Lake Robinson. Species present include members of the sunfish, pickerel, catfish, sucker, topminnow, and live bearer families, all of which spawn in shallow water. Shoreline near the intake exhibits steep gradients and lack of suitable spawning areas. Therefore, it is expected that the plant will have a minimal impact on fish eggs and larval fish. The entrainment of fish eggs and larvae in the cooling water system will be monitored monthly during the major spawning period of April through July by suspending a 1/2-meter diameter 0.505μ egg net in the discharge canal adjacent to the plant. Estimates will then be made of the number of fish eggs and larvae entrained. Day and night samples will be taken so that diurnal as well as seasonal, changes can be noted.

Comment:

"The fifth paragraph on page 5-19 infers that since only a modest reduction in game fish productivity is expected due to the operation of the plant, a monitoring program to quantify this reduction does not appear justified. . . . We suggest that the conditions to the operating license and the monitoring program described on page 5-19 be modified to require that preoperational and operational monitoring be required to the extent necessary to accurately quantify the impacts of the plant on the aquatic life." (Reference 1, pages 7 and 8)

CP&L Comment:

A fishery monitoring program has been developed to quantify and qualify the effect of plant operation on the fish populations. It is still contended, though, that game fish productivity will not be significantly altered and that at most, only a modest reduction will occur.

As to requiring that preoperational and postoperational monitoring be required as a condition for an operating license, it must be noted that the plant operating license was received in 1970 and that commercial operation of the plant began in 1971. At this time, it is an impossibility to perform preoperational monitoring.

Comment:

"The consumptive loss due to forced evaporation is estimated at 19.5 cfs. However, the adverse effects of this loss on downstream uses including aquatic and bottom land ecosystems are not evaluated.

CP&L Response:

Flow measurements in Black Creek above and below Lake Robinson have been recorded since 1960. The average flows for this period of record have been 171 cfs above the lake and 235 cfs below the lake. The minimum flows of record have been 19.9 cfs above the lake and 51 cfs below the lake. On an average basis, the 15.3 cfs forced evaporation rate amounts to less than 10% of the normal stream flow below the dam and is not expected to have a significant adverse effect on the downstream aquatic and bottomland ecosystems. Even during dry periods, the reduction in natural streamflow as a result of forced evaporation, is not of a magnitude to cause significant impact on the downstream ecosystems.

Carolina Power & Light Company

H. B. Robinson Steam Electric Plant Unit No. 2

Comment:

"Our criticism with regard to areas with which we ordinarily are most concerned is that the cost/benefit summary falls short of the degree of quantification often seen in statements of this type. Of particular note is the fact that $5 \times 10^9 \frac{KWh}{Year}$ of electrical energy are generated annually and by the close of the year 1972, 7×10^9 KWh of output-corresponding to 10^4 hours of full-power operation were provided by the station, yet no annual revenue value for the electrical energy generated is provided by the statement." (Reference 4, page 1)

CP&L Response:

The following table shows annual revenue value for H. B. Robinson No. 2 during 1970 through 1972.

Year	Average System Revenue ($/KWH)	Robinson No. 2 KWH Generated	Robinson No. 2 Revenue @ System Average
1970	0.01155	3,335,000	$ 38,519
1971	0.01287	2,414,172,000	$31,070,394
1972	0.01373	4,828,594,000	$66,296,596
Total		7,246,101,000	$97,405,509

Comment:

"In both cases cited above the expected releases are greater than allowed by the Technical Specification for operation of this power station, and are greater than proposed Appendix I of 10 CFR part 50.

It is noted that the major source of both liquid and gaseous effluent releases of major concern are directly related to the steam generator blowdown and the associated blowdown tank vent. Correction of the particular source of radioactive effluents has been required and carried out on several other, similar nuclear power stations." (Reference 4, page 2)

CP&L Response:

It should be noted that the values calculated by the AEC staff were arrived at using standard models and quite conservative assumptions. In the absence of operating data, these values would provide a basis for evaluating the impact of the plant. However, when data is available, it will provide a more realistic evaluation, as in the case of H. B. Robinson Unit No. 2. Although the staff's calculation shows releases of 1000 Ci/yr of tritium, 30 Ci/yr gross liquid, 4260 Ci/yr gross noble gases and a violation of Technical Specifications, the actual total plant releases for 1972 were 429 Ci of tritium, 0.983 Ci gross liquid excluding tritium, and 179.2 Ci of noble gases. These values represent about 11.6%, 4.3%, and 1% of the Technical Specification limits for tritium, liquid and noble gas releases.

The Staff's calculation shows a release of 0.46 Ci/yr of I^{131} from the steam generator blowdown tank vent. The total amount (both gaseous through the vent and in liquid release from the tank) based on the last quarter data of 1972 (the first quarter that extensive steam

generator blowdown analysis was done), is 0.0144 Ci/yr. The releases given in the AEC draft would be expected under the postulated conditions. However, the postulated conditions represent very conservative assumptions which result in calculational releases far in excess of those actually experienced. The releases based on operating experience over the last two years are as follows:

Average I^{131} concentration in steam generators based on weekly measurements - $5 \times 10^{-7} \mu Ci/ml$

Steam generator blowdown rate - 5 gpm

Partition factor (vapor/liquid) - 0.05

Gaseous I^{131} released from blowdown tank vent

$$= (5 \times 10^{-7} \mu Ci/ml) \left(5 \frac{gpm}{steam\ gen.}\right) (3\ steam\ gen)\ (0.05)$$

$$= 7.47 \times 10^{-4}\ Ci/yr$$

I^{131} released from blowdown tank in liquid release

$$= 1.42 \times 10^{-2}\ Ci/yr$$

Similarly, average steam generator gross activity based on daily measurement = $10^{-6} \mu Ci/ml$

This results in a gross liquid radioactivity release from blowdown tank of 2.98×10^{-2} Ci/yr.

Releases from this source constitute about 10% - 15% of the gross liquid and I^{131} releases and 0.006% of the tritium release.

Comment:

"Despite the above discussion only the most general type of discussion of waste handling alternatives is contained in the draft statement, with no specific discussion concerning the alternatives which would treat radioactive effluents associated with steam generator blowdown.

The Summary and Conclusion sections of the draft statement contain no recommendations for action regarding the above points.

In view of the above discussion, it is felt that the draft environmental impact statement is deficient in this respect, and that a specific program for treatment of the steam generator blowdown tank vent to reduce radioactive effluents be required." (Reference 4, page 2)

CP&L Response:

Although the steam generator blowdown represents a significant portion of the total radioactive release, the releases are still only a few percent of Technical Specification limits, and are within the numerical guidelines for the "as low as practicable" criteria of the proposed Appendix I.

Comment:

"The Environmental Report for this project indicates that approximately 60% of the temperature rise through the Impoundment is caused by natural conditions. Carolina Power and Light has been requested to provide additional information to further substantiate this phenomenon." (Reference 12, page 3)

CP&L Response:

During the 12-month period of April 1959 through March 1960, prior to the startup of Unit 1, natural influences caused an average yearly rise in water temperatures between the lake inflow and lake outflow of approximately 5.4°F. During the 12 months of 1972 when both Units 1 and 2 were in operation and influencing water temperature, the difference of temperature between lake inflow and lake outflow averaged 9.7°F. Therefore, influence of plant operation accounts for an additional 4.3°F or approximately 44% of the total rise of temperature from lake inflow to lake outlet while 56% is due to natural conditions:

April 1959 - March 1960 (prior to Unit 1 operation)

Average S. C. 23 temperature	65.0°
Average U. S. 1 temperature	59.6°
Influence due to natural conditions	5.4° Δt

1972 (both Units 1 and 2 operating)

Average S. C. 23	68.8°
Average U. S. 1	59.1°
Influence due to natural and plant operation	9.7° Δt

Influence due to natural and plant operation	9.7° Δt
Influence due to natural	5.4° Δt
Influence due to plant operation	4.3° Δt

Therefore, plant operation	44%
natural conditions	56%

It should be noted that the applicant is aware that the yearly average will vary from year to year due to a variety of meteorological conditions. The degree of induced error has not been calculated, but it is felt these data are representative figures. All data are available for review.

Comment:

"The Draft Environmental Impact Statement predicts a rise of 6°F. in the discharge from Robinson Impoundment. Carolina Power and Light has been requested to outline proposals to ensure that the discharge from Robinson will not violate the 5°F. rise after appropriate mixing." (Reference 12, page 3)

CP&L Response:

The 6°F rise applies to surface temperatures and does not take into account the reduction of downstream temperature achieved through the discharge of sub-surface waters through the Howell-Bunger valves. Compliance with South Carolina Water Quality Standards will be achieved through appropriate operation of these valves.

Comment:

"Carolina Power and Light has been requested to outline monitoring procedures it intends to implement to show that there will be no violation of applicable standards for the discharge from Robinson." (Reference 12, page 3)

CP&L Response:

There is continuous temperature monitoring of the discharge from the lake which provides a means of verifying compliance with the 90°F maximum temperature standard; however there is no direct measure for the rise above ambient. Temperature rise therefore will be determined from a computed lake equilibrium temperature based on local meteorological conditions.