final

NUREG-0417

environmental statement

related to operation of

EDWIN I. HATCH NUCLEAR PLANT UNIT NO. 2

Georgia Power Company

MARCH 1978

Docket No. 50-366

U. S. Nuclear Regulatory Commission • Office of Nuclear Reactor Regulation

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THE EDWIN I. HATCH NUCLEAR PLANT UNIT NO. 2

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Docket No. 50-366

U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR REACTOR REGULATION

SUMMARY AND CONCLUSIONS

This Final Environmental Statement was prepared by the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation (the staff).

1. The action is administrative.

2. The proposed action is the issuance of an operation license to the Georgia Power Company for the startup and operation of the Edwin I. Hatch Nuclear Plant, Unit No. 2 (Docket No. 50-366), located on the Altamaha River in Appling County, approximately 11 miles north from Baxley, Georgia.

   This facility will employ a boiling-water reactor to produce a nominal rating of 2436 megawatts-thermal (MWt). A steam turbine-generator will use this heat to provide up to 820 (803 net) megawatts electrical (MWe) of electrical power capacity. The plant will be licensed for operation with a thermal output up to 2550 MWt which corresponds to a gross electrical output of 835 MWe. The exhaust stream will be condensed by water circulated through mechanical draft cooling towers; makeup water for the cooling towers will be drawn from the Altamaha River.

3. The information in this Statement represents the second assessment of the environmental impact associated with the Edwin I. Hatch Nuclear Plant, Unit No. 2, pursuant to the guidelines of the National Environmental Policy Act of 1969 (NEPA) and 10 CFR Part 51 of the Commission's Regulations. After receipt of an application, in 1970, to construct this plant, the staff carried out a review of impact that would occur during the construction and operation of this plant. That evaluation was issued as a Final Environmental Statement in October 1972. As the result of that environmental review, a safety review, an evaluation by the Advisory Committee on Reactor Safeguards, and a public hearing in Baxley, Georgia and Washington, D.C., the AEC (now NRC) issued a permit in December 1972, for the construction of Unit No. 2 of the Edwin I. Hatch Nuclear Plant. As of January 1978, the construction of Unit No. 2 was 99% complete. With a proposed fuel-loading date of April 1978 for Unit No. 2, the applicant has petitioned for license to operate Unit No. 2 and has submitted (July 1975) the required safety and environmental reports to substantiate this petition. The staff has reviewed the activities associated with the proposed operation of this plant and the potential impact, with both beneficial and adverse effects, is summarized as follows:

   a. A total of about 2244 acres (9.08×10^6 sq. meters) will be used for the Hatch site of which approximately 200 acres will be used for plant facilities and other construction activities. About 105 of these acres will be restored upon completion of construction. Approximately 1548 acres (6.26×10^6 sq. meters) are required for transmission line rights-of-way (Section 2.2.2).

   b. The major water supply for the heat dissipation system will be from the Altamaha River. A maximum of 34,000 gpm (2145 l./sec.) will be withdrawn by the service water system for cooling tower operation and makeup supply of which a maximum of 23,600 gpm (1489 l./sec.) will be returned to the river. Approximately 19,300 gpm (1236 l./sec.) from the service water system will be used to supply makeup water to the cooling towers to replace evaporative, drift and blowdown quantities. For Unit No. 2 operation, the consumption water use from the Altamaha River is about 2% of minimum recorded river flow (Sections 3.2.1, 3.3.3, and 5.3.6).

   c. The approximate volume of thermal discharge (26 cfs) (736 l./sec.) for Unit No. 2 operation is very small compared with the average river flow (13,000 cfs) (368,160 l./sec). There will be no significant increase in the totally-mixed river temperature. Estimates of the extent of the thermal plume under conservative conditions are small and the effect on the river biota is not considered significant (Sections 5.3.1.2 and 5.4.2.2).

   d. Based upon data from the impingement monitoring program for Unit No. 1, postulated incremental losses due to the operation of Unit No. 2 will not significantly affect the resident or anadromous fish population in the Altamaha River (Section 5.4.2.1).

e. Assuming 100% mortality of entrained shad eggs and larvae during passage through the condenser and cooling system, losses to shad populations due to operation of the unit w ll be insignificant (less than 2% at low flow conditions) (Section 5.4.2.1).

f. ne concentration of chemicals and sanitary wastes discharged to the Altamaha River will be in conformance with the effluent limits contained in the NPDES permit issued by the State of Georgia. (Section 5.3.4 and Appendix F).

g. The risk associated with accidental radiation exposure is very low (Section 7.1).

h. No significant environmental impacts are anticipated from normal operational releases of radioactive materials. The approximate radiation dose from all Unit No. 2 releases to the estimated year 1992 population that reside within 50 miles of the site is one man-rem/year. This is a small fraction of the 23,000 man-rems/year that this population receives from natural background radiation (Table 5.5-3).

4. The following Federal, State, and local agencies were asked to comment on the Draft Environmental Statement issued in April 1977.

Advisory Council on Historic Preservation
Department of Agriculture
Department of the Army, Corps of Engineers
Department of Commerce
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Department of Transportation
Energy Research and Development Administration
Environmental Pro ection Agency
Federal Energy Administration
Federal Power Commission
Governor, State of Georgia
State Clearinghouse, State of Georgia
Department of Natural Resources, State of Georgia
Georgia Public Service Commission
Georgia Water Quality Control Board
Altamaha Georgia Southern Area Planning and Development Commission
Appling County Commissioners
Superintendent of Schools - Appling County
Mayor, City of Baxley
City Manager, City of Baxley

Comments on the Draft Environmental Statement were received from the following:

Department of Agriculture, Agricultural Research Service
Department of Agriculture, Forest Service
Department of Agriculture, Soil Conservation Service
Department of Commerce, National Oceanic and Atmospheric Administration
Energy Research and Development Administration (now Department of Energy)
Environmental Protection Agency, Region IV Office
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Altamaha Georgia Southern Area Planning and Development Commission
Appling County Chamber of Commerce
State of Georgia, Office of Planning and Budget
Georgia Power Company

Copies of these comments are included in this Final Environmental Statement as Appendix A. The staff has considered these comments, and the responses are located in Section 11.

This Final Environmental Statement was made available to the public, to the Environmental Protection Agency, and to other specified agencies in March 1978.

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6. On the basis of the analysis and evaluation set forth in the Final Environmental Statement, and after weighing the environmental, economic, technical and other benefits against environmental costs and after considering available alternatives at the construction stage, it is concluded that the action called for under NEPA and 10 CFR Part 51, is the issuance of an operating license for Unit No. 2 of the Edwin I. Hatch Nuclear Plant subject to the following conditions for the protection of the environment:

a. License Conditions

Before engaging in additional construction or operational activities which may result in a significant adverse environmental impact that was not evaluated or that is significantly greater than that evaluated in this Environmental Statement, the applicant shall provide written notification to the Director, Office of Nuclear Reactor Regulation.

b. Significant Environmental Technical Specification Requirements

The environmental technical specifications issued for the Edwin I. Hatch Nuclear Plant, Unit No. 2, will include but not be limited to the following requirements:

(1) The applicant will carry out the environmental (thermal, chemical, radiological, and ecological) monitoring programs outlined in this Statement, and in the Final Environmental Statement for the construction permit as modified and approved by the staff and implemented in the environmental technical specifications incorporated in the operating license for the Edwin I. Hatch Nuclear Plant, Unit No. 2 (Section 6).

(2) If, during the operating life of the station, effects or evidence of irreversible environmental damage is detected, the applicant will provide to the staff an analysis of the condition and proposed corrective action.

(3) The applicant will conduct a monitoring program as described in the environmental technical specifications to determine the quantity and type of corrosion products in the cooling system discharge (Sections 5.3.4, 5.3.5, and 6.3.4).

(4) The applicant will conduct a monitoring program as described in the environmental technical specifications to verify two-unit operational effects upon benthic organisms as well as impingement and entrainment effects (Section 6.3.5).

(5) The applicant will conduct a terrestrial monitoring program as described in the environmental technical specifications to verify two-unit operational effects on vegetation and erosion (Sections 5.4.1 and 6.3.6).

(6) The applicant will conduct an offsite radiological monitoring program as described in the environmental technical specifications to measure radiation levels in the site environs (Section 6.3.7).

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FOREWORD

This environmental statement was prepared by the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation (the staff) in accordance with the Commission's regulation, 10 CFR 51, which implements the requirements of the National Environmental Policy Act of 1969 (NEPA).

The NEPA states, among other things, that it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice.
- Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Further, with respect to major Federal actions significantly affecting the quality of the human environment, Section 102(2)(C) of the NEPA calls for preparation of a detailed statement on:

(i) the environmental impact of the proposed action;

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(iii) alternatives to the proposed action;

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and,

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

An environmental report accompanies each application for a construction permit or a full-power operating license. A notice is published in the FEDERAL REGISTER regarding the availability of the report. Any comments by interested persons on the report are considered by the staff. In conducting the required NEPA review, the staff meets with the applicant to discuss items of information in the environmental report, to seek new information from the applicant that might be needed, for an adequate assessment, and generally to ensure that the staff has a thorough understanding of the proposed project. In addition, the staff seeks information from other sources that will assist in the evaluation and visits and inspects the project site and surrounding vicinity. Members of the staff may meet with State and local officials who are charged with protecting State and local interests. On the basis of all the foregoing and other such activities or inquiries as are deemed useful and appropriate, the staff makes an independent assessment of the considerations specified in Section 102(2)(C) of the NEPA and 10 CFR Part 51.

This evaluation leads to the publication of a draft environmental statement, prepared by the Office of Nuclear Reactor Regulation, which is then circulated to Federal, State and local governmental agencies for comment. A summary notice is published in the Federal Register of the availability of the applicant's environmental report and the draft environmental statement.

Interested persons are also invited to comment on the proposed action and the draft statement. Comments should be addressed to the Director, Division of Site Safety and Environmental Analysis, at the address shown below.

After receipt and considerations of comments on the draft statement, the staff prepares a final environmental statement, which includes a discussion of questions and objections raised by the comments and the disposition thereof; a final benefit-cost analysis, which considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects with the environmental, economic, technical, and other benefits of the facility; and a conclusion as to whether--after the environmental, economic, technical, and other benefits are weighed against environmental costs and after available alternatives have been considered--the action called for, with respect to environmental issues, is the issuance or denial of the proposed permit or license or its appropriate conditioning to protect environmental values. This final environmental statement and the safety evaluation report prepared by the staff are submitted to the Atomic Safety and Licensing Board for its consideration in reaching a decision on the application.

This environmental review deals with the impact of operation of the Edwin I. Hatch Nuclear Plant Unit No. 2. Assessments that are found in this statement supplement those described in the Final Environmental Statement (FES-CP) that was issued in October 1972 in support of issuance of a construction permit for Unit No. 2 and an operating license for Unit No. 1. The information to be found in the various sections of this Statement updates the FES-CP in four ways: (1) by identifying differences between environmental effects of operation (including those which would enhance as well as degrade the environment) currently projected and the impacts that were described in the preconstruction review; (2) by reporting the results of studies that had not been completed at the time of issuance of the FES-CP and which were under mandate from the NRC staff to be completed before initiation of the operational review; (3) by evaluating the applicant's preoperational monitoring program; and factoring the results of this program into the design of a post-operational surveillance program and into the development of environmental technical specifications; and (4) by identifying studies being performed by the applicant that will yield additional information relevant to the environmental impacts of operating the Edwin I. Hatch Nuclear Plant Unit No. 2.

The staff recognized the difficulty a reader would encounter in trying to establish the conformance of this review with the requirements of the National Environmental Policy Act with only "updating information." Consequently a copy of the FES-CP was included in the Draft Environmental Statement issued in April 1977 (NUREG-0257). In addition, introductory résumés in appropriate sections of this Statement will summarize both the extent of "updating" and the degree to which the staff considers the subject to be adequately reviewed.

Copies of this Final Statement may be purchased from the National Technical Information Service as indicated on the inside front cover. Mr. Clifford A. Haupt is the NRC Environmental Project Manager for this Statement. Should there be any questions regarding its contents, Mr. Haupt may be contacted at the following address:

Division of Site Safety and Environmental Analysis
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555
Phone: (301) 492-8434

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1. INTRODUCTION

1.1 HISTORY

On July 17, 1970, the Georgia Power Company (applicant) filed an application with the Atomic Energy Commission (now Nuclear Regulatory Commission) for a permit to construct the Edwin I. Hatch Nuclear Plant Unit No. 2. Construction Permit No. CPPR-90 was issued accordingly on December 27, 1972 following reviews by the AEC Regulatory staff and its Advisory Committee on Reactor Safeguards, as well as public hearings before an Atomic Safety and Licensing Board in Baxley, Georgia on September 8 and September 19, 1972 and in Washington, D.C. on November 17, 1972. The conclusions obtained in the staff's environmental review were issued as a Final Environmental Statement in October 1972. In April 1977, a Draft Environmental Statement related to the operation of Edwin I. Hatch Nuclear Plant, Unit No. 2, was issued by the NRC as NUREG-0257. As of January 1978, construction of Unit No. 2 was approximately 99% complete and the reactor is expected to be ready for fuel loading in April 1978. The unit has a boiling-water reactor which will produce up to 2436 MWt and a net electrical output of 803MWe.

In July 1975, the Georgia Power Company submitted an application including a Final Safety Analysis Report (FSAR) and Environmental Report (EROL) requesting issuance of an operating license for Unit No. 2. These documents were docketed on October 21, 1975 and the operational safety and environmental reviews initiated at that time.

Hatch Unit No. 2 is owned jointly by Georgia Power Company (GPC) (50.1%), Oglethorpe Electric Membership Corporation (OEMC)(30.0%), the Municipal Electric Authority of Georgia (MEAG), an instrumentality of the State (17.7%), and the City of Dalton (2.2%).

1.2 PERMITS AND LICENSES

The applicant has provided a status listing of environmentally related permits, approvals, and licenses, required from Federal, regional, State, and local agencies in connection with the proposed project. This information may be found in Chapter 12 of the EROL. The staff has reviewed that listing and has discussed the status of required permits with the Georgia Department of Natural Resources and the U.S. Environmental Protection Agency. No significant environmental issues have been identified during these discussions and the staff is not aware of any non-NRC licensing activities that would preclude or significantly delay the scheduled operation of this plant.

The applicant applied for a National Pollutant Discharge Elimination System (NPDES) permit and the Georgia Department of Natural Resources, Environmental Protection Division, issued this permit in June 1977. (See Appendix F).

2. THE SITE

2.1 RÉSUMÉ

The staff revisited the Edwin I. Hatch Nuclear Plant site in March 1976 to determine what changes had occurred at the site and in the surrounding environs since the preconstruction environmental review in 1972. Of interest were changes in regional demography predictions and land use caused by available new information and construction of the plant facilities respectively. Population distribution estimations in the vicinity of the site have been revised. Changes in land utilization are indicated, reflecting construction of the Edwin I. Hatch Nuclear Plant Unit No. 2. Changes in the local economy due to construction are also discussed. The staff's assessments of these recent findings are presented in Section 2.2. Since the issuance of the FES-CP, additional information has been made available regarding water use and quality. This new information has been assessed and is discussed in Section 2.3. The meteorology section has been updated to include new information. This information is included in Section 2.4. Additional background information related to the aquatic and terrestrial biota within the environs of the site and the Altamaha River are discussed in Section 2.5. The aquatic discussion has been considerably expanded from that presented in the FES-CP, incorporating new material on the Altamaha River made available since that time. This material also considers the present conditions and influence at the Edwin I. Hatch Nuclear Plant due to the operation of Unit No. 1.

2.2 REGIONAL DEMOGRAPHY AND LAND USE

2.2.1 Changes in Population

The population projections for the 50-mile radius surrounding the site have been revised downward. The primary reason for the revision is that the FES-CP projections were based on State population estimates prior to the availability of the 1970 Federal census data. The FES-CP estimated the population distribution within 50 miles as 253,465 in 1972 and 270,917 in 2012. The current population estimates are 211,145 and 245,335 in 1972 and 2012, respectively.

All population data are based on the 1970 census; future population levels for 1982, 1992, and 2012 are based on allocations of the population projected by the Georgia Social Science Advisory Committee.

Table 2.2-1 presents the 1975 population estimate within 50 miles of the site.

2.2.2 Changes in Land Use

There have been no significant changes in land use in the region surrounding the Hatch site since the issuance of the FES-CP. The primary land use changes due to plant construction have occurred on site where approximately 95 acres have been committed to the plant facilities. An additional 105 acres have been in use for construction purposes. Soil disposal and borrow areas have claimed nine acres of gum-cypress swamp, sixteen acres of bottomland hardwood, ten acres of cut-over timberland and forty-nine acres of agricultural land. These areas have all been grassed as have those construction areas which are no longer needed. All 105 acres of construction area will have been returned to some type of vegetative cover by completion of construction. Table 2.2-2 and Figures 2.2-1 and 2.2-2, present a summary of the distribution of preconstruction plant communities on site and the status of the site as of November 1974. The applicant has indicated (See 11.2.2.2) that upon completion of construction of the Hatch Nuclear Plant, Unit No. 2, as much of the temporary construction land areas as possible will be returned to timber production.

In addition to the direct changes in land use on site, approximately 1041 acres of wooded land have been cleared and grassed in conjunction with construction of the HNP-Bonaire transmission line. An additional 507 acres occur in areas where only the tower bases preclude continuation of prior uses. The land use on the right-of-way for the HNP-Bonaire transmission line is summarized in Table 2.2-3.

TABLE 2.2-1[1]

1975 POPULATION DISTRIBUTION ESTIMATE (0-50 MILES)

Miles	Direction															
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
0-1	0	0	0	0	0	0	0	4	0	0	17	8	21	0	0	0
1-2	4	0	0	0	0	0	0	8	17	4	12	25	0	0	0	0
2-3	8	4	0	0	0	0	8	41	4	29	25	8	21	0	0	8
3-4	24	8	16	0	0	12	25	25	0	45	12	17	0	0	8	39
4-5	50	4	24	12	4	12	45	62	41	41	12	12	4	0	12	24
5-10	218	218	218	256	276	264	264	264	264	264	254	245	231	212	210	218
10-20	4,634	964	2,944	1,254	1,252	988	928	1,424	4,694	1,055	1,021	5,305	2,082	619	1,331	10,029
20-30	1,442	1,717	2,183	2,862	4,654	944	928	1,898	1,718	5,968	1,960	1,568	1,293	2,078	3,528	1,450
30-40	2,071	4,943	5,556	2,788	1,687	2,276	10,330	2,768	2,274	3,441	2,454	3,406	1,560	5,931	2,178	5,021
40-50	9,596	3,899	3,873	4,523	11,560	1,506	951	2,909	2,643	2,391	12,963	3,514	3,185	3,877	3,729	3,936
SUBTOTALS:	18,047	11,757	14,814	11,695	19,433	6,002	13,479	9,403	11,655	13,238	19,730	14,108	8,397	12,717	10,996	20,725

TOTAL 50-MILE POPULATION: 216,196

TABLE 2.2-2[2]

PRECONSTRUCTION AND PRESENT (11/75) PLANT COMMUNITIES
ON THE EDWIN I. HATCH NUCLEAR PLANT SITE

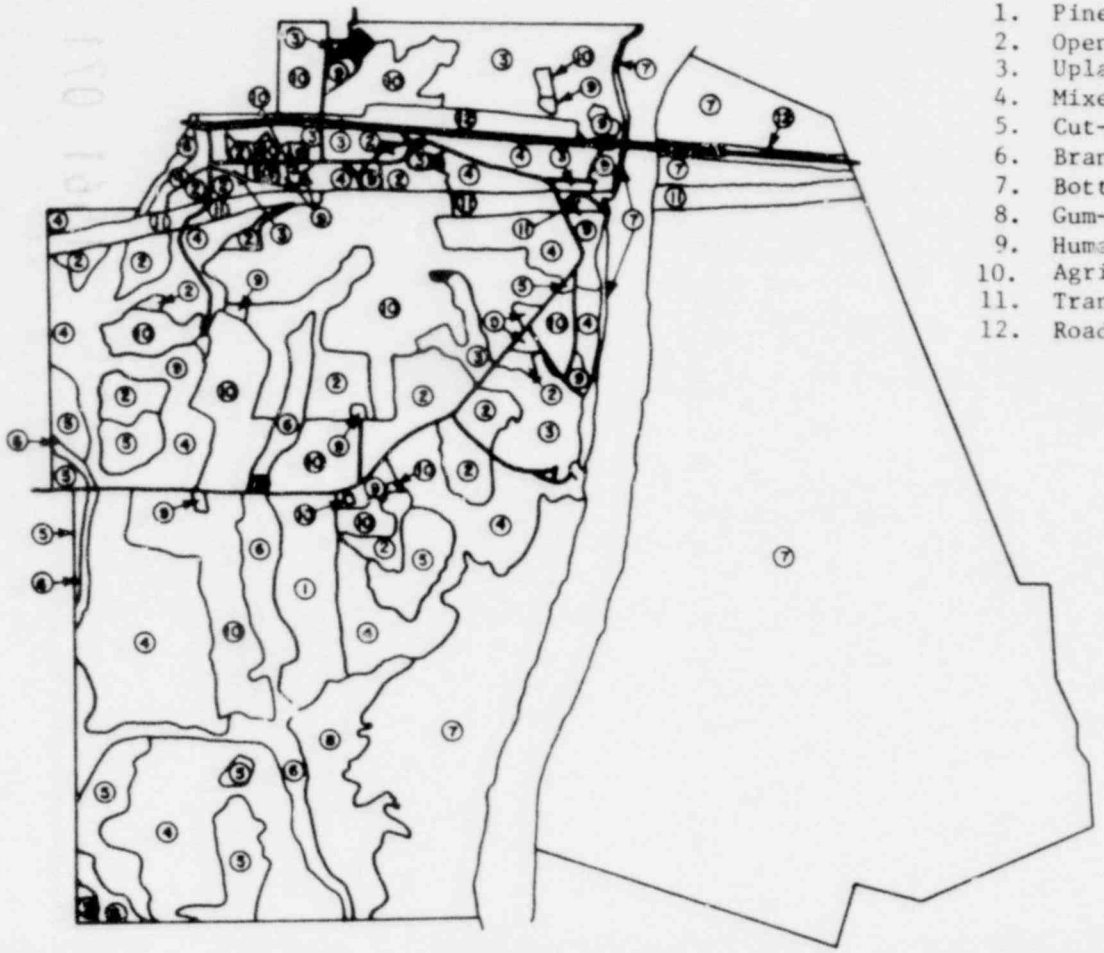
	Before Construction	Condition as of 11/74
Pine Plantation	38	111
Open Pine Field	143	38
Upland Pine Forest	78	59
Mixed Pine-Hardwood Forest	354	395
Cut-over Timberland	85	45
Branch Hardwood	76	76
Bottomland Hardwood	1032	1016
Gum-Cypress Swamp	46	36
Homestead	30	--
Agriculture	286	0
Transmission Line Right-of-Way	41	14
Roadside	30	33
Lake	4	--
Construction Area	--	200
Grassed Area (Includes right-of-way on southern half of property)	--	220
TOTAL	2243	2243

2.2.3 Changes in the Local Economy

Construction activity on Hatch Unit No. 1 peaked from mid-1971 to mid-1972 when approximately 1600 workers were employed at the site. The peak force working on Unit No. 2 was reached in 1974-1975. Although the staff is unable to establish a causal relationship, the data in Table 2.2-4 suggest that the economic impact of the Hatch Nuclear Power Plant on Appling County and the City of Baxley has been substantial.

2.2.4 Historical and Natural Landmarks

As indicated in the FES-CP and FEDERAL REGISTER (43 FR 5361, 2/7/78), no historical areas or natural landmarks have been identified in the National Register of Historic Places for Appling County.



1. Pine Plantation
2. Open Pine Field
3. Upland Pine Forest
4. Mixed Pine-Hardwood Forest
5. Cut-over Timberland
6. Branch Hardwood
7. Bottom Land Hardwood
8. Gum-Cypress Swamp
9. Human Habitation
10. Agriculture
11. Transmission Line Right-of-Way
12. Roadside

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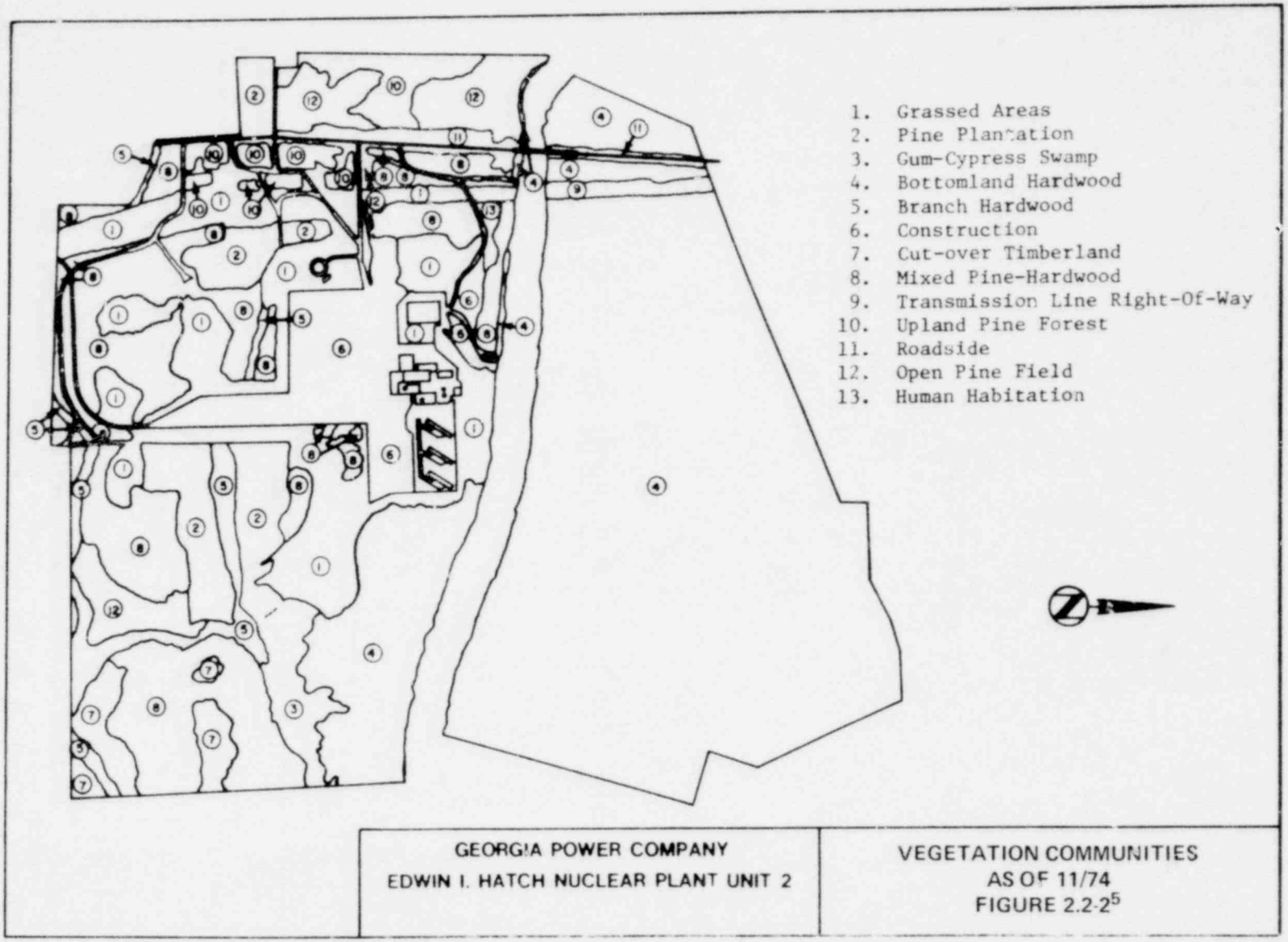
EDWIN I. HATCH NUCLEAR PLANT UNIT 2

VEGETATION COMMUNITIES
BEFORE CONSTRUCTION
FIGURE 2.2-1[4]



1. Grassed Areas
2. Pine Plantation
3. Gum-Cypress Swamp
4. Bottomland Hardwood
5. Branch Hardwood
6. Construction
7. Cut-over Timberland
8. Mixed Pine-Hardwood
9. Transmission Line Right-Of-Way
10. Upland Pine Forest
11. Roadside
12. Open Pine Field
13. Human Habitation

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2

VEGETATION COMMUNITIES
AS OF 11/74
FIGURE 2.2-2[5]

TABLE 2.2-3[3]

LAND USE ON HNP-BONAIRE TRANSMISSION RIGHT-OF-WAY

	Number of acres	% of total right-of-way acres
Wooded	1041	67.2%
Uncultivated open areas and pastures	195	12.5%
Cultivated areas	193	12.5%
Wetlands	89	5.8%
Urban	30	2.0%
TOTAL	1548	100%

2.3 WATER USE

2.3.1 Regional Water Use

2.3.1.1 Surface Water

The Altamaha River, which runs by the site, is not used for municipal or industrial water supply. The only known usage of Altamaha River water for direct human consumption is induced flow from several small river wells in the fishing village of Davis Landing about 8 river miles downstream from the site. Usage is believed to be small and intermittent.

The Altamaha River in the vicinity of the site is used heavily for sport fishing. There is commercial fishing about 115 miles downstream from the site.

2.3.1.2 Groundwater Usage

Groundwater is the primary source of water for human consumption, domestic, and stock watering use in the site area. Little or no use is made of groundwater for irrigation. At present, there is no industrial use for groundwater (other than the Hatch Plant) within 3 miles of the site. There were 61 domestic wells surveyed in the Construction Permit Stage Environmental Report. Of these, 27 are reported now in use. The others were either not functioning or are now within plant property and have been abandoned.

2.3.2 Surface Water Hydrology

The plant is located on the Altamaha River, Georgia's largest, about 11 miles north of Baxley, Ga. The Altamaha River is formed by the junction of the Oconee and Ocmulgee Rivers about 20 miles upstream from the site. The Altamaha River has a drainage area of about 11,700 square miles and enters the Atlantic Ocean about 117 miles downstream from the site.

There are two major impoundments upstream from the site, and none downstream. The larger is Lake Sinclair, 169 miles upstream on the Oconee River. The smaller is Jackson Lake, about 262 miles upstream on the Ocmulgee River.

The yearly average flow rate in the Altamaha River is 13,000 cubic feet per second, based on 42 years of record of the Doctortown Gage, 57 miles downstream from the site. The minimum flow of record past the site is estimated to have been between 1,200 and 1,400 cubic feet per second, lasting between 22 and 23 days. An extreme low flow of about 900 cubic feet per second can be extrapolated from records as being supported by groundwater seepage alone, without supplementation from upstream reservoirs. The total normal and emergency service water requirements of the plant are about 100 cubic feet per second, which can be safely supplied by the Altamaha River under all circumstances.

TABLE 2.2-4[6]

INDICATORS OF ECONOMIC GROWTH IN APPLING COUNTY, 1969-1975

	Appling County			City of Baxley			
	Tax Mileage	Ad Valorem Tax Yield	Septic Tank Permits	Residential Permits	Value of Commercial Buildings	Water Connections	Value of Business Licenses*
1969	26	$ 728,737	NA	2	NA	26	$30,064
1970	26	$ 925,880	36	20	$ 82,500	37	$32,277
1971	26	$1,156,153	84	15	$ 68,500	76	$35,687
1972	16	$1,455,907	133	25	$496,760	104	$35,970
1973	16	$1,833,517	96	9	$189,347	84	$36,330
1974	16	$2,646,366	47	3	$369,029	31	$37,467
1975	16.25	$3,513,411	55	4	$ 75,315	23	$37,104

NA = Data not available.
*Value of individual firms license based on previous year's gross receipts.

The maximum flow of record is estimated to have been between 170,000 to 200,000 cubic feet per second, corresponding to an elevation of 91.3 ft. above mean sea level at the site. The Probable Maximum Flood (PMF), as defined by Regulatory Guide 1.59, has been estimated to be about 612,000 cubic feet per second, corresponding to a stillwater level of 105 ft. MSL (or 108.3 ft. MSL with attendant waves).

Other floods were postulated (such as dam failures, coincident with smaller storms), but the PMF produced the design basis water level at the site. Plant grade is at elevation 129.5 ft. MSL, well above the design basis flood level. These extreme water levels have been calculated solely for the purposes of engineering analyses of safety-related systems; the probability of events leading to such high water levels is extremely low. Flood analyses and designs are discussed in greater detail in the Final Safety Analysis Report (FSAR).

2.3.3 Groundwater Hydrology

There are two local aquifers and one regional aquifer under the site. The regional artesian aquifer is predominantly limestone, and is located about 235 feet below plant grade. Its piezometric level is at 60 ft. MSL. This aquifer has no recharge areas near the site, and is separated from the local aquifers by an aquiclude more than 100 feet thick. It is not hydraulically connected to any of the local hydrologic features of the site.

The two local aquifers are an upper water table aquifer with local drainage more or less paralleling the surface topographic slope, and a minor confined aquifer under slight artesian pressure. These two minor aquifers are separated by an aquiclude about 40 to 50 feet thick.

Both of the minor aquifers are hydraulically connected to surface waters and drain into streams and ponds, which eventually drain into the Altamaha River.

Of the 27 active wells in use near the site, 24 of them draw on the minor aquifers, and only 3 draw on the principal artesian aquifer. The plant will withdraw about 327 gallons per minute (GPM) from the principal artesian aquifer. This small amount is not expected to affect local users.

2.3.4 Water Quality

The FES-CP indicated the quality of the water in the Altamaha River to be good in relation to parameters directly affected by station discharge.[1] Additional data collected since then do not contradict that finding but allow a more complete description of quality.

Four additional years of weekly temperature and dissolved oxygen measurements taken by GPC in the vicinity of the station are summarized in the EROL.[2] The maximum temperature observed during this period (86.3°F) was less than the value (87.8°F) reported in the FES-CP for an earlier five year period. During the reported four year period temperature exceeded 83.0°F one percent of the time. Temperature exceeded 79.9°F ten percent of the time. The EROL indicates that data collected at Doctortown includes a maximum reading of 91.4°F during an eleven year record[3] and data collected over a 26 month period at the Highway 1 Bridge show a maximum reading of 89.6°F.[4]

Although the applicant has described the Altamaha River as unpolluted, the minimum dissolved oxygen values reported during the four year study were 2.3, 5.8, 3.1, and 5.7 mg/l.[5] The two lower values are indicative of a polluted condition. Inspection of the EROL indicates that the low oxygen concentrations were observed at river mile 113.10, about four miles downstream from the Hatch site.[6] The statistical summary presented in the EROL shows oxygen concentration to have much greater variation at this station than at any of the others. Thus a local source of influence is likely. Diurnal oxygen variation is significant but does have a pronounced pattern indicating photosynthesis.[7]

Data on other constituents summarized in the EROL show the river to have a low hardness and to be relatively free of dissolved inorganic substances. These data are included in Table 3.2-4.

2.4 METEOROLOGY

In general the regional climate described in the FES-CP[1] is still appropriate since no significant changes have been observed in meteorological parameters measured at the Savannah, National Weather Service office[2] and at Macon, National Weather Service office.[3]

Onsite meteorological data collected from June 1970 through September 1974 was supplied in the EROL[4] for use in evaluation of relative concentration X/Q and relative deposition D/Q at various points surrounding the plant. The values determined are the result of gaseous releases under normal operating conditions and were derived using the assumptions and methods identified in Regulatory Guide 1.111.[5] The results of this analysis appear in Section 5 of this Statement.

2.5 SITE ECOLOGY

2.5.1 Terrestrial Ecology

At the time of issuance of the FES-CP (October 1972) there was little information available on the terrestrial systems on the Hatch site. Work was progressing at that time to acquire the relevant information and the results were submitted at the operating license stage.[1]

Three general vegetation types have been found to occur on site.[1] Figure 2.5-1 presents the distribution of these communities and indicates by letter the study plots which were used in obtaining information on the site vegetation.

The three main habitat types were identified as: (1) dry upland vegetation (site A), (2) floodplain (sites B, C and D), and (3) planted pine-old field (site E).[1] The dominant species on each of the plots are listed in Table 2.5-1. The canopy vegetation on site A is dominated by loblolly pines with an understory of huckleberry and several species of hardwoods. The relative densities indicate a mixed pine forest succeeding to hardwood. Site B consists of an area of ridges and sloughs close to the river and an inland area which is relatively flat. The ridge and slough section is dominated by blue beech with little understory and an herb layer of poison ivy. The inland area has a greater diversity of tree species with loblolly pine dominating the canopy. A very dense understory was reported that was characterized in many places by dense thickets of blackberry and other shrubs which made the area nearly impassable. Site C is a flood plain community in the northwest portion of the site (upstream and across the river from the plant). Sweetgum is the dominant of the larger tree species with black willow, blue beech and loblolly pine also frequent. Blue beech is the most numerous understory tree species. Switch cane, possum haw, palmetto and sweetgum are also frequent in the understory. Site D is downstream and across the river from the plant. This area consists of dense areas of tangled blackberry stems or switch cane covered by grape vine, pepper vine and greenbriar on the ridges interspersed with more open areas along the sloughs with sweetgum the most common tree. Outside of the tangle areas, the understory contains many blue beech, palmetto and holly. In site E, planted slash pine dominates the canopy with trees averaging four meters tall. There is little understory and the herb layer is dominated by one species of aster and two species of golden rod. This area is typical of abandoned farmland succeeding to woodland. A more complete description of these areas is provided in the EROL.[1] Table 2.5-1A identifies the principal soil types present at the Hatch site. Those soils which meet the requirements for classification as prime farmlands are also indicated.

Eleven species of mamals, thirty-one species of birds, eleven species of amphibians and thirteen species of reptiles were observed on site (see Table 2.5-2). One of these species is regarded as rare or endangered.

2.5.2 Aquatic Ecology

As a result of discussions between the Georgia Power Company and U.S. EPA phycologists, it was concluded that due to high flow rates and high turbidity phytoplankton would not be a major contributor to primary productivity in the river and the utility's efforts should be concentrated on periphyton rather than phytoplankton.[4] Thus, although a phytoplankton study was proposed by the applicant,[3] no study was conducted. Hynes[5] concluded that rivers with high flow rates and high turbidity carry little true phytoplankton. The source of most planktonic algae occurring in fast flowing rivers with high turbidity is either populations released from upstream reservoirs or the suspension of scoured periphyton. Two upstream reservoirs do exist on the Altamaha River, Lake Sinclair and Jackson Lake; however, they are respectively 169 and 268 rivermiles above the plant site and do not contribute significantly to the true phytoplankton populations existing in the vicinity of the plant.

The staff concludes that true phytoplankton in the vicinity of the Hatch plant is insignificant and that the major portion of any that may be observed represents scoured periphyton in suspension.

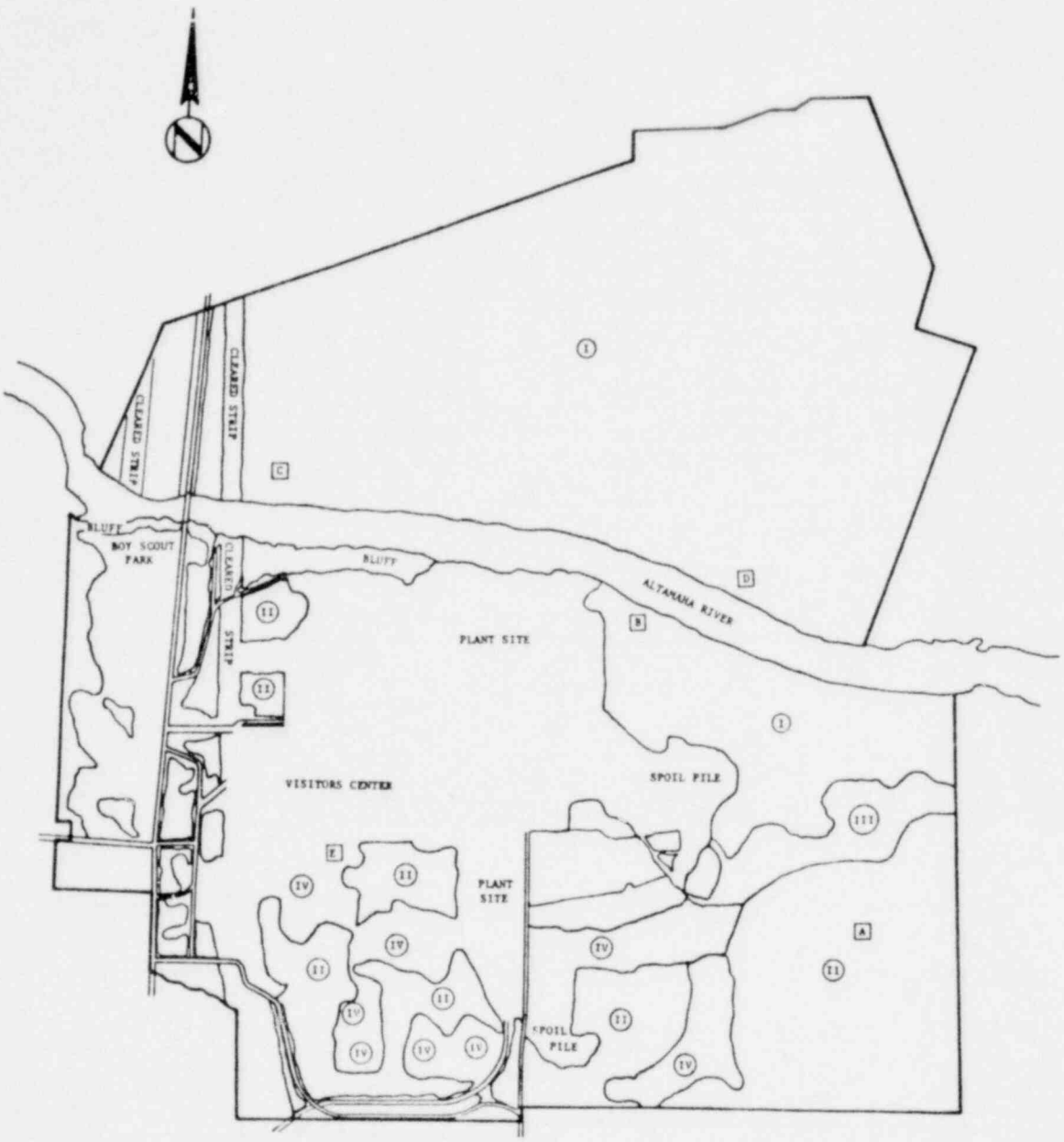


Figure 2.5-1[2] Generalized Vegetation Map of the Hatch Plant Site.
Type I: Floodplain Vegetation
Type II: Upland Mixed Pine - Hardwood
Type III: Transitional Between I and II
Type IV: Cleared and Cultivated (Planted Pine)

TABLE 2.5-1[1]

DOMINANT PLANT SPECIES*

Site	A Dry Upland	B	C Flood Plain	D	E Planted Pine-old Field
Canopy	Loblolly Pine	Loblolly Pine	Sweetgum	Sweetgum	Slash Pine
	Dogwood	Blue Beech	Black Willow	Blue Beech	
			Blue Beech	Elm	
				Red Maple	
Understory	Huckleberry	Huckleberry	Blue Beech	Switch Cane	
	Blackjack Oak	Blue Beech	Possum Haw		
		Beauty-Berry	Palmetto		
		Azalea	Sweetgum		

*Relative density approximately 10% or greater.

Periphyton

The EROL[6] characterizes the periphyton of the Altamaha River based on a study from October 1973 to September 1974 using vertically-held artificial substrates (diatometers). Periphyton sampling was continued on a reduced scale using similar methods after the beginning of Unit No. 1 operation and the results from calendar year 1975 are presented by Georgia Power Company.[7]

The periphytic algal species composition consists of 121 total taxa, 89 Bacillariophyceae (diatoms), 23 Chlorophyceae (green algae), eight Myxophyceae (blue-green algae) and one Rhodophyceae (red algae). A complete list of taxa collected from the Altamaha River is presented in the EROL.[8]

Maximum diversities in periphytic algae taxa in 1974 were observed in the spring and fall.[6] The maximum number of diatom taxa were found in the spring and early fall, with the minimum number occurring in the winter. Cairns[9] showed that in unpolluted streams diatoms grew best at 18 to 20°C (64 to 68°F), temperatures normally occurring in the spring and early fall in the Altamaha River. In contrast to the Bacillariophyceae, the Chlorophyceae and Myxophyceae are the most diverse taxa during the warm summer months. Green and blue-green algae generally tolerate higher temperatures than diatoms[10] with blue-green algae flourishing in nutrient-rich warm water.[11]

Diatom succession through time was evident in 1974. Cocconeis fluviatilis and Navicula aikenensis were prevalent in the fall algal flora, with Gomphonema spp. and Synedra spp. representing the most frequently occurring taxa in the winter months. These taxa were replaced by Acnanthes lanceolata and Fragilaria virescens in the spring and summer. The summer and fall saw the return of Cocconeis fluviatilis as a frequently occurring taxon.

The most common green algae were Closterium sp., Cosmarium sp., Mougeotia sp., and Stigeoclonium sp. These four taxa were found most frequently in the summer months, with all but Stigeoclonium sp. occurring year round.[6]

Both biomass, determined by ash-free dry weight of organic accumulation on the artificial substrates, and chlorophyll a concentrations were determined for all samples collected.

TABLE 2.5-1A

PRINCIPAL SOIL TYPES*

Soil Type	Potential for Prime Farmland
Albany sand	
Bayboro loam	
Carnegie loamy sand, 2 to 5 percent slopes	Yes
Carnegie loamy sand, 2 to 8 percent slopes	
Cowarts loamy sand, 2 to 5 percent slopes	Yes
Cowarts loamy sand, 5 to 8 percent slopes	
Coxville loam	
Dunbar loamy sand, 5 to 12 percent slopes	
Duplin loamy sand, 2 to 5 percent slopes	Yes
Duplin loamy sand. 5 to 8 percent slopes	Yes
Fuquay loamy sand, 0 to 5 percent slopes	
Hazlehurst loamy sand	
Irvington loamy sand	Yes
Johnston and Rains soils	
Johnston part	
Rains part	
Kershaw sand, 2 to 8 percent slopes	
Leefield soils	Yes
Leefield loamy sand	Yes
Mascotte sand	
Norfolk loamy sand, 2 to 5 percent slopes	
Olustee sand	Yes
Pelham loamy sand	
Sunsweet sandy loam, 5 to 12 percent slopes, eroded	
Surrency loamy sand	
Troup sand, 0 to 5 percent slopes	
Tifton loamy sand, 0 to 2 percent slopes	
Tifton loamy sand, 2 to 5 percent slopes	Yes
Troup-Wicksburg complex, 8 to 12 percent slopes	Yes
Wicksburg gravelly coarse sand, 2 to 8 percent slopes	
Wahee and Coxville soils	

*U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Appling and Jeff Davis Counties, Georgia, May 1975, Map Sheets 4 and 10 and Map Unit Guide.

TABLE 2.5-2[1]

TERRESTRIAL FAUNA

MAMMALS	BIRDS		AMPHIBIANS	REPTILES
Opossum	Belted Kingfisher	Mocking Bird	Spotted Salamander	Common Musk Turtle
Southeastern Shrew	Blue Jay	Mourning Dove	Marbled Salamander	Eastern Box Turtle
Shorttail Shrew	Bobwhite	Osprey	Three-lined Salamander	River Cooter
Eastern Cottontail	Brown Thrasher	Parula Warbler	Southern Toad	Yellow-bellied Turtle
Eastern Gray Squirrel	Cardinal	Prothonatary Warbler	Fowler's Toad	Gopher Tortoise
Beaver	Carolina Wren	Red-eyed Vireo	Southern Cricket Frog	Green Anole
Cotton Mouse	Common Crow	Red-tailed Hawk	Green Tree Frog	Six-lined Racerunner
Hispid Cotton Rat	Eastern Bluebird	Robin	Pine Woods Tree Frog	Five-lined Skink
House Mouse	Eastern Meadowlark	Rufous-sided Towhee	Little Grass Frog	Broad-headed Skink
Raccoon	Eastern Wood Peewee	Song Sparrow	Ornate Chorus Frog	Southeastern Five-lined Skink
Whitetail Deer	Great Blue Herron	Starling	Bullfrog	Southern Black Racer
	Hermit Thrush	Turkey Vulture		Eastern King Snake
	House Sparrow	White-throated Sparrow		Banded Water Snake
	Killdeer	Yellow-bellied Sapsucker		
	Loggerhead Shrike	Yellow-shafter Flicker		
	Mallard			

Artificial substrate recovery was hampered by winter and spring flooding during both years of data collection. Fluctuations in flow of the Altamaha River contributed to the observed wide fluctuations in biomass, chlorophyll a determination, and diversity between samples. Biomass was shown to have peaked in early and/or late summer for both years at all stations.[7] There were considerable decreases in chlorophyll a concentrations at north bank stations in 1975 compared to 1974.[7]

Macroinvertebrate Drift

A macroinvertebrate drift fauna study from the Altamaha River was conducted during calendar year 1973. A total of 143,966 individual aquatic and semi-aquatic macroinvertebrates representing 115 taxa were collected and identified, when possible, to the generic level. The EROL[12] lists the taxa identified from the drift samples taken in the vicinity of the Hatch plant. Immature mayflies (Ephemeroptera) represented the largest portion of the total annual number of drift organisms (29.5 percent). The most abundant genera were Baetis, Pseudocloeon, Stenonema, Isonychia, and Tortopus. Larval and adult aquatic beetles (Coleoptera) also comprised a large portion of the drift (29.3 percent). Most abundant were larvae of the dytiscid beetle, Hydroporous, which accounted for 19.3 percent of the total number of drift organisms. Numerous, also, were adult and larval Elmidae: Stenelmis sp., Macronychus glabratus, and Ancyronyx variegatus. Immature stoneflies (Plecoptera) represented 8.0 percent of the total drift. The most abundant stonefly was Perlesta. Immature caddisflies (Tricoptera) comprised 6.4 percent of total drift. The most abundant of this group were genera of the family Hydropsychidae: Hydropsyche, Macronemum, Potamyia and Cheumatopsyche.

Other groups abundant in the drift were Cladocera (17.3 percent) and immature Diptera (4.7 percent). Average values for the Shannon/Weiner[13] diversity index were prepared for each day and night sampling period. Values for diversity $\bar{H}$ were significantly greater (at .05 level) for night samples than for day samples. The mean number of taxa per sample was significantly greater (at the .05 level) in night samples than in day samples. During spring and summer sampling periods, usually three times as many taxa were collected at night compared to corresponding day samples. The number of taxa collected for both day and night samples decreased in the fall. The maximum mean value per sample exceeded 30 taxa during the May sampling period.

The mean number of aquatic macroinvertebrates per sample increased with rising temperature and discharge during spring. A peak occurred in early April with the number of organisms decreasing for the remainder of April and May concurrent with a decrease in discharge. A second peak occurred in early June with a corresponding increase in discharge. The mean number of organisms decreased regularly from early June to the end of September when the mean number leveled off and remained somewhat constant for the remainder of the year. The average number of organisms collected per sampling period was significantly higher (.05 level) at night. Usually 10 times as many organisms were obtained during night sampling periods than during corresponding day sampling periods.

Estimated density of macroinvertebrate drift organisms was also significantly greater at night. Peak densities of macroinvertebrates collected at night occurred in April and June with corresponding increases in discharge.

Benthos

Benthos from the Altamaha River in the vicinity of Unit 2 were collected at six week intervals from July 1973 through July 1974 and quarterly through 1975. Sampling was performed using Dendy multi-plate samplers and a Petersen dredge.

Approximately 100 taxa have been identified including members of the Crustacea, Collembola, Ephemeroptera, Odonata, Plecoptera, Hemiptera, Megaloptera, Coleoptera, Tricoptera, Diptera, Mollusca, and Hydracarina. A complete species list is given in the EROL[14] and updated in the Annual Environmental Surveillance Report (AESR).[7]

The mayfly (Ephemeroptera) populations showed high numbers of individuals in the spring and summer with emergence in mid-fall. Caddisfly (Trichoptera) populations exhibited the same trends shown by the mayflies, with high numbers in the spring and summer. Chironomidae exhibit a multivoltine life cycle with increases in individuals during early winter and summer. Low numbers were found during mid-fall and late winter. In general, most benthic species found in the Altamaha River in the vicinity of the site demonstrated seasonal abundance. Spring and summer months yielded higher numbers of organisms.

Species diversity ($\bar{H}$). Shannon/Weiner index,[13] of all stations showed the same general trends with $\bar{H}$ values being slightly lower during the winter and increasing in the spring.

After operation of Unit No. 1 diversity values at downstream stations were compared to upstream stations and did not reflect any immediate deleterious effects from operation of the Hatch plant.

Freshwater Mussels

A qualitative study of freshwater mussels in the Altamaha River in the vicinity of the Hatch plant was conducted during 1968. Populations of nine species of freshwater mussels, Unionidae, were found. A list of taxa is presented in the Environmental Report for the Construction Permit stage.[3]

The Altamaha River has an unusually high number of endemic taxa of Unionidae for an Atlantic coastal river. Approximately 18 taxa of Unionids are known to occur in the Altamaha; of these, seven are considered endemic to the river system.[15] The seven species are Elliptio hopetonensis, Elliptio dariensis, Elliptio shepardianus, Lampsilis dolabraeformis, Anodonta gibbosa, Alosmidonta arcula and Elliptio (Canthyria) spinosa. All seven of the endemic species have been reported in the vicinity of the Hatch site. Three species, Lampsilis dolabraeformis, Elliptio spinosa, and Elliptio hopetonensis were found in abundance during the 1968 study.[3]

The seven endemic species were listed as endangered in the Proceedings of the 1974 Conference on Endangered Species of Georgia.[16] None of the seven, however, were granted official State protection.[17] None appear on the Federal endangered and threatened list.[18]

Corbicula sp., the introduced Asiatic clam, not reported in the 1968 study, has been collected during the benthic sampling program. The presence of the clam Corbicula sp. in the Altamaha River is significant. In July of 1974, a peak density of approximately 10,000/m^2 was reported for one locality near the Hatch plant.[19] The clam is monoecious and has a high reproductive capacity. Adult populations can build up rapidly in lakes and streams, and may reach densities of up to 65,000/m^2.[20] Corbicula can heavily infest hydro installations, foul condensers at steam plants, and accelerate lake or canal sedimentation rates.[21,22] The distribution and abundance in the Altamaha River in the vicinity of the site is generally unknown and may become a significant problem in the future.

Fishes

Adult and juvenile fishes were collected monthly in the vicinity of the Hatch Station using a pattern of anchored gill nets with progressive mesh sizes, and a boat mounted electrofishing device from May 1972 to July 1974 and quarterly by gill net only during late 1974 to late 1975. Results of these studies are presented in the EROL[6] and AESR.[7] Juvenile fishes were collected monthly in the vicinity of the Hatch Station at two stations using a 100 ft, 1/4" bar mesh bag seine during the period April through November 1974. Three monthly juvenile fish surveys were conducted at two stations in 1975.

Dahlberg and Scott[23] reported 93 freshwater species from the Altamaha River. Sampling for fishes in the vicinity of the site resulted in the collection of 66 species, 5 of which are not listed in Dahlberg and Scott since they are not truly freshwater forms. A total of 75 freshwater and euryhaline species expected to occur in the Altamaha River in the vicinity of the Hatch plant is given in Table 2.5-3.

Gill netting in 1972-1974 resulted in a total of 2,217 individuals representing 30 taxa. The Shannon and Weiner diversity index ($\bar{H}$) ranged from 1.77 to 3.08. Gill netting in 1975 resulted in a total of 242 specimens from 18 taxa.

The four most abundant taxa taken by gill net from 1972 to 1974 were Dorosoma cepedianum, Carpiodes sp. cf velifer, and cyprinus, Minytrema melanops and Lepisosteus osseus. Together they comprised 79.2% of the total catch. In the 1975 survey, the four most abundant taxa in rank order taken by gill net were Carpiodes sp. cf velifer and cyprinus, Dorosoma cepedianum, Lepisosteus osseus and Moxostoma anisurum. Together they comprised 81% of the total catch. No data on fish captured by electrofishing is presented.

Juvenile fish collected by seining in 1974 resulted in 11,904 specimens from 19 species and are summarized in the EROL[24] and the AESR.[25] A total of 1,191 specimens were collected from an unreported number of taxa in 1975. The four most abundant taxa taken for both 1974 and 1975 were Hybognathus nuchalis, Alsoa sapidissima, Carpiodes sp. cf velifer, and Trinectes maculatus. Together they comprised 98.7% of the specimens taken in 1974 and 86% of the specimens taken in 1975.

TABLE 2.5-3

FISH TAXA IN VICINITY OF HNP

ACIPENSERIDAE - Sturgeons	
Acipenser brevirostrum	Shortnose sturgeon
Acipenser oxyrhynchus	Atlantic sturgeon
LEPISOSTEIDAE - Gars	
Lepisosteus osseus	Longnose gar
Lepisosteus platyrhincus	Florida gar
AMIIDAE - Bowfins	
Amia calva	Bowfin
ANGUILLIDAE - Freshwater Eels	
Anguilla rostrata	American eel
CLUPEIDAE - Herrings	
Alosa aestivalis	Blueback herring
Alosa mediocris	Hickory shad
Alosa sapidissima	American shad
Dorosoma cepedianum	Gizzard shad
*Dorosoma petenense	Threadfin shad[1]
UMBRIDAE - Mudminnows	
Umbra pygmaea	Eastern mudminnow
ESOCIDAE - Pikes	
Esox americanus	Redfin pickerel
Esox niger	Chain pickerel
CYPRINIDAE - Minnows and Carps	
Cyprinus carpio	Carp
Hybognathus nuchalis	Silvery minnow
*Hybopsis rubrifrons	Rosyface chub[1]
Notemigonus crysoleucas	Golden shiner
Notropis callisema	Ocmulgee shiner
Notropis cummingsae	Dusky shiner
Notropis hudsonius	Spottail shiner
*Notropis leedsi	Ohoopee shiner[1]
Notropis longirostris	Longnose shiner
Notropis maculatus	Taillight shiner
Notropis petersoni	Coastal shiner
Pimephales promelas	Bluntnose minnow
CATOSTOMIDAE - Suckers	
Carpiodes sp. cf cyprinus	
Carpiodes sp. cf velifer	
Erimyzon oblongus	Creek chubsucker
*Erimyzon succetta	Lake chubsucker
Minytrema melanops	Spotted sucker
Moxostoma anisurum	Silver redhorse
*Moxostoma robustum	Smallfin redhorse[1]

ICTALURIDAE - Freshwater Catfishes	
Ictalurus brunneus	Snail bullhead
Ictalurus catus	White catfish
Ictalurus natalis	Yellow bullhead
Ictalurus nebulosus	Brown bullhead
Ictalurus platycephalus	Flat bullhead
Ictalurus punctatus	Channel catfish
Noturus gyrinus	Tadpole madtom
Noturus leptacanthus	Speckled madtom
AMBLYOPSIDAE - Cavefishes	
**Chologaster cornuta*	Swampfish[1]
APHREDODERIDAE - Pirate Perches	
Aphredoderus sayanus	Pirate perch
BELONIDAE - Needlefishes	
Strongylura marina	Atlantic needlefish
CYPRINODONTIDAE - Killifishes	
Fundulus notti	Starhead topminnow
Leptolucania ommata	Pygmy killifish
POECILIIDAE - Livebearers	
Gambusia affinis	Mosquitofish
Heterandria formosa	Least killifish
ATHERINIDAE - Silversides	
Labidesthes sicculus	Brook silverside
PERCICHTHYIDAE - Temperate basses	
Morone chrysops	White bass
Morone saxatilis	Striped bass
CENTRARCHIDAE - Sunfishes	
Acantharchus pomotis	Mud sunfish
Centrarchus macropterus	Flier
Elassoma evergladei	Everglades pygmy sunfish[1]
**Elassoma okefenokee*	Okefenokee pygmy sunfish[1]
Elassoma zonatum	Banded pygmy sunfish
Enneacanthus gloriosus	Bluespotted sunfish
Enneacanthus obesus	Banded sunfish
Lepomis auritus	Redbreast sunfish
Lepomis gulosus	Warmouth
Lepomis macrochirus	Bluegill
Lepomis marginatus	Dollar sunfish
Lepomis microlophus	Redear sunfish
Lepomis punctatus	Spotted sunfish
Micropterus salmoides	Largemouth bass
**Pomoxis annularis*	White crappie[1]
Pomoxis nigromaculatus	Black crappie
PERCIDAE	
**Etheostoma fusiforme*	Swamp darter[2]
Etheostoma hopkinsi	Christmas darter
Etheostoma olmstedi	Tessellated darter
Perca flavescens	Yellow perch
Percina nigrofasciata	Blackbanded darter

MUGILIDAE - Mullets	
Mugil cephalus	Striped mullet
BOTHIDAE - Lefteye flounders	
Paralichthys lethostigma	Southern flounder
SOLEIDAE - Soles	
Trinectes maculatus	Hogchoker

*Not collected but reported or suspected to inhabit the area.
[1]Dahlberg and Scott, 1971 (see Reference 23).
[2]Collette, 1962 (see Reference 32).

Commercial Fishery

Commercial catfishing and shadfishing are allowed in the Altamaha River in the vicinity of the Hatch plant. No commercial catfishing catch statistics are available; however, catfishermen complain that they must expend increasing amounts of effort to maintain their usual catches of channel catfish.[6] This effort is expressed in numbers of hooks fished, and is reported to have doubled since 1972.[6] Based on the results of preoperational monitoring conducted in the vicinity of the site this purported reduction in the catfish fishery is not attributable to plant operation.

Shad fishermen have complained of greatly reduced American shad catches since 1970. Previous studies have demonstrated that the commercial effort in the Altamaha River utilizes nearly 50 percent of the annual shad run. Since the annual commercial fishing effort in the Altamaha River has remained relatively constant for the past eleven years, the catch from this effort may be used as an indicator of the annual shad migration.[6] Table 2.5-4 shows the annual reported shad catch from the Altamaha River for the past eleven years. The catch steadily decreased annually since 1969; however, a slight improvement is noted for 1975. Factors influencing the size of annual shad runs are complex and are not completely understood at present. No breakdown of the catch for the Altamaha River in the vicinity of the site is available. It is believed, however, that the majority of shad are caught below the town of Jesup, Georgia.

Sports Fishery

A short term landing type creel survey was conducted by Georgia Department of Natural Resources, Game and Fish Division,[26] during the summer of 1972. A 107 mile segment of the Altamaha River was sampled with access points above and below the Hatch site from July 1, 1972 to August 25, 1972, a period of eight weeks. A non-uniform probability sample design was employed. A total of 346 fishermen were interviewed during the survey. Expanded fishing pressure during the eight week period was 83,469 angler hours. Based on other creel surveys in Georgia, the sport fishing pressure for the eight week period represents slightly more than one fifth of the annual pressure on the Altamaha River. Therefore, the estimated annual fishing pressure on the surveyed segment of the Altamaha River would be 417,345 angler hours or 55.9 angler hours per acre. Expanded harvest for the eight week period was 158,591 fish weighing 54,886 lbs. Channel catfish (Ictalurus punctatus) was the dominant species caught making up 52.7 percent by number and 47.2 percent by weight. Approximately 33.5 percent by number and 28.1 percent by weight was bluegill (Lepomis macrochirus) and redbreast sunfish (Lepomis auritus). The per acre harvest during the survey period was calculated to be 21.2 fish weighing 7.35 lbs. Based on other creel surveys in Georgia coastal streams the estimates of harvest for the eight week period represents 16 to 30 percent of the annual creel. Assuming that 20 percent of the annual creel from the Altamaha River are caught in July and August, the annual harvest from the surveyed segment of the river would be 792,955 fish weighing 274,430 lbs.

TABLE 2.5-4

ANNUAL COMMERCIAL CATCHES OF SHAD,
ALTAMAHA RIVER, 1964 TO 1975*

Year	Pounds	Value
1964	182,369	$ 59,224
1965	192,267	65,481
1966	158,810	41,995
1967	137,126	23,857
1968	295,907	71,677
1969	407,700	119,111
1970	345,400	99,140
1971	241,900	79,087
1972	154,500	55,474
1973	76,827	30,483
1974	54,930	20,016
1975**	87,662	50,441

*Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, Volume 2, Appendix A, Table 5.2-3.

**Annual Environmental Surveillance Report No. 2, January 1-December 31, 1975, Section 5.6.

No breakdown of angling pressure or annual harvest is available in the vicinity of the Hatch plant.

The Georgia Power Company staff monitored sport fishing activity at river mile 118.5, upstream from the site on Saturday, May 19, 1973.[6] Fifty-five fishing boats were launched from a paid boat ramp with an average of two fishermen per boat. The applicant estimated that there were approximately 440 fishermen on a ten mile stretch of river in the vicinity of the Hatch plant. Although Georgia Power Company personnel were unable to record the efforts of the fishermen, several legal limits of 50 redbreast sunfish (Lepomis auritus) per fisherman was observed. The applicant concluded that sport fishing pressure in the vicinity of the plant is significant.

In 1975, Georgia Power Company personnel interviewed a local shad fisherman who estimated that no more than 200 American shad were caught in the vicinity of the plant.[27]

Based on the state creel survey, the sports fishery monitoring efforts by the applicant, and the number of pay and non-pay boat ramps upstream and downstream of the Route 1 bridge, the staff concludes that an extensive sports fishery exists in the Altamaha River in the vicinity of the Hatch plant.

Rare or Endangered Fishes

The list of fishes known from the Altamaha River in the vicinity of the Hatch plant has been compared to both the Federal and State Endangered and Threatened Species Lists.[17,18] One species, the shortnose sturgeon (Acipense. revirostrum) has been reported from the plant site and appears on both the Federal and State lists. A single adult specimen was collected by gill net on March 13, 1974 in the vicinity of the Hatch site. Three additional specimens of Acipenser sp., two juveniles and one larva were collected but could not be identified to the species level.

The shortnose sturgeon is a rare form restricted to the eastern seaboard of North America from the Saint Johns River in New Brunswick to the Saint Johns River of eastern Florida.[28] Little is known of the life history of this form due to its rarity. Spawning takes place in the spring in the middle reaches of large tidal rivers from April to early June, depending on latitude. Adults apparently return to a parent stream for spawning. The shortnose sturgeon is captured most often in large tidal rivers but is also taken in brackish and salt water.

Captures in the Gulf of Maine indicate that it goes to sea and travels some distance from the parent stream.[28] Gut analysis of Hudson River specimens has shown that the diet consists of sludgeworms, Chironomid larvae, small crustaceans, and plants.

Important Species

Two important species of fish found in the Altamaha River are the American shad (Alosa sapidissima) and the hickory shad (Alosa mediocris). Both species have annual spring spawning runs up the Altamaha River. The present upstream limit of the shad run is in the vicinity of Hawkinsville, Georgia, a distance of 252 miles from the mouth of the Altamaha.[29] Tagging studies done in 1968 resulted in population estimates for both hickory and American shad. The population estimate for American shad was 989,213 lbs, for hickory shad 117,648 lbs. The shad spawn in the Altamaha River from January to April depending on water temperature. Some shad spawning may occur at water temperatures from 8°C to 26°C with peak spawning activity occurring at temperatures between 14°C and 21°C.[29]

During 1967 and 1968, spawning areas for the Altamaha were determined by the use of egg collecting nets. Some spawning occurred throughout the river system with the major spawning area extending from about 60 miles upstream into the tributaries.[29] The largest catch per unit effort of shad eggs occurred at stations located below the site.

Other important species utilizing the Altamaha River channel proper are the largemouth bass (Micropterus salmoides), blueback herring (Alosa aestivalis), striped bass (Morone saxatilis), and the Atlantic sturgeon (Acipenser oxyrhynchus).

Fish Eggs and Larvae

Fish eggs and larvae were collected during drift and entrainment studies from the Altamaha River in the vicinity of the Hatch plant. Samples were collected weekly from February through June from 1973 through 1975. Both day and night samples were taken.

In 1973, American shad (Alosa sapidissima) eggs were collected in the river from early February through June. Mean densities approached $30/10^4M^3$ in March night collections and in May day collections. Average numbers collected per sampling period were greater at night as compared to corresponding day samples. Mean egg densities in both day and night samples varied inversely with river flow. Larvae of American shad were present in drift samples from March through June. Larval densities never exceeded $3/10^4M^3$.[30]

In 1974, Alosa sapidissima eggs were present in the drift from February through July. Both day and night collections reached a maximum of $25\text{-}30/10^4M^3$. Egg density remained above $10/10^4M^3$ consistently from mid-March through May. In 1975, A. sapidissima eggs were present in the drift from February through June, with a maximum in mid-May of about $50/10^4M^3$ in both day and night collections. Density of eggs fluctuated inversely with river discharge through June. In general, density of Alosa sapidissima eggs remained higher for a longer period of time in 1974 than in 1973 or 1975 probably as a result of increased river flow in 1973 and 1975. No data on larval density for American shad are available for 1974 and 1975 sampling periods.

In 1973, Hickory shad (Alosa mediocris) eggs and larvae were rare in the drift. Hickory shad have extremely adhesive eggs and utilize tributaries and oxbows rather than the main channel to spawn.[31] A total of nine eggs and one larva were collected. Egg densities were negligible for most of the season and reached $1.7/10^4M^3$ during one day and night sampling period in early March. Maximum density of A. mediocris larvae occurred in March and reached $0.5/10^4M^3$ for a day sampling period.

In 1973, blueback herring (Alosa aestivalis) eggs and larvae were rare in the drift. No eggs and only 14 larvae were collected. Density of A. aestivalis larvae exceeded $1/10^4M^3$ in three night sampling periods in March and April. Peak density of larvae was $1.3/10^4M^3$.

In the 1974 and 1975 sampling periods, there was no attempt to identify eggs and larvae of Alosa mediocris from Alosa aestivalis. Combined densities of larvae only were reported under the taxon Alosa spp.

Larvae of Alosa spp. were present in the 1974 drift from February through July. Both day and night densities peaked in March and in early May reaching a maximum of $30\text{-}40/10^4M^3$. In 1975, the larval density of Alosa spp. was suppressed early in the season as a result of extreme river flow in February through May. As river flow decreased in May, larval density

increased, especially in night samples. Larvae were still present in night drift at the end of the survey in June.

Catostomid larvae were present in the drift from March through July in 1974 and 1975 from March to the end of the survey in June. Maximum density of $1000/10^4M^3$ was recorded in March for 1974. In 1975, catostomid density peaked in late April and early May reaching about $100/10^4M^3$.

Centrarchid larvae were present in the 1974 samples from February through the end of the survey in July as river flow diminished in April; centrarchid density rose to about $30/10^4M^3$. A second increase in river flow coincided with a decrease in density in early May after which river flow decreased and density rose to about $40/10^4M^3$.

In 1975, centrarchid larvae were present in the drift in February and were increasing in abundance at the end of the survey in June. Maximum larval densities ($200/10^4M^3$) were observed in June and July night collections.

Cyprinid larvae were collected from January through July in 1974. Maximum densities occurred in late February ($80\text{-}90/10^4M^3$) and again in early May exceeding $100/10^4M^3$. Both peaks occurred during periods of increased river flow. Cyprinid larvae were collected from February through June in 1975. Maximum densities occurred in March ($800\text{-}900/10^4M^3$). Maximum densities occurred during periods when river flow was decreasing rapidly after a peak. Densities in night collections were greater than in day collections in both 1974 and 1975.

Two sturgeon larvae, Acipenser sp. were collected in the drift during the spring of 1973. Positive identification to the species level is lacking and the specimens are currently being examined by an expert for verification.

2.6 BACKGROUND RADIOLOGICAL CHARACTERISTICS

The U.S. Environmental Protection Agency[1] has reported average background radiation dose equivalents in Georgia as 100 millirem/person/year. Of this total, 43.3 millirem/person/year was attributed to cosmic radiation. External gamma radiation (primarily from K-40 and the decay products of the uranium and thorium series) was estimated as 38.9 millirem/person/year. The remainder of the whole body dose is due to internal radiation (mostly K-40) which was estimated to average 18 millirem/person/yr.

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6. Ibid., Table 2.5-5.

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3. THE PLANT

3.1 RESUMÉ

During this environmental review, construction of Edwin I. Hatch Nuclear Plant Unit No. 2 was proceeding and Unit No. 1 was in commercial operation (see Figure 3.1-1). There have been minor changes in the design of Unit No. 2 subsystems since the issuance of the FES-CP. These changes include a modification to the cooling tower distribution trays, a finalized design for the discharge structure and changes to the liquid, gaseous, and solid radioactive waste treatment systems. These various changes were reassessed to provide a current evaluation. New parameters and mathematical models were utilized in this assessment to calculate the releases of radioactive materials in liquid and gaseous effluents from the modified radioactive waste treatment systems.

3.2 DESIGN AND OTHER SIGNIFICANT CHANGES

3.2.1 Plant Water Use

Surface Water

The Altamaha River provides the major source of water for the plant. An average of 22,550 gallons per minute and maximum 34,000 gallons per minute will be withdrawn for cooling tower operation for the Hatch Unit No. 2 plant. Of this amount, an average of 12,200 gallons per minute with a maximum of 23,600 gallons per minute will be returned to the river. The average consumptive use due to evaporation and drift from the cooling towers will be about 10,400 gallons per minute.

Groundwater

A smaller quantity of water (for plant uses other than cooling) will be withdrawn from wells tapping the regional artesian aquifer. Of the 327 gallons per minute withdrawn for two-unit normal operation, 320 gallons per minute will be used as makeup for the condensate water system and 7 gallons per minute will be used for the sanitary water system. Practically all of this withdrawal will eventually be released to the river.

3.2.2 Heat Dissipation System

There will be two major cooling water systems and one supplemental system in the plant. The circulating water system will supply 556,000 gallons per minute of cooling water for each unit to the steam condensers. Mechanical draft cooling towers will dissipate the waste heat to the atmosphere. The system will dispose of 5.71×10^9 BTU/hr for each unit under normal conditions.

The service water system will supply cooling water to auxiliary systems in the plant, and will also supply makeup water to the circulating water system. Approximately 19,300 gpm from the service water system will be used to provide makeup water to replenish losses due to evaporation, drift and blowdown from the cooling towers. Four pumps will supply an average of 22,550 gallons per minute from the Altamaha River.

The third system, the residual heat removal system (RHR), will supply water independently from the service water system. The RHR system will be used for normal and emergency shutdown of the reactors.

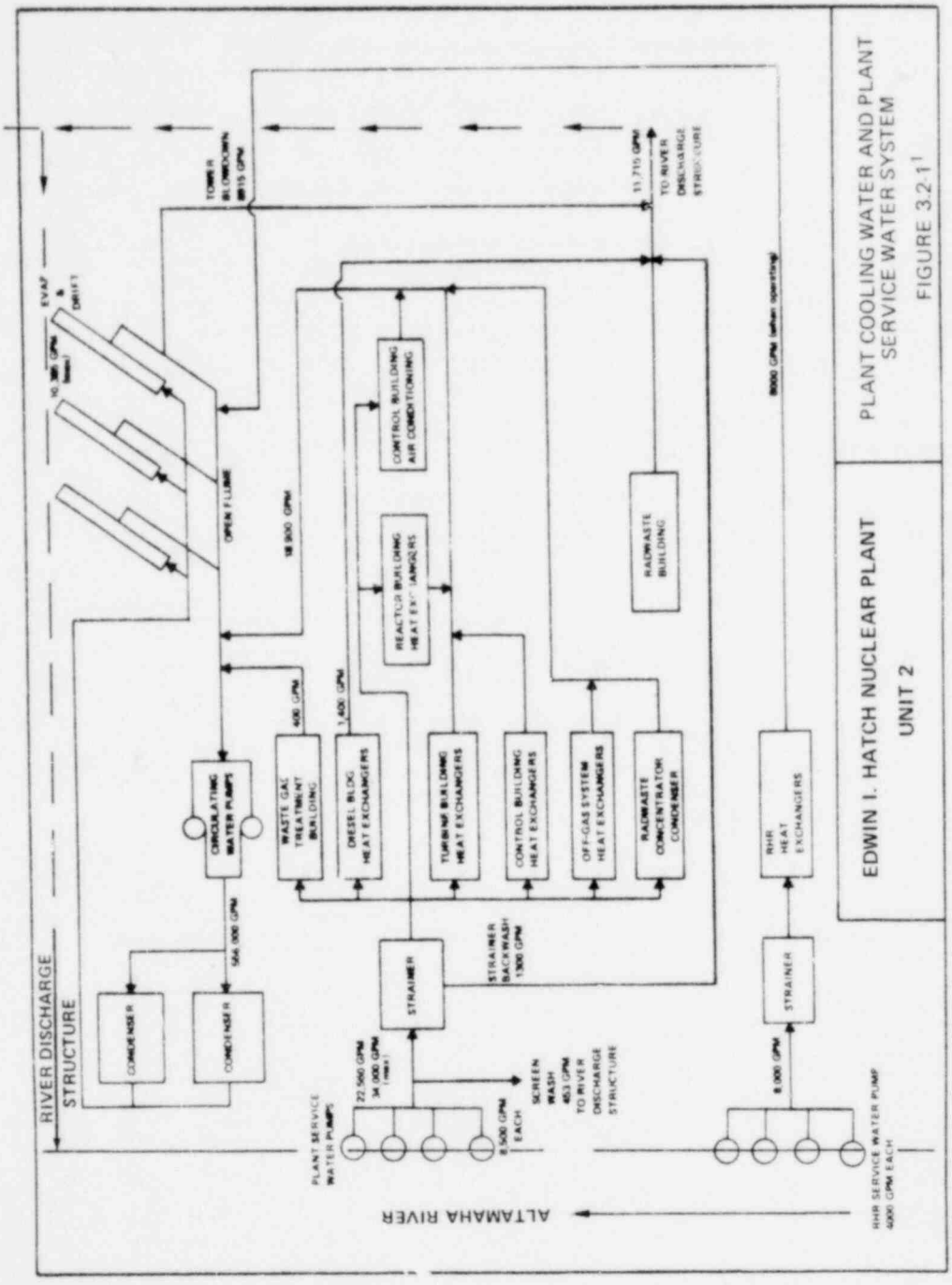
The Altamaha River has adequate flow under all conditions to supply the required water for the plant. A flow diagram for all water systems is shown in Figure 3.2-1.

Intake Structures

All withdrawals from the Altamaha River will be from a single intake structure common to both units. Screened water will be withdrawn through the intake structure, which is about 150 feet long, 60 feet wide, and located about 60 feet above normal water level. This structure is situated so that water is available to the plant at both minimum flow and design basis flood conditions on the river. The water entrances are covered with trash racks and traveling

Figure 3.1-1 Aerial View of Edwin I. Hatch Nuclear Plant (July 17, 1975)

Source: Georgia Power Company


EDWIN I. HATCH NUCLEAR PLANT
UNIT 2
PLANT COOLING WATER AND PLANT SERVICE WATER SYSTEM
FIGURE 3.2-1
RIVER DISCHARGE STRUCTURE
ALTAMAHA RIVER
CONDENSER
CONDENSER
CIRCULATING WATER PUMPS
WASTE GAC TREATMENT BUILDING
DIESEL BLDG HEAT EXCHANGERS
REACTOR BUILDING HEAT EXCHANGERS
CONTROL BUILDING AIR CONDITIONING
TURBINE BUILDING HEAT EXCHANGERS
CONTROL BUILDING HEAT EXCHANGERS
OFF-GAS SYSTEM HEAT EXCHANGERS
RADWASTE CONCENTRATOR CONDENSER
RADWASTE BUILDING
RHR HEAT EXCHANGERS
STRAINER
STRAINER
PLANT SERVICE WATER PUMPS
RHR SERVICE WATER PUMPS
4000 GPM EACH
8,500 GPM EACH
TO RIVER DISCHARGE STRUCTURE
TO RIVER DISCHARGE STRUCTURE
OPEN FLUME
EVAP & DRIFT

screens which can be backwashed to remove debris and impinged fish. The maximum intake velocity at the design low flow in the river will be 1.9 ft/sec. and proportionately less at higher river flows.

Discharge Structure

The various service water and RHR streams depicted in Figure 3.2-1 will enter a mixing box common to both units, and will then be discharged to the river through two 42-inch pipes extending 120 feet into the river perpendicular to shore and approximately 1260 feet downstream from the intake structure. The discharge pipes are at elevations 59 ft. MSL, or about 4 feet below the river surface at its lowest anticipated level. Discharge velocity under normal conditions will be 3.0 ft/sec.

3.2.3 Radioactive Waste Treatment

Since the FES-CP was issued, the applicant has modified the liquid, gaseous and solid radioactive waste treatment systems as proposed in the Final Safety Analysis Report (FSAR). The staff has calculated revised liquid and gaseous source terms and annual quantity of solid waste with radioactive contents based on more recent operating data applicable to the Hatch Nuclear Plant.

On April 30, 1975, the Nuclear Regulatory Commission announced its decision in the rulemaking proceeding (RM-50-2) concerning numerical guides for design objectives and limiting conditions for operation to meet the criterion "as low as is reasonably achievable" for radioactive material in light-water-cooled nuclear power reactor effluents. This decision is implemented in the form of Appendix I to 10 CFR Part 50. To effectively implement the requirements of Appendix I, the NRC staff has reassessed the parameters and mathematical models used in calculating releases of radioactive materials in liquid and gaseous effluents in order to comply with the Commission's guidance. This guidance directed that current operating data, applicable to proposed radwaste treatment and effluent control systems for a facility, be considered in the assessment of the input parameters. The staff has completed its reassessment and these parameters, models and their bases are given in Regulatory Guide 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors," April 1976, and the staff's BWR-GALE Code, NUREG-0016.

In compliance with Section V.B of Appendix I to 10 CFR Part 50, the applicant submitted, on June 4, 1976, information necessary to evaluate the capability of the Hatch Nuclear Plant, Unit Nos. 1 and 2, for keeping levels of radioactivity in effluents to unrestricted areas, "as low as is reasonably achievable." In these submittals, the applicant chose to comply with the Commission's September 4, 1975 amendment to Appendix I, eliminating the necessity of performing a cost-benefit analysis as required by Paragraph II.D of Appendix I.

The staff has evaluated the radioactive waste treatment systems proposed for Hatch Nuclear Plant, Unit Nos. 1 and 2, to reduce the quantities of radioactive materials released to the environment in liquid and gaseous effluents. The staff has generated new liquid and gaseous source terms to determine conformance with Appendix I based on new operating data applicable to the Hatch Nuclear Plant, Unit Nos. 1 and 2, on changes to the radwaste treatment systems provided in the applicant's June 4, 1976 submittals and described below, and on changes in the calculational model. The calculated releases of radioactive material in liquid and gaseous effluents are provided in Tables 3.2-2 and 3.2-3 and are based on the parameters given in Table 3.2-1 using the calculational model presented in NUREG-0016. The new source terms were used to calculate the dose estimates discussed in Section 5.5. The staff believes that the radionuclide composition set forth in Tables 3.2-2 and 3.2-3 reasonably characterizes the annual average calculated releases of radioactive material in liquid and gaseous effluent from the Hatch Nuclear Plant, Unit Nos. 1 and 2.

3.2.3.1 Liquid Radwaste System Modifications

The liquid radwaste system for Hatch Nuclear Plant, Unit Nos. 1 and 2, is a separate system with a single laundry facility at Unit No. 1, as shown in Figure 3.2-2. The liquid radwaste effluent radiation monitor has been modified to include automatic isolation of the discharge line, rather than manual control, if the radiation measurements exceed a predetermined level in the discharge line. Spent resins from the waste demineralizer and the floor drain demineralizer will be processed by the solid waste system, rather than regenerated as was stated in the FES-CP.

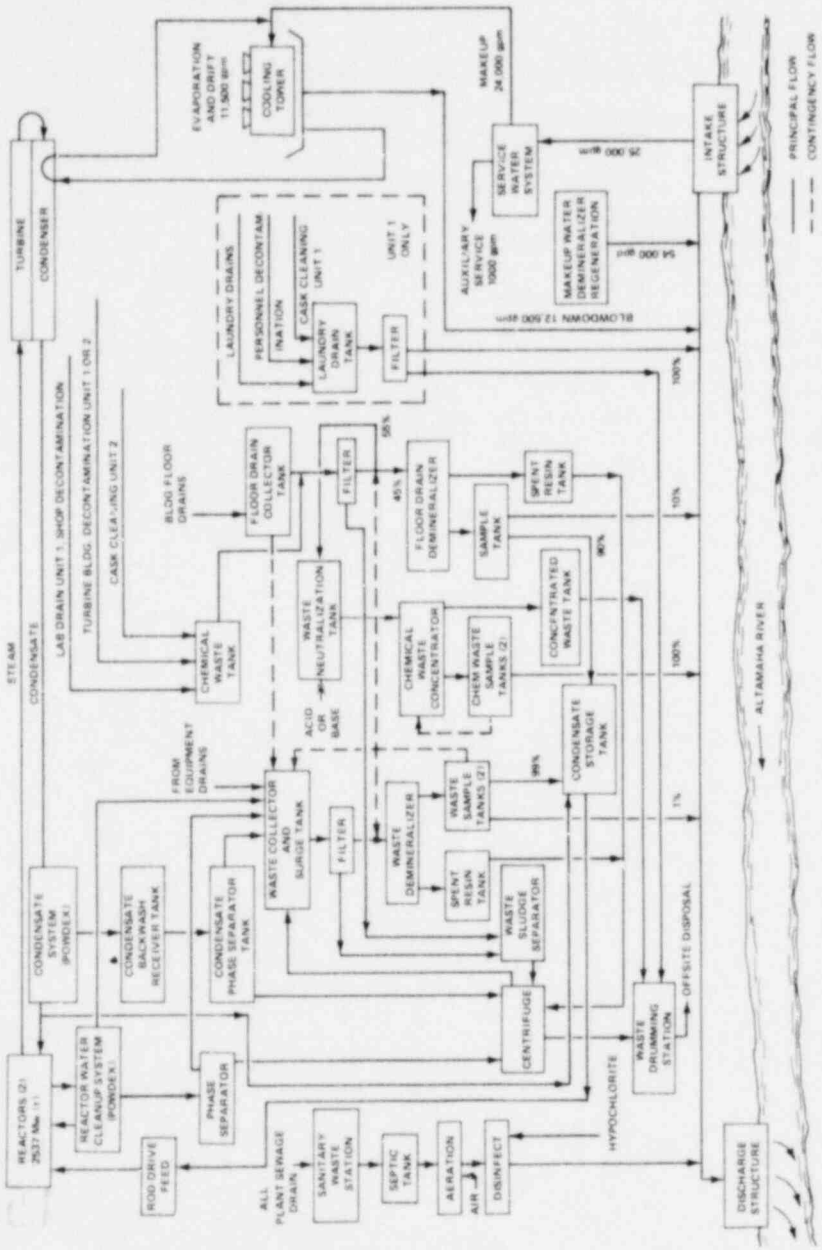


Figure 3.2-2 Liquid Radwaste System for Hatch Nuclear Plant, Unit Nos. 1 and 2.

3.2.3.2 Gaseous Radwaste System Modifications

The gaseous radwaste system modifications consist of routing the waste gas building ventilation flow of 2400 cfm to the main stack and changes to the turbine building ventilation system, as shown in Figure 3.2-3. The turbine building ventilation system design will include an air recirculation and cooling system to reduce the ventilation air flow rate to permit treatment before release to the environment. The turbine building ventilation air exhausts will be treated by two 12,500 cfm filter trains consisting of HEPA filters and charcoal absorbers.

3.2.3.3 Solid Radwaste System Modifications

Modifications to the solid radwaste system consist of state-of-the-art improvements in packaging solid wastes for offsite shipment to a licensed burial site.

Wet solid wastes, consisting mainly of spent demineralizer resins collected in a 1200 gallon spent resin tank, and sludges from the six phase separators will be dewatered by a centrifuge and mixed with cement or urea-formaldehyde solidification agent. The mixer will utilize liquid wastes from the 4500 gallon concentrated waste tank that collects waste evaporator bottoms for liquid needed for proper solidification.

The staff estimates that approximately 31,000 ft^3 of packaged wet solid waste containing approximately 3700 Ci and 4700 ft^3 of dry solid waste containing a total of less than 5 Ci will be shipped offsite annually per reactor. Greater than 90% of the radioactivity associated with the solid waste will be long-lived fission and corrosion products, principally Cs-134, Cs-137, Co-58, Co-60 and Mn-54. The applicant estimates that approximately 20,000 ft^3 (2000 drums) of wet solids totaling approximately 1770 Ci will be shipped offsite annually per reactor.

All containers will be shipped to licensed burial sites in accordance with NRC and DOT regulations. The solid waste system will be similar to systems that have been evaluated and found to be acceptable in previous license applications. Therefore, the staff finds this solid waste system to be acceptable.

3.2.3.4 Evaluation

The liquid source term calculated for each reactor using the parameters in Table 3.2-1 and Regulatory Guide 1.112 (BWR-GALE Code, NUREG-0016) is 0.32 Ci/yr, excluding tritium, and 32 Ci/yr of tritium as shown in Table 3.2-2. The gaseous source term calculated for each reactor is approximately 31,000 Ci/yr of noble gases, 0.12 Ci/yr of iodine-131, 32 Ci/yr of tritium, 9.5 Ci/yr of carbon-14 and 0.003 Ci/yr of particulates for each reactor as shown in Table 3.2-3. These source terms were used to calculate the doses and provide comparison with the design objectives of Appendix I to 10 CFR Part 50 as given in Section 5.5.

The staff's evaluation concludes that the liquid and gaseous radioactive waste treatment systems for Hatch, Unit Nos. 1 and 2, are capable of maintaining releases of radioactive materials in effluents to "as low as is reasonably achievable" levels in accordance with 10 CFR 50.34a during normal operation, including anticipated operational occurrences. As shown in Section 5.5, the resulting doses associated with Hatch Nuclear Plant, Unit Nos. 1 and 2, meet the dose design objectives set forth in Sections II.A, B and C of Appendix I to 10 CFR Part 50 and satisfy the dose and curie design objectives in RM-50-2 in accordance with the September 4, 1975 option to Section II.D of Appendix I. On this basis, the staff finds these systems acceptable.

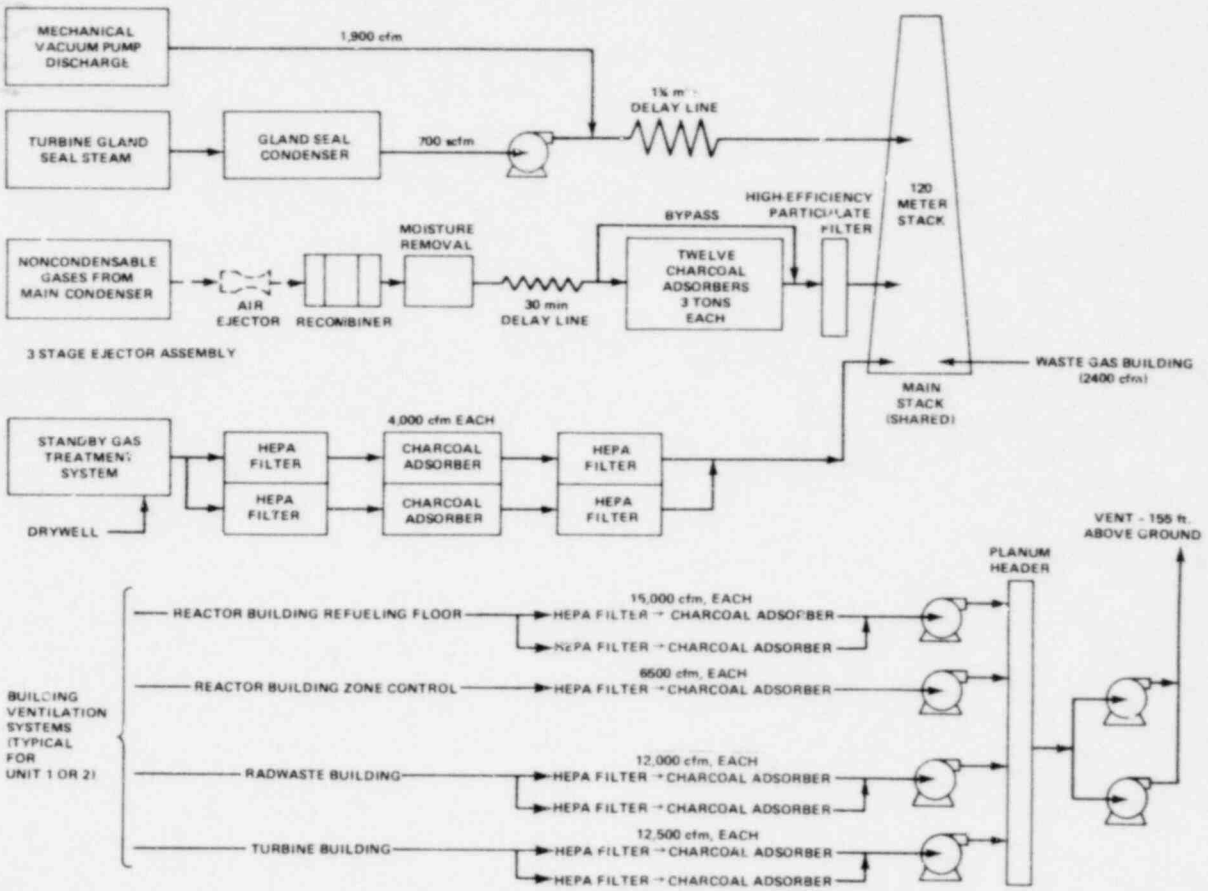


Figure 3.2-3 Gaseous Radwaste System for Hatch Nuclear Plant, Unit No. 2.

TABLE 3.2-1

PRINCIPAL PARAMETERS AND CONDITIONS USED IN

CALCULATING RELEASES OF RADIOACTIVE MATERIAL IN

LIQUID AND GASEOUS EFFLUENTS FROM HATCH, UNIT NOS. 1 OR 2

(PER UNIT)

Reactor Power Level (MWt)	2537
Plant Capacity Factor	0.80
Fraction of Fuel Releasing Radioactivity to the Primary Coolant	
Noble gases	60,000 uCi/sec for 3,400 MWt after 30 min
Iodine-131 (independent of power level)	5×10^{-3} uCi/gm
Primary Coolant System	
Weight of liquid in reactor vessel (lb)	4.57×10^{5}
Cleanup demineralizer flow (lb/hr)	1.0×10^{5}
Steam flow rate (lb/hr)	1.05×10^{7}
Condenser air inleakage (scfm)	20
Condensate demineralizer flow (lb/hr)	1.05×10^{7}
Dilution Flow (gal/min)	12,000
Iodine Partition Factors (gas/liquid)	
Steam/liquid in the reactor vessel	0.02
Fraction of Iodine Getting Through	
Condensate demineralizer	0.01
Cleanup demineralizer	0.1
Holdup Times	
Holdup pipe	30 min
Charcoal delay krypton	0.76 days
Charcoal delay xenon	13.5 days

1561 100

TABLE 3.2-1 cont'd

Decontamination Factors	I	Cs	Others
Waste collection system (high purity)	10^2	10	10^2
Floor drain neutralizer system (low purity)	10^2	2	10^2
Chemical waste system	10^3	10^4	10^4

	All Nuclides Except Iodine	Iodine
Waste Evaporator DF	10^4	10^3

Demineralizer Type	Cation	Anion	Cs, Rb
Mixed-Bed-Deep-Bed on Clean Waste (H + OH) DF[a]	10^2(10)	10^2(10)	10(10)
Mixed-Bed-Deep-Bed on Floor Drain (H + OH) DF[a]	10^2(10)	10^2(10)	2(10)
Mixed-Bed (Powdex) DF	10	10	2

Dynamic Adsorption Coefficients	Cm^3/gm
Kr (operating temperature 77°F, dew point 45°F)	18.5
Xe (operating temperature 77°F, dew point 45°F)	330

1561 101

[a]For two demineralizers in series, the DF for the second demineralizer is given in parentheses.

TABLE 3.2-2

CALCULATED RELEASES OF RADIOACTIVE MATERIALS
IN LIQUID EFFLUENTS
FROM HATCH NUCLEAR PLANT, UNIT NOS. 1 OR 2

Nuclide	Ci/yr/reactor
Corrosion & Activation Products	
Na-24	1.2(-2)[b]
P-32	4.7(-4)
Cr-51	1.2(-2)
Mn-54	1.1(-3)
Mn-56	9.6(-3)
Fe-55	2.4(-3)
Fe-59	7(-5)[a]
Co-58	4.5(-3)
Co-60	9.7(-3)
Ni-65	6(-5)
Cu-64	3.8(-2)
Zn-65	4.8(-4)
Zn-69m	2.7(-3)
Zn-69	2.8(-3)
Zr-95	1.4(-3)
Nb-95	2(-3)
W-187	5.1(-4)
Np-239	1.4(-2)
Fission Products	
Br-83	7.3(-4)
Sr-89	2.4(-4)
Sr-90	1(-5)
Sr-91	4.2(-3)
Y-91m	2.7(-3)
Y-91	1.3(-4)
Sr-92	2.1(-3)
Y-92	5.9(-3)
Y-93	4.4(-3)
Zr-95	2(-5)
Nb-95	2(-5)
Nb-98	2(-5)
Mo-99	4.2(-3
Tc-99m	1.6(-2)
Ru-103	1.9(-4)
Rh-103m	5(-5)
Ru-105	9.5(-4)
Rh-105m	9.6(-4)
Rh-105	3.3(-4)
Ru-106	2.4(-3)
Ag-110m	4.4(-4)
Te-129m	1(-4)
Te-129	6(-5)
Te-131m	1.8(-4)
Te-131	3(-5)
I-131	1.8(-2)
Te-132	2(-5)
I-132	6.6(-3)
I-133	5.1(-2)
I-134	5.9(-4)
Cs-134	1.5(-2)
I-135	2.4(-2)
Cs-136	1.3(-3)
Cs-137	2.9(-2)
Ba-137m	4.4(-3)
Cs-138	5(-5)
Ba-139	3.7(-4)
Ba-140	9.4(-4)
La-140	1.6(-4)
La-141	2.7(-4)
Ce-141	8(-5)
La-142	3(-4)
Ce-143	6(-5)
Pr-143	9(-5)
Ce-144	5.2(-3)
All Others	5(-5)
Total (except H-3)	3.2(-1)
H-3	32

a = exponential notation; 1(-4) = 1×10^{-4}

b = nuclides whose release rates are less than 10^{-5} Ci/yr/reactor are not listed individually but are included in the category "All Others".

TABLE 3.2-3

CALCULATED RELEASES OF RADIOACTIVE MATERIALS IN GASEOUS EFFLUENTS
FROM HATCH NUCLEAR PLANT, UNIT NOS. 1 OR 2
(Ci/yr/reactor)

Nuclides	Reactor & Auxil. Bldgs	Turbine Bldg	Rad-waste Bldg	Gland Seal	Air Ejector Waste Gas	Mech. Vac Pump	Total
Kr-83m	a	a	a	37	36	a	73
Kr-85m	6	68	a	63	3400	a	3500
Kr-85	a	a	a	a	200	a	200
Kr-87	6	130	a	220	8	a	360
Kr-88	6	230	a	220	2200	a	2700
Kr-89	a	a	a	930	a	a	930
Xe-131m	a	a	a	a	71	a	71
Xe-133m	a	a	a	3	48	a	51
Xe-133	130	250	10	87	15,000	2300	18,000
Xe-135m	92	650	a	26	a	a	770
Xe-135	68	630	45	240	a	350	1300
Xe-137	a	a	a	1100	a	a	1100
Xe-138	14	1400	a	870	a	a	2300
I-131	3.4(-2)	1.9(-2)	5(-3)	3.5(-2)	a	3(-2)	1.2(-1)
I-133	1.4(-1)	7.6(-2)	1.8(-2)	1.4(-1)	a	a	3.7(-1)
Cr-51	6(-6)	1.3(-4)	9(-5)	c	c	c	2.3(-4)
Mn-54	6(-5)	6(-6)	3(-4)	c	c	c	3.7(-4)
Fe-59	8(-6)	5(-6)	1.5(-4)	c	c	c	1.6(-4)
Co-58	1.2(-5)	6(-6)	4.5(-5)	c	c	c	6.3(-5)
Co-60	2(-4)	2(-5)	9(-4)	c	c	c	1.1(-3)
Zn-65	4(-5)	2(-6)	1.5(-5)	c	c	c	5.7(-5)
Sr-89	1.8(-6)	6(-5)	4.5(-6)	c	c	c	6.6(-5)
Sr-90	1(-7)	2(-7)	3(-6)	c	c	c	3.3(-6)
Zr-95	8(-6)	1(-6)	5(-7)	c	c	c	9.5(-6)
Sb-124	4(-6)	3(-6)	5(-7)	c	c	c	7.5(-6)
Cs-134	8(-5)	3(-6)	4.5(-5)	c	3(-6)	c	1.3(-4)
Cs-136	6(-6)	5(-7)	4.5(-6)	c	2(-6)	c	1.3(-5)
Cs-137	1.1(-4)	6(-6)	9(-5)	c	1(-5)	c	2.2(-4)
Ba-140	8(-6)	1.1(-4)	1(-6)	c	1.1(-5)	c	1.3(-4)
Ce-141	2(-6)	6(-6)	2.6(-5)	c	c	c	3.4(-5)
C-14	1.5	a	a	a	8	a	9.5
H-3	-	-	-	-	-	-	32
Ar-41	25	c	c	c	c	c	25

a = less than 1.0 Ci/yr noble gases and carbon-14: less than 10^{-4} Ci/yr for iodines.

b = exponential notation: 7.0 (-3) = 7.0 x 10^{-3}

c = less than 1% of total for nuclide

3.2.4 Chemical, Sanitary and Other Waste Treatment

The sources of wastes discharged to the Altamaha River have been described in the FES-CP.[2] Collection of additional data on quality of makeup water have made refinements possible in calculated discharge concentrations. The calculations have been repeated to make use of latest information. It should be noted that these changes do not result from conceptual changes in operation. Therefore, the description of chemical usage is not repeated. To some extent the difference between the new numbers and the old merely further attest to the natural variability of ambient water quality. The numbers are illustrative but not absolute.

During operation of Unit No. 2, chemical wastes will be produced in the processing of high purity feedwater for steam generation. Chemicals in makeup water will be concentrated by evaporation from the cooling tower system. No corrosion or scale inhibitor will be used in the cooling water. However, chlorine will be injected into the service water and circulating water to control biological fouling.

The updated results of the analyses of river water are summarized in Table 3.2-4, and the concentration of various ions in the discharge are included for comparison.

Experience with operation of Unit No. 1 resulted in a need for less chlorine than was predicted in the FES-CP. The Amertap System was effective for maintaining condenser tube cleanliness. The cooling tower design for Unit No. 1 includes covered distribution trays which has resulted in minimal fouling of the trap by algae. The manufacturer of the Unit No. 1 tower also recommended a low chlorine application rate to protect the wooden packing. The Unit No. 2 tower design has the distribution trays exposed to direct sunlight. Greater photosynthetic production will occur in these trays and thus is expected that a greater use of chlorine will be necessary to control algae in Unit No. 2. The asbestos cement packing used in the Unit 2 towers does not carry the limitation on chlorine usage prescribed for the Unit 1 tower packing. The Georgia Power Company expects that the chlorine usage program described in the FES-CP will be followed. The NPDES permit (Appendix F) issued by the State specifies that a chlorine minimization program shall be conducted by the applicant.

TABLE 3.2-4

CHEMICAL CHARACTERISTICS (in mg/l) OF HATCH STATION MAKEUP AND EFFLUENT WATER QUALITY

	Makeup Water Quality[a]		Combined Plant Effluent[b] (Demineralizer Waste and Blowdown)	
	Average	Maximum	Average	Maximum
Calcium	8.0	12.8	19	60
Magnesium	2.1	6.7	3.3	9.0
Manganese	0.09	0.15	0.18	**
Sodium	6.8	20.0	15	56
Potassium	1.9	4.0	3.9	14
Iron	0.7	1.5	1.5	5.5
Chlorides	5.0	10.0	11	38
Sulfates	6.5	12.8	9.6	41
Nitrates	0.3	0.6	0.6	3.5
Phosphates	0.4	2.6	0.8	**
Silicates	11.7	22.9	25	73
Bicarbonates	32.4	57.3	74	240
Total Dissolved Solids	65.1	95.3	**	**

[a] Edwin I Hatch Nuclear Plant Unit No. 2 Environmental Report-Operating License Stage, July 1975, Table 5.4-2.

[b] Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report-Operating License Stage, July 1975, Table 3.6-1.

** Estimates have not been made for these parameters.

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3.2.5 Transmission Lines

There have been no changes to the transmission system as described in the FES-CP.

REFERENCES FOR SECTION 3

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, Figure 3.3-1.

2. U.S. Atomic Energy Commission, Final Environmental Statement for Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2, Docket Nos. 50-321 and 50-366, October 1972, p. III-18.

4. STATUS OF SITE PREPARATION AND CONSTRUCTION

4.1 RÉSUMÉ AND STATUS OF CONSTRUCTION

As of January 1978, the construction of Edwin I. Hatch Nuclear Plant Unit No. 2 was approximately 99% complete. Aside from the effects of sediment runoff into the south floodplain and onsite streams, construction impacts on the terrestrial and aquatic environment do not differ from those presented in the FES-CP. The assessment on the socio-economic effects of plant construction has been updated and the staff conclusions presented in the FES-CP remain valid.

4.2 IMPACTS ON TERRESTRIAL ENVIRONMENT

The impacts of site preparation and construction on the terrestrial environment have been as a result of changes in land use. Decreases in some communities are a result of commitment to plant structures (about 95 acres) or a change to some other natural cover. The decreases and increases are tabulated in Tables 2.2-2 and 2.2-3. The greatest single change is the 1041 acres of wooded land which have been cleared for the HNP-Bonaire transmission line and will be managed for grasses or low growing shrubs.

On site there has been some damage to the south floodplain community due to erosion of one of the spoil piles with the resultant sediment runoff being carried into the floodplain where some trees have been killed.[1] The semiannual monitoring reports have indicated that the causes of the damage in these areas are under control and that there is no evidence of additional damage since the 1973-1974 observations which first revealed the damage.

The discussion as presented in Section IV.B.1 of the FES-CP remains valid for the topics discussed there.

4.3 IMPACTS ON AQUATIC ENVIRONMENT

4.3.1 Effects on Water Use

Most construction which would have affected the river in any way had been completed before the issuance of the FES-CP. There are no additional water use impacts due to construction which are not sufficiently discussed in the FES-CP.

4.3.2 Effects on Aquatic Biota

Altamaha River

Prior to construction of Unit No. 1, which preceded and to some extent was concurrent with the construction of Unit No. 2, there exists inadequate baseline data to allow a direct quantitative temporal evaluation of construction impacts. The applicant did not present a discussion in the EROL of impacts to the aquatic biota in either the Altamaha River or onsite streams due to construction of Unit No. 2. Although there is no evidence that the applicant has conducted a quantitative temporal monitoring program to specifically evaluate construction effects on aquatic biota due to construction of unit No. 2, a spatial evaluation of impacts to the aquatic biota of the Altamaha River can be made by examining data from the 1974 and 1975 preoperational biological sampling program. Comparison of data for each year from sampling stations in the Altamaha River above and below the plant site indicate no major differences in the parameters measured that could be causally related to construction activities. This observation suggests that any construction effects that may have occurred prior to 1974, primarily related to construction of the common intake and discharge structures, were of a temporary nature because such effects are not evident from subsequent monitoring efforts.

Onsite Streams

The EROL[1] indicates that several onsite streams located near a spoils pile had received highly turbid runoff due to erosion. Severe siltation of the streams was noted during terrestrial surveys. The effect of this siltation on the aquatic biota of the streams was not addressed in either the EROL or the preoperational environmental surveillance report.

The staff is unable to assess the impact of increased siltation on the aquatic biota of the onsite streams since no data are presented. However, based on the staff's experience in assessing construction effects at other facilities, the staff assumes that the impact was severe but of a temporary nature. The staff finds that the remaining construction activities are of such a nature that further impacts on aquatic biota due to siltation loadings are not anticipated. Therefore, no long term irretrievable damage to the onsite streams is expected.

The EROL[1] also indicates that a small stream located between the cooling towers and the flood-plain on the eastern edge of the plant received a cement or concrete like effluent from a drain pipe on the southwest side of the plant fence. This concrete like effluent was due to operations at a truck washing area which included the cleaning of concrete delivery trucks near the cement-batch plant located on the site. In September 1976, the cement plant was being dismantled and trucks were no longer washed down at this location. A subsequent inspection[2] by the U.S. NRC Office of Inspection and Enforcement verified that there are no concrete discharges to any streams at the site.

Remaining Constructional Activities

No constructional activities remain that would significantly affect local aquatic biota. The intake and discharge structures are completed. The present preoperational monitoring program is believed to be adequate to detect any subsequent major impacts to the Altamaha River that could result from the remaining grading and excavating required for roadway, parking lots and cleared areas no longer needed for construction activities. Seeding of the spoils pile during the fall of 1974 has severely limited erosion and continued siltation of the onsite streams should cease. The staff concludes that the applicant is presently exercising adequate efforts to minimize construction impacts on the aquatic biota. The March 1976 site visit by members of the NRC staff, during which construction practices designed to minimize impact to the aquatic biota were observed, verifies this conclusion. The staff further is of the opinion that any biological changes occurring in the aquatic environment from the remaining activities will be minor and temporary and will not have an adverse impact on biota in the vicinity of the station.

4.4 SOCIO-ECONOMIC IMPACTS

A reassessment of construction impacts that may have been imposed on the local community, i.e., school crowding, housing problems, crime increases, traffic increases, changes in the business economy has shown that the analysis presented in Section IVB-3 of the FES-CP remains essentially unchanged. Construction workers were housed primarily in trailer parks and in the towns of Vidalia and Baxley. Appling County, which includes the town of Baxley, has experienced net increases in population and in the business sector since the start of construction at the Hatch site, but the staff at this time has been unable to specifically correlate these increases with the construction of the plant.

REFERENCES FOR SECTION 4

References for Section 4.2

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, Volume 2, Appendix C, p. c-8.

References for Section 4.3

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, Volume 2, Appendix C, p. c-8.

2. U.S. Nuclear Regulatory Commission, Inspection and Enforcement Report No. IE:II:LEF, 50-366/76-8, September 8, 1976.

5. ENVIRONMENTAL EFFECTS OF STATION OPERATION

5.1 RÉSUMÉ

Several minor changes relative to the environmental effects of Unit No. 2 operation have been identified in this staff evaluation since the issuance of the FES-CP. Staff conclusions regarding impacts on land and water presented in the FES-CP continue to be valid. A reassessment and updating of information has been provided with respect to both impacts upon the aquatic environment and water quality standards (EPA Effluent Guidelines) and impacts. Radiological impacts were updated and revised by utilizing new source term calculations, and by providing a comparison of station radioactive emission levels with Appendix I limitations. Also, new generic information has been included on the transportation of radioactive material and additional information describing the environmental effects of the uranium fuel cycle reflecting the Commission's Interim Rule have been incorporated.

5.2 IMPACTS ON LAND USE

5.2.1 Station Operation

The operation of the E. I. Hatch Nuclear Plant, Unit No. 2, will have minimal impact on offsite activities. There may be some increase in fogging due to operation of the mechanical draft cooling towers but experience from Unit No. 1 has indicated no noticeable effect[1] and there is not likely to be any significant difference due to the addition of Unit No. 2. The discussions in Section V.A of the FES-CP remain valid except that the conservative arguments with respect to cooling tower effects are superseded by experience with the operation of Unit No. 1.

5.2.2 Transmission Lines

The land uses along the HNP-Bonnaire transmission line are presented in Table 2.2-3. Use of the corridor is encouraged by the applicant for growing of crops and pasture of general low growing crops and ground cover. The statements concerning transmission lines in Section V.A.1 of the FES-CP remain valid.

The FES-CP did not address the effects of ozone production by extra high voltage (EHV) transmission lines or induced electrical effects. Data have been presented in the literature by Scherer et al[2] and Frydman et al[3] indicating that ozone production by energized transmission lines up to 765 kV is highly unlikely to add detectably to existing atmospheric background levels. The staff has made an analysis of these reports and has concluded that no basis exists at present for predicting adverse biological or environmental effects due to ozone from 500 kV transmission lines.

Recent information[4] indicates that electrostatic effects in fences, metal building, and motor vehicles, while possible, do not present hazards of lethal electric shock to humans or animals. However, shock ranging from "barely perceptible" to "real jolt" have been received from metal structures and vehicles beneath EHV lines. A fire hazard exists beneath EHV lines if vehicles are refueled within the right-of-way.

The staff concludes that electrostatic induction could cause inconvenience and varying degree of nuisance to residents who live near the corridors but there is no likelihood of mortality caused by electrocution of persons or animals from the applicants 500-kV lines or lines of lower voltages. There is reasonable possibility that electric shock could be involved as an indirect cause of human injury or death by aggravating a pre-existing health condition, for example, or causing a fall from or loss of control of a vehicle or by causing a fire during vehicle refueling.

The remedy for electrostatic induction is to ground all structures which could be affected such as fences, metal farm buildings and the like. The staff recommends that grounding be performed on all potentially affected structures along 500-kV lines associated with Unit No. 2.

The effect of electric fields on humans working or living under or around EHV transmission lines has received much attention. A review of the work to date has been sponsored by the Electric Power Research Institute.[5] An excerpt from the final report (Page 78) states:

"In summary, all of the American and West European test results on humans (except for Spain) at present field levels (less than about 20 kV/m) gave no indication of hazardous effects. Many of the European laboratory tests were conducted under very carefully controlled conditions which eliminated the possibility of unrecognized and overshadowing environmental factors such as low-frequency acoustical noise. The fact that the Soviets and Spanish researchers have not considered other environmental influences which could cause similar effects, such as low-frequency acoustical noise, and the fact that both the Soviet and West European research scientists have not been able to observe the reported switchyard worker symptoms in a significant way in tests conducted under carefully controlled laboratory conditions, support the view that factors other than electric field as normally encountered were responsible for the observed symptoms."

While experimental work is still underway on the biological effects of ground level electric fields along EHV transmission lines, the weight of current of evidence points to the conclusion that there are no significant biological effects attributable to the fields associated with such lines. The staff, therefore, concludes that there will be no significant adverse impacts associated with the operation of the 500-kV transmission lines for Unit No. 2.

The staff recommends that for a four (4) year period,or until the Hatch-Bonnaire corridor is certified as stabilized, that an inspection program be conducted to determine any incidences of erosion or other environmental degradation. A report of any erosion phenomena, including actions taken to correct such erosion effects, shall be submitted to the Director of the NRC Region IV Office with a copy to the Director of the Division of Operating Reactors, Headquarters. This recommendation will be incorporated in the monitoring programs described in Section 6.

5.3 IMPACTS OF WATER USE

5.3.1 Thermal Impacts of Water Use

5.3.1.1 Standards

Georgia water quality requirements applicable to the plant thermal discharge into the Altamaha River require that the receiving water temperature be maintained at less than 90°F and not exceed 5°F above the ambient temperature. The NPDES permit specifies that temperature be measured 500 feet downstream of the discharge pipe at a depth of 3 feet. Preoperational surveillance indicates that the river ambient temperature may occasionally exceed 90°F.

5.3.1.2 Normal Operation

Normal two-unit operation will require about 45,000 gallons per minute of water from the Altamaha River. Of this, approximately 21,800 gallons per minute will be lost as evaporation and drift from the cooling towers, and the remaining 23,200 gallons per minute will be returned to the river. The impact of the release is expected to be minimal. This amount of water represents only 4.6 percent of the minimum river flow of record (1200 cubic feet per second). The returned water contains only 2 percent of the heat discharged by the plant. There will be no significant increase in the totally-mixed river temperature as a result of normal plant operation.

5.3.1.3 Shutdown Conditions

Cold shutdown of the plant under emergency conditions will place a more severe heat load on the river than would normal operation. Under the most severe circumstances, up to 32,000 gallons per minute would be discharged, with a temperature of up to 50°F above ambient. This water could be mixed with up to 32,000 gallons per minute of service water before mixing if desired. No criteria for mixing has been established however. At the lowest seasonal flow of record (1200 cubic feet per second), this added heat would raise the totally mixed river temperature about 2°F. This extreme case could only occur during emergency shutdown of both units, loss of offsite power, and record low river flow. Although State standards might be temporarily violated, emergency conditions are not normally considered for their environmental impact or compliance with environmental standards.

5.3.1.4 Modeling Studies

The applicant performed several mathematical simulations of the impact of thermal discharge on the temperature in the Altamaha River, under a variety of normal and severe conditions. The

results of these studies are presented in the EROL and will not be repeated here. Field studies of discharges of the plant into the Altamaha River from the Hatch Unit No. 1 plant have shown that temperature rise is small, and barely measurable under most conditions.[1] Based on these limited field data, the simulations presented in the EROL appear to be conservative.

5.3.1.5 Conclusions

The simulations for normal operation generally show only small surface areas where the temperatures above ambient is greater than 5°F. If the modeling predictions are correct, the State of Georgia standards for temperature above ambient levels beyond the mixing zone will not be violated.

Compliance with the standard on maximum river temperature of 90°F outside of the mixing zone is complicated by the fact that data recorded near the site and downstream at the Doctortown gage indicate that the ambient river temperature will occasionally exceed 90°F. The temperature of water being discharged could also exceed 90°F under extreme meteorological conditions. Therefore, if both river temperature and discharge temperature were above 90°F coincidentally, the plant could be operating in violation of the thermal standards. This issue has not yet been resolved.

5.3.2 Industrial Chemical Wastes

Table 3.2-4 listed the concentrations of various substances in the station effluent. The values in that table include the major chemical additions to cooling tower blowdown. Table 3.2-4 also includes values for make-up water quality which is the ambient concentration of the substances in the river.

Because the river flow rate is quite large relative to the blowdown flow rate, the concentration of the substances in the river will be close to the ambient values as the discharge becomes mixed with the river water. To illustrate the rapidity with which discharge concentrations are reduced to ambient values, concentrations have been computed in the discharge plume at a distance of 250 feet downstream from the point of discharge. The applicant's thermal dispersion model presented in Section 5 as Figure 5.4-2 indicates that at low river flow the discharge is diluted to 20% of its initial concentration at the distance of 250 feet. Table 5.3-1 shows the computed concentrations based on this dilution.

The column labelled "maximum" is the concentration which might exist if ambient concentrations and discharge concentrations were simultaneously at their highest values and at the same time the low river flow prevailed. Thus, it is an intermittently, or more likely, a rarely, occurring condition.

5.3.3 Sanitary Wastes

The objectives for processing and disposal of sanitary waste remain the same as described in the FES-CP. The applicant has reported[2] that the treatment will include two packaged units each with capacity to process a flow of 7500 mgd rather than a single unit of this capacity as described on page III-20 in the FES-CP.

5.3.4 EPA Effluent Guidelines and Limitations

The State of Georgia Environmental Protection Division is authorized to issue the NPDES discharge permit for the facility under the Federal Water Pollution Control Act. Effluent limitations will be established as part of the permitting procedure.

The station must comply with provisions of 40 CFR 423.12 (copy of applicable sections included as Appendix C) shortly after startup. These provisions set forth "Effluent limitation guidelines representing the degree of treatment attainable by the application of the best practical control technology currently available." Additionally, in establishing effluent limits for the NPDES permit, the State may consider more stringent limitations where necessary to protect other water uses. Compliance with State Water Quality Standards usually satisfies these latter limitations. Applicable sections of the State standards were summarized in the EROL.[3] An NPDES permit was issued by the State of Georgia on June 6, 1977 (See Appendix F).

The staff evaluation of the expected station performance relative to the effluent limitation guidelines is discussed below:

TABLE 5.3-1

CHEMICAL CHARACTERISTICS (mg/l) OF HNP MAKEUP AND EFFLUENT WATER QUALITY

	Makeup Water Quality[1]		Combined Plant Effluent (Demineralizer Waste[2] and Blowdown)		River Concentration 250 Feet Downstream From Discharge	
	Average	Maximum	Average	Maximum	Average	Maximum
Calcium	8.0	12.8	19	60	10.2	22.2
Magnesium	2.1	6.7	3.3	9.0	2.3	7.2
Manganese	0.09	0.15	0.18	**	0.11	--
Sodium	6.8	20.0	15	56	8.4	27.2
Potassium	1.9	4.0	3.9	14	2.3	6.0
Iron	0.7	1.5	1.5	5.5	0.9	2.3
Chlorides	5.0	10.0	11	38	6.2	15.6
Sulfates	6.5	12.8	9.5	41	7.1	18.4
Nitrates	0.3	0.6	0.6	3.5	0.4	1.2
Phosphates	0.4	2.6	0.8	**	0.5	--
Silicates	11.7	22.8	25	73	14.4	32.9
Bicarbonates	32.4	57.3	74	240	40.7	93.8
Total Dissolved Solids	65.1	95.3	**	**		

[1] Edwin I. Hatch Nuclear Power Plant, Unit No. 2, Environmental Report Operating License Stage, July 1975, Table 5.4-2.

[2] Edwin I. Hatch Nuclear Power Plant, Unit No. 2, Environmental Report Operating License Stage, July 1975, Table 3.6-1.

** Estimates have not been made for these parameters.

40 CFR Paragraph No.:

423.12 (b1) - Requires pH to be in the range of 6.0 - 9.0. The NPDES permit specifies a pH range of 6 - 11 standard units for low-volume wastes, but this flow shall be mixed with and diluted by the cooling tower blowdown flow such that the overall pH of the combined waste streams shall comply with this EPA guideline. The Altamaha River is slightly acidic and has relatively low buffering capacity. The effect of closed cycle cooling should be an elevation of pH. It is not expected that the upper limit on the pH could pose a problem. The summary of chemical analysis for the river water shows a minimum pH value well below the effluent guideline and the water quality standard levels. This suggests the possibility of difficulty in complying with the lower limit on pH when the ambient value is low. The applicant has indicated that pH of demineralizer wastes will be adjusted to the range of 6.0 to [illegible]rior to discharge, but in any event, compliance with the EPA guideline (pH 6.0 - 9.0) for wast[illegible]er discharge shall be adequate protection for the environment.

423.12 (b2) - Prohibits discharge of polychlorinated biphenol compounds. The applicant will comply with this condition by stipulation in the discharge permit.

423.12 (b3) - Limits concentration of solids, oil, and grease in low volume wastes.

423.12 (c) - Since well water is the source for steam generation, low level waste streams should be within the limit for total suspended solids. The applicant will comply with the provision regarding oil and grease by stipulation in the discharge permit.

423.12 (b4) - Not applicable.

423.12 (b5) - Limits concentration of substances in metal cleaning wastes.

423.12 (f) - The applicant has stated (conversation during March 1976 site visit) that initial cleanup wastes will be disposed of by land spraying which will result in compliance with this provision. Periodic cleaning of steam cycle components and service water heat exchangers will

be required. Offsite disposal by a licensed contractor or discharge in compliance with the NPDES Permit (Part II, Items 2, 3, and 6) should assure that the impacts of such discharges are insignificant.

423.12 (b6) - Limits concentration of substances in boiler blowdown. There will be no blowdown from the steam cycle. Thus, this provision will be met.

423.12 (b7) - Not applicable.

423.12 (b8) - Limits concentration of chlorine in cooling tower blowdown to an average concentration of 0.2 mg/l and a maximum of 0.5 mg/l.

423.12 (i) - The applicant has proposed that the average free residual concentration at the discharge be 0.5 mg/l.[6] This would not comply with the provision. Furthermore, a limitation more stringent than the guideline level may be imposed by the State of Georgia to assure compliance with receiving water standards.

423.12 (b9) - Limits discharge of chlorine to two hours per day per unit and prohibits simultaneous discharge of chlorine from two units. Because of the limited use of chlorine for Unit No. 1, the applicant should have no difficulty in complying with this provision.

423.12 (b10) - Declare that above provisions apply prior to mixing of waste streams. This provision was recognized in making the above evaluations. The limitation under 423.12 (b8) applies prior to mixing of the discharges of the two units.

In 1983, the Hatch Nuclear Plant will be subject to the following additional requirements specified in 40 CFR 423.13:

423.13 (i) -Adds limits on the concentration of corrosion inhibitors. The applicant has indicated[7] that no corrosion inhibitors will be added to the cooling water. Nevertheless, if later operating experience demonstrates the need for such inhibitors, the staff will require the GPC to conduct and submit an environmental review prior to their use. The present proposal to operate without inhibitors will result in compliance with this part of the provision.

423.13 (l) - The applicant will discharge from the cold side of the cooling system, thereby meeting this provision.

There are several aspects of the discharge which may be further limited by receiving water standards. Temperature data for the Altamaha show that ambient values approach and perhaps exceed the 90°F (32.2°C) requirement for the river.[8] Both the U.S. EPA and Georgia Environmental Protection Division have concluded that a discharge from the Hatch Nuclear Plant which is less than or equal to the upstream ambient river temperature is acceptable. The applicant, nevertheless, plans to obtain an exemption to Section 316 (a) of the FWPCA. Although no mixing zone has been specified yet, the staff understands that the State is currently reviewing data so as to define such a mixing zone for the Hatch Nuclear Plant discharge.

The applicable State water quality standards also prohibit discharge of toxic wastes in concentrations that would harm man, fish or game, or other beneficial aquatic life.[9] The staff believes that this receiving water requirement should result in a limitation on the discharge of chlorine more stringent than the effluent guideline limit.

The Georgia DEP has indicated (Appendix G) that they do not anticipate that the discharge will contain sufficient residual chlorine to result in receiving stream concentrations in excess of the recommended criteria of 10.0 micrograms per liter of total residual chlorine for fresh water and marine organisms.

The effluent limitation guidelines do not address corrosion products in the condenser cooling water. The staff believes, based on a determination of the Langlier Index for average make up water quality, that there will be a strong tendency for corrosion. A determination of corrosion products in the cooling tower blowdown should be made during the first year of operation. Appropriate corrective actions, if found necessary, should be recommended by the applicant and submitted to NRC for environmental review.

5.3.5 Effects on Water Users Through Changes in Water Quality

The analysis in the FES-CP remains valid. The only uses of the Altamaha River downstream of Hatch are fishing and recreation. The staff has reassessed chemical discharges to consider information obtained since the publication of the FES-CP. In the FES-CP, the staff evaluated the impact of blowdown containing a total residual chlorine concentration of 2 mg/l. In the EROL, the applicant indicated that the free residual concentration in the discharge would be kept below a maximum of 0.5 mg/l. This was done in recognition of EPA effluent limitation guidelines. The guidelines further require that the average free residual be less than 0.2 mg/l. Consistent with the guidelines, the applicant did not address total residual chlorine. The average level of 0.2 mg/l free residual will be met prior to mixing the Unit No. 2 blowdown with the Unit No. 1 blowdown. The staff believes that in meeting the guideline for free residual, the total residual would be much less than the value of 2 mg/l evaluated in the FES-CP.

Based on definitive work by others[10,11] on the impact of residual chlorine on aquatic biota which was published after the issuance of the FES-CP, the staff now believes that a concentration of total residual chlorine in the station discharge in excess of 0.2 mg/l could be toxic to aquatic biota. In accordance with regulations of the Georgia Environmental Protection Division (EPD), the discharge must not be at toxic levels. The NPDES permit issued by the State of Georgia has limited the effluent concentration of chlorine to the EPA guideline level (0.2 mg/l average free residual and 0.5 mg/l for maximum residual) from a single unit prior to mixing. The permit further requires a study of applicable methods to reduce total residual chlorine levels.

The rapid dilution of the discharge in the river, as described in the FES-CP, will reduce the concentration further. With concentration at a lower value, the conclusion of the FES-CP that there will be no impact due to chlorine discharge remains valid.

The staff has estimated that the discharge of corrosion products will be an intermittent occurrence at the Hatch Station. If at toxic levels, this will be unacceptable under the State water quality standards. This occurrence is controllable by proper management of circulating water chemistry through blowdown control and addition of chemicals. Any such program for use of inhibitors will be subject to environmental review under the NPDES permit and the environmental technical specifications for Hatch Unit No. 2. Because of the uncertainty of the need and variety of control alternatives, any speculation as to magnitude of impact is unwarranted at this time.

As indicated in Section 5.3.4, the ambient pH of the Altamaha River occasionally exceeds the range specified for pH in the EPA effluent limitation guidelines. Under this condition, it is conceivable that plant discharge would not meet guideline requirements. It is the staff's opinion that discharge at a pH below the EPA guideline level because of ambient river conditions would not result in any environmental impact.

5.3.6 Effects on Surface Water Supply

The Hatch Nuclear Plant is expected to have a negligible effect on surface water supplies of the region. For combined two-unit operation, the consumptive use of Altamaha River water will be about 21,800 gallons per minute, which represents less than 0.4 percent of the average river flow of 13,000 cubic feet per second and about 4 percent of the minimum recorded flow of 1200 cubic feet per second.

5.3.7 Effects on Groundwater Supplies

A minimal quantity of groudwater, 327 gallons per minute, will be withdrawn by two wells from the regional artesian aquifer for normal two-unit operation. Drawdown of the peizometric head in this aquifer is estimated to be only 3 feet at each of the wells. Of the wells surveyed near the plant, only three others withdraw from the regional artesian aquifer. The remainder withdraw from the minor shallow aquifers which are not hydraulically connected to the regional aquifer. Groundwater usage at the site is not expected to affect any other users.

5.4 ENVIRONMENTAL IMPACTS

5.4.1 Impacts on the Terrestrial Environment

The only source of potential damage to the terrestrial environment from the operation of the Hatch Unit No. 2 Nuclear Plant is due to operation of the closed cycle cooling system. Dissolved salts in the circulating water will be carried out of the tower in entrained droplets referred to as drift. These drops and their salt burden are eventually deposited on the ground

or become airborne particulates after evaporation. The FES-CP addressed the question of drift with simple conservative arguments and concluded that no damage should result from the operation of the Unit No. 2 mechanical draft cooling towers. Nevertheless, a vegetative monitoring program was required for Unit No. 1.

At this time, more advanced models could be applied to the problem, but since there is operational data from the Unit No. 1 monitoring program, it is more appropriate to address ourselves to these results. Based on the information from the first year of operation of Unit No. 1, no vegetative effects attributable to cooling tower drift had been observed.[1,2] The high annual rainfall and fresh water make up to the cooling towers both contribute to make it highly unlikely that drift effects will be observed for Unit No. 2. However, since the drift load will approximately double after addition of Unit No. 2, the staff recommends continuation of the current monitoring program after start-up of Unit No. 2 for a period of at least four (4) years. (termination contingent on staff review and approval) and correlation of results with low altitude true and false color aerial photography. The photographic techniques will allow an inexpensive long-term check on drift effects.

5.4.2 Impacts on the Aquatic Environment

5.4.2.1 Intake Effects

Impingement

The number of fish impinged at the E. I. Hatch Nuclear Plant Unit No. 2 will be a function of intake velocity, volume of water pumped, river flow, area of the intake structure, fish populations in the area and the degree to which fish are drawn or attracted to the intake structure. The normal operation of Unit No. 2 will require the withdrawal of approximately 22,500 gpm (50 cfs) of water from the Altamaha River. The average flow for the Altamaha River is 13,000 cfs, with a minimum daily low flow of 1,200 cfs at the plant site computed from flow records at Doctortown, Georgia, 57.5 river miles downstream from the plant site. An analysis of annual minimum flows at Charlotte, Georgia indicates that the extrapolated minimum low flow (without reservoir supplementation) is 900 cfs. The estimate of the maximum flood of record ranges from 170,000 to 200,000 cfs.[3] The calculated velocity of water through the traveling screens of the intake structure is 1.9 fps at the minimum assumed river flow and less than 1 fps under average river flow conditions.[4] During the shad spawning season (February through May) when the density of fishes in the river is high, the average river flow is 20,170 cfs and intake velocities would be about 0.7 fps. The density of fishes in the vicinity of the intake structure and the degree to which fish are drawn or attracted to the intake structure are unknown although qualitative information is available.

Impingement of fish on the traveling screens at the intake structure was evaluated for Unit No. 1 by counting the numbers of fish impinged during a 24-hour period once a week during the period November 1974 through December 1975, some 62 samples. Data are summarized in the Semi-Annual Environmental Surveillance Report and the EROL.[5,6] A total of 68 fish from 13 taxa were collected. The maximum number of specimens reported from a sample was 15 in January 1975. The most diverse sample contained four species (six organisms) and was taken in July 1975. The most common species impinged was Trinectes maculatus with 48 specimens being collected during the sampling period. The total weight of all specimens taken during the period November 1974 to December 1975 was 468.5 g.

These unusually low impingement values are probably the result of the high river velocity past the shoreline intake structure and low intake velocities across the traveling screens.

No sturgeons or shad were collected during the impingement sampling program.

Due to the complexity of the interactions between flow rates, velocities across the intake screens, behavior of fish in the vicinity of the screens and the uncertainty of fish densities in the region of the screens, no precise estimate of anticipated incremental impingement loss due to operation of Unit No. 2 can be presently made. A preliminary analysis of data from the Indian Point Nuclear Power Plant Unit No. 1 and the Millstone Nuclear Power Plant has shown that impingement losses did not increase linearly with the addition of a second unit and impingement losses were greater than twice the previous year's totals from the single unit. The Browns Ferry Nuclear Power Plant, however, reported less than twice the previous year's losses after startup of the second unit. Due to conflicting results of the preliminary analysis and the fact that none of the plants remove their cooling water from a riverine environment, estimates on incremental impingement losses at the Hatch Nuclear Plant due to the operation of Unit No. 2 cannot be accurately made; however, even a tenfold increase in the current Unit No. 1 related impingement losses, an extremely conservative estimate, would not significantly affect the resident or anadromous fish populations in the Altamaha River.

Entrainment

Organisms less than 3/8 inch in size entrained in the intake water are likely to pass through the traveling screens and pass through the plant's heat removal system. They will be exposed to mechanical shock, hydrostatic pressure changes, chemical toxicity and elevated temperatures. The staff concludes that 100% mortality will result for organisms entrained in the cooling water system. No tidal flows or changes in flow due to tides are known from the Altamaha River in the vicinity of the Hatch Nuclear Plant.

Due to the high flow rates and velocities of water passing the intake, most planktonic organisms are probably well mixed in the water column. Assuming that the distribution of organisms in the water column is essentially random and that the mortality experienced by entrained organisms is 100%, the losses sustained by populations with individuals small enough to pass through the traveling screens would be proportional to the flow through the plant. Table 5.4-1 provides both the percent of total flow entrained under various river flow conditions passing through the condenser cooling system during operation of Unit No. 2 and for the combined operation of Units No. 1 and 2.

TABLE 5.4-1

ENTRAINMENT VERSUS RIVER FLOW

River Flow (cfs)	Percent Flow Entrained By Operation Of Unit No. 2	Percent Flow Entrained By Operation Of Both Unit No. 1 and Unit No. 2
Calculated minimum 900	5.5%	11.8%
Observed minimum daily flow 1,200	4.2%	8.9%
Average flow 13,000	.38%	.82%
Maximum flood of record 180,000	.028%	.06%

Anticipated losses and the significance of these losses to the riverine populations of the various biotic communities are presented in the following.

Phytoplankton

High turbidity and flow rates in the Altamaha River result in fairly low population levels. The overall contribution by phytoplankton to primary productivity in the river is insignificant when compared to periphyton. Losses sustained by various phytoplankton populations even under extreme low flow conditions would be about an 11% reduction in numbers. The regenerative ability of phytoplankton would rapidly offset these losses as the water mass moves past the plant intake. The impact of phytoplankton losses on other organisms in the food chain would be minimal since the present populations of phytoplankton are considered insignificant.

Periphyton

Periphyton, or attached organisms, would not be expected to sustain losses due to entrainment. High flows and high turbidity may result in suspension of a portion of these organisms in the water column making them susceptible to entrainment; however, losses will probably be insignificant when compared to the total population.

Macroinvertebrate Drift

Maximum populations of macroinvertebrate drift for 1973 occurred from early April to late September. The mean discharge at Doctortown, Georgia, for this period was about 20,000 cfs or slightly greater in the vicinity of the Hatch Nuclear Plant. Assuming a random distribution in the vicinity of the plant intake structure, approximately .25% of the flow would have been entrained by Unit No. 2 or with both units operating approximately .5% of the flow. A .25% incremental reduction in total drift due to operation of Unit No. 2 would be undetectable. The mean flow for the past 10 years during the same time interval (April through September) is

approximately 13,000 cfs. The combined effect of the two units, again assuming a random distribution of drift organisms, would reduce population levels by .7%. Macroinvertebrate drift organisms occur in lower densities in fall through spring. Minimum river flow occurs in September, October, and November. The 10-year average flow during these three months is 6,557 cfs. Assuming a random distribution of macroinvertebrate drift organisms, approximately .75% of the drift would experience mortality due to entrainment from Unit No. 2 operation or a combined reduction due to entrainment from the operation of both units of 1.5%. The staff concludes that a mortality rate of 1.5% is insignificant.

Fish Eggs and Larvae

The Altamaha River is utilized as spring spawning ground for several migratory fish species, including American shad (Alosa sapidissima), hickory shad (Alosa mediocris) and blueback herring (Alosa aestivalis). Two larval specimens of Acipenser sp. were collected in drift samples in 1973. Larvae of Catostomidae, Centrarchidae and Cyprinidae were collected in considerable numbers during the spring and early summer of 1974 and 1975 in the vicinity of the Hatch Nuclear Plant. Densities of organisms from these three families during spring and early summer of 1974 and 1975 are presented in Section 2.5.2.

During the spring and early summer of 1975, two additional weekly drift samples were taken immediately in front of the intake structure. The circulating water system for Unit No. 1 was fully operational during the survey.

Day and night averages along both transects and the intake samples were computed for densities of abundant taxa from samples collected during each weekly survey. Analysis of variance of the data for abundance was used to compare day and night densities and to compare densities of samples collected near the intake structure with densities collected along the transects. Mean night densities were significantly greater than day densities for total fish larvae and for larvae of Catostomidae, Centrarchidae, Cyprinidae, and Alosa spp. There was no significant difference between mean day and night densities of Alosa sapidissima eggs. The mean density of other fish eggs collected was significantly greater in night samples than in day samples. Only the Centrarchidae and Cyprinidae were found to have a significantly greater mean density of larvae near the intake structure than in the rest of the river. Both families prefer shallow quiet areas of the river and floodplains for spawning and rearing and may have accumulated near the shoreline as a result of low velocities and eddies.

Estimates of number of abundant fish eggs and larvae entrained were prepared by multiplying average densities for day and night sampling periods by the fraction of the river flow entrained during the sampling periods. These are presented in Table 5.4-2.

Since the intake volume remains constant at 50 cfs, changes in numbers of eggs and larvae entrained are a result of variations in river flow and spawning activity upstream of the Hatch Plant. Estimates of entrained Cyprinidae and Centrarchidae in Table 5.4-2 have been multiplied by a factor to reflect their greater abundance in the vicinity of the intake structure.

Assuming that the relationship between entrainment and intake flow is linear, the level of entrainment mortality in spring and early summer of 1975, if both units were operating, would be double the values shown in Table 5.4-2. Since the maximum fraction of daily river flow entrained as cooling water in 1975 for Unit No. 1 was less than .5%, or postulated two unit operation of less than 1.0 percent, there should be no significant reduction in the ichthyoplankton populations in Altamaha River near the Hatch Nuclear Plant.

The historic flow records of the Altamaha River report the 10 year average monthly flow (1964-1973) in the Altamaha River near Doctortown, Georgia, is 33,607 cfs for March and 26,675 cfs for April during which the greatest mean number of shad eggs and larvae are present in the Altamaha River. Flow rates in the vicinity of the Hatch Nuclear Plant are slightly lower. Approximately .14% of the flow in March and .18% of the flow in April would have been entrained during operation of Unit No. 2 or .28% for March and .32% of the flow for April with operation of both units. The lowest average monthly flow rates for the Altamaha River over the 10 year period 1964-1973 was 11,980 cfs for March and 7,930 cfs for April. Approximately .4% of the flow in March and .6% of the flow in April would have been entrained during operation of Unit No. 2 or .8% for March and 1.2% of the flow for April with operation of both units. Assuming 100% mortality of fish eggs and larvae from condenser and cooling tower passage and a random distribution of fish eggs and larvae, the losses to the shad populations due to entrainment from operation of Unit No. 2 and the incremental losses due to operation of both units will be insignificant even during the historic average low flow for March and April.

TABLE 5.4-2

RATE OF ENTRAINMENT OF ICTHYOFAUNA (1975)[a]

		FISH LARVAE/DAY					FISH EGGS/DAY	
Week Beginning	Percent Flow Entrained	Total	Alosa spp.	Cyprinidae	Catostomidae	Centrarchidae	Total	Alosa sapidissima
Feb. 3	.28	54	0	13	0	0	30	15
Feb. 10	*	*	*	*	*	*	*	*
Feb. 17	.25	954	0	852	0	21	136	53
Feb. 24	.25	-	-	-	-	-	-	-
Mar. 3	.12	-	-	-	-	-	-	-
Mar. 10	.20	3195	0	2647	12	289	278	175
Mar. 17	.22	13937	0	13614	29	281	90	22
Mar. 24	-	-	-	-	-	-	-	-
Mar. 31	.13	9975	0	0	5892	77	323	82
Apr. 7	.17	583	23	170	247	57	304	76
Apr. 14	.10	13461	9	2408	5473	106	174	0
Apr. 21	*	*	*	*	*	*	*	*
Apr. 28	*	*	*	*	*	*	*	*
May 5	.31	5311	0	862	3562	57	844	454
May 12	.24	1822	11	167	358	746	665	527
May 19	.27	4043	0	186	1320	398	1478	334
May 26	.30	5917	114	606	128	3304	168	89
June 2	-	-	-	-	-	-	-	-
June 9	.41	3178	109	413	37	1005	22	22
June 16	-	-	-	-	-	-	-	-
June 23	.38	8739	294	103	242	7301	0	0

* = Survey cancelled due to equipment failure.

- = Survey not required due to high water or post season.

a = Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 1, Annual Environmental Surveillance Report No. 2, January 1 - December 31, 1975, p. 5-14.

5.4.2.2 Discharge Effects

Temperature

Normal operation of both Unit Nos. 1 and 2 requires the withdrawal of approximately 100 cfs of water from the Altamaha River. Approximately 49 cfs of this withdrawal will be lost due to evaporation and drift from the cooling towers, with the remaining 51 cfs being returned to the river. The amount of heated effluent (51 cfs) is approximately .4% of the average river flow (13,000 cfs), approximately 4.6% of the minimum observed river flow (1200 cfs), and approximately 5.6% of the calculated minimum river flow (900 cfs).

Since no thermal stratification exists in the river in the vicinity of the Hatch Nuclear Plant, no temperature changes attributable to hydraulic mixing due to withdrawal of water from the river exists.

The discharge pipes extend approximately 120 feet from the river bank and are located 4 feet below the surface of the river at minimum flow (1200 cfs). During normal operating conditions, the average total discharge for both Units No. 1 and 2 including the service water discharge will be 58 cfs, resulting in a discharge velocity of 3 fps perpendicular to the river flow.

The applicant modeled the discharge plume using the Motz-Benedict model for horizontal jet discharges. Based on the results of the modeling effort, several predicted plumes for various operating and meteorological conditions are presented in Figures 5.4-1 through 5.4-6. Figures 5.4-1 and 5.4-2 depict plumes under normal two unit operating conditions for winter and summer. Figures 5.4-3 and 5.4-4 illustrate normal two unit operation with a high wet bulb temperature and a low river temperature for winter and summer representing a conservative estimate of maximum plume dimension and maximum ΔT. Figures 5.4-5 and 5.4-6 show the least likely and most thermally severe cases for winter and summer which would occur only when the following conditions exist: (a) river flow equal to lowest seasonal flow of record; (b) both units being brought to a cold shutdown condition; and (c) loss of offsite power at which time the cooling towers would be inoperative.

The staff has evaluated the results of the Motz-Benedict model and have found them to be acceptable. The area within the 1°, 3°, and 5°F isotherm has been determined for normal and conservative meteorological and riverine conditions for both the summer and winter season and are presented in Table 5.4-3.

Under normal operating conditions, the Hatch Plant discharge will meet all State thermal standards. It is evident from Figures 5.4-1 through 5.4-6 the State standards can be met after a short mixing zone even under conservative conditions. If the following conditions should occur simultaneously (1) lowest estimated seasonal flow of record, (2) both units being brought to the cold shutdown state, and (3) an onsite power outage resulting in inoperative cooling towers, the thermal discharge would be in violation of State standards.

Elevated surface water temperatures during summer and early fall in the immediate vicinity of the discharge area will not significantly affect phytoplankton or periphyton. Phytoplankton exists in relatively low concentrations in the river and the high flow rates past the discharge structure will result in insignificant acute or chronic mortality to populations. Storr[7] showed that plankton exhibits very low (5% or less) mortality for temperatures under 95°F. After 95°F, lethality increases rapidly to 100% at 105°F. Under normal and severe summer operating conditions of high river temperature and cold shutdown without offsite power, the area of the discharge plume in excess of 95°F would be less than .3 acres.

The effect of thermal plume passage on drifting macroinvertebrates is considered to be insignificant. Most macroinvertebrates have upper lethal temperatures in excess of the normal discharge temperatures. Thermal plume passage time will be brief and the area of highest plume temperatures is small.

Neither the applicant's model nor the one proposed by the staff predict even an occasional sinking plume that might intersect with the bottom. Therefore, no acute or chronic effects on periphyton or benthos are predicted either by scour or elevated temperatures.

Numerous mechanisms by which fish populations may be detrimentally influenced directly or indirectly by a thermal plume have been proposed, these include: thermal shock to adults and juveniles due to plume passage, disruption of migratory routes due to thermal blockage, cold shock during winter as a result of rapid plant shutdown, alteration of the thermal regime at fish reproductive areas, exceeding the upper lethal thermal maximum for a particular species, enhancement of fish diseases due to elevated temperatures, gas bubble disease, entrainment in the plume of fish eggs or larvae, and disruption of interspecific relationships between fishes or other organisms, such as a food source.

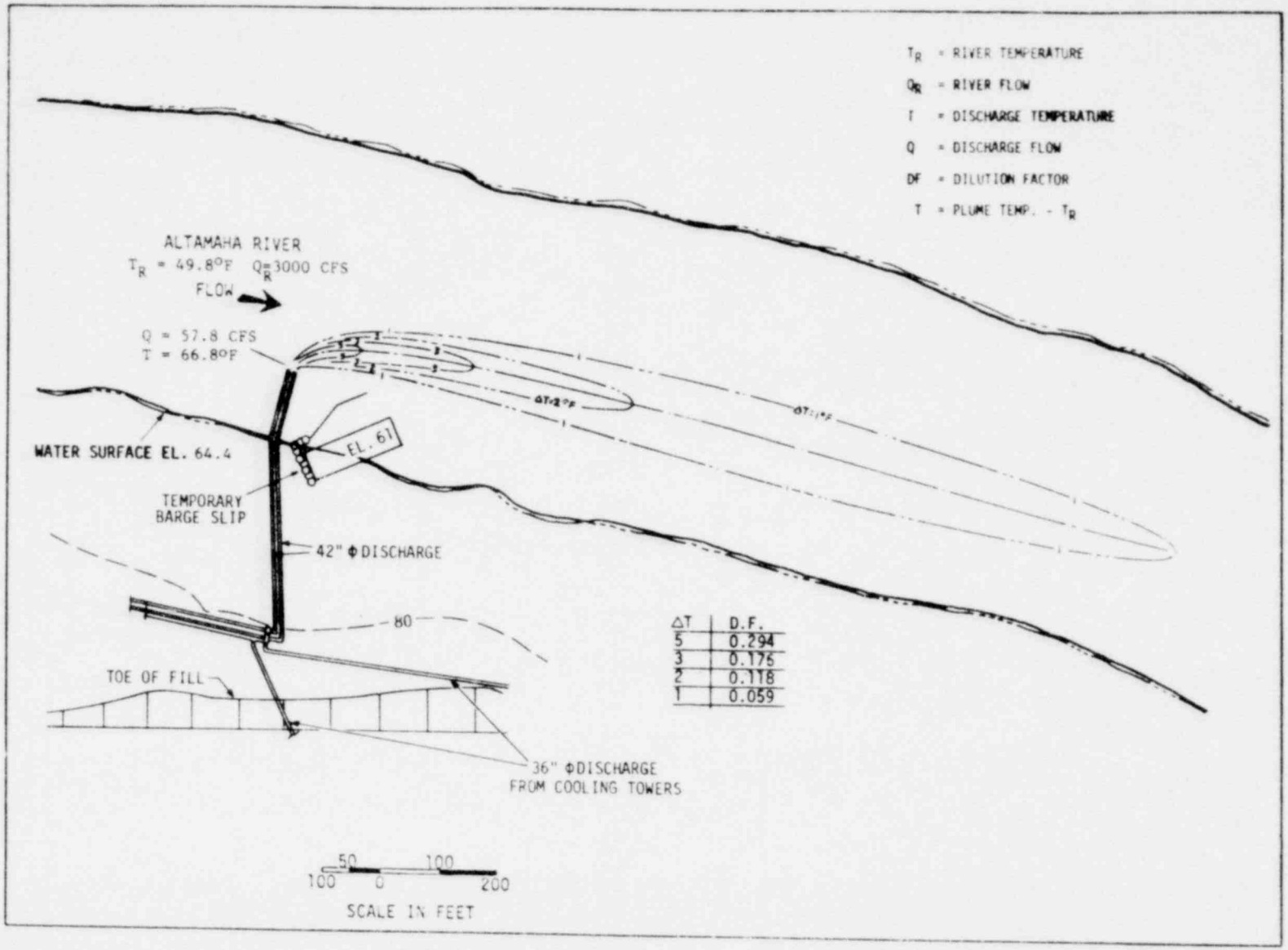

Figure 5.4-1[8] Edwin I. Hatch Nuclear Plant Unit 2: Normal 2-Unit Operation During Average Winter Meteorological Conditions.

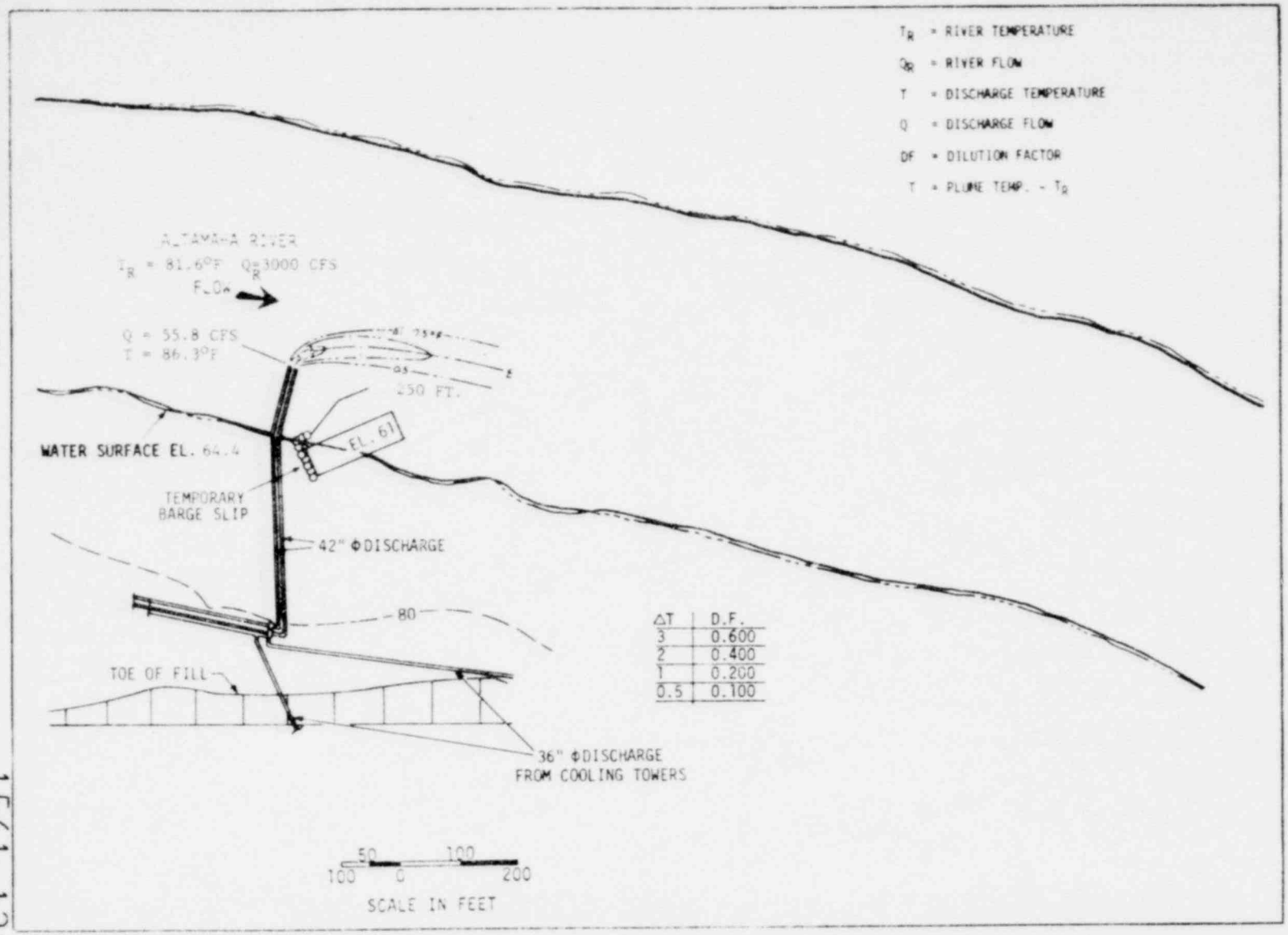

Figure 5.4-2[8] Edwin I. Hatch Nuclear Plant Unit 2: Normal 2-Unit Operation During Average Summer Meteorological Conditions.

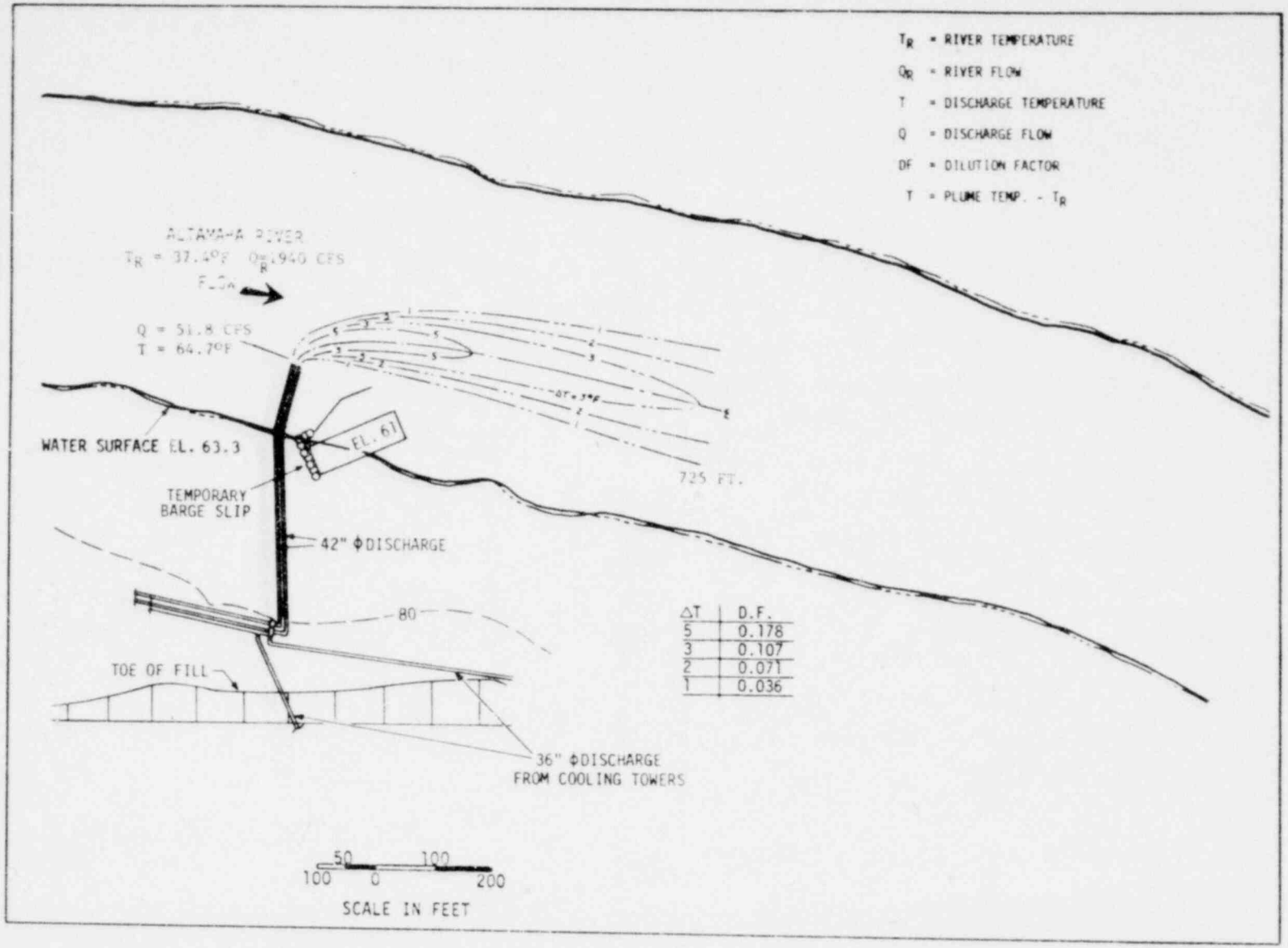

Figure 5.4-3[8] Edwin I. Hatch Nuclear Plant Unit 2: 2-Unit Operation During Extreme Winter Meteorlogical Conditions.

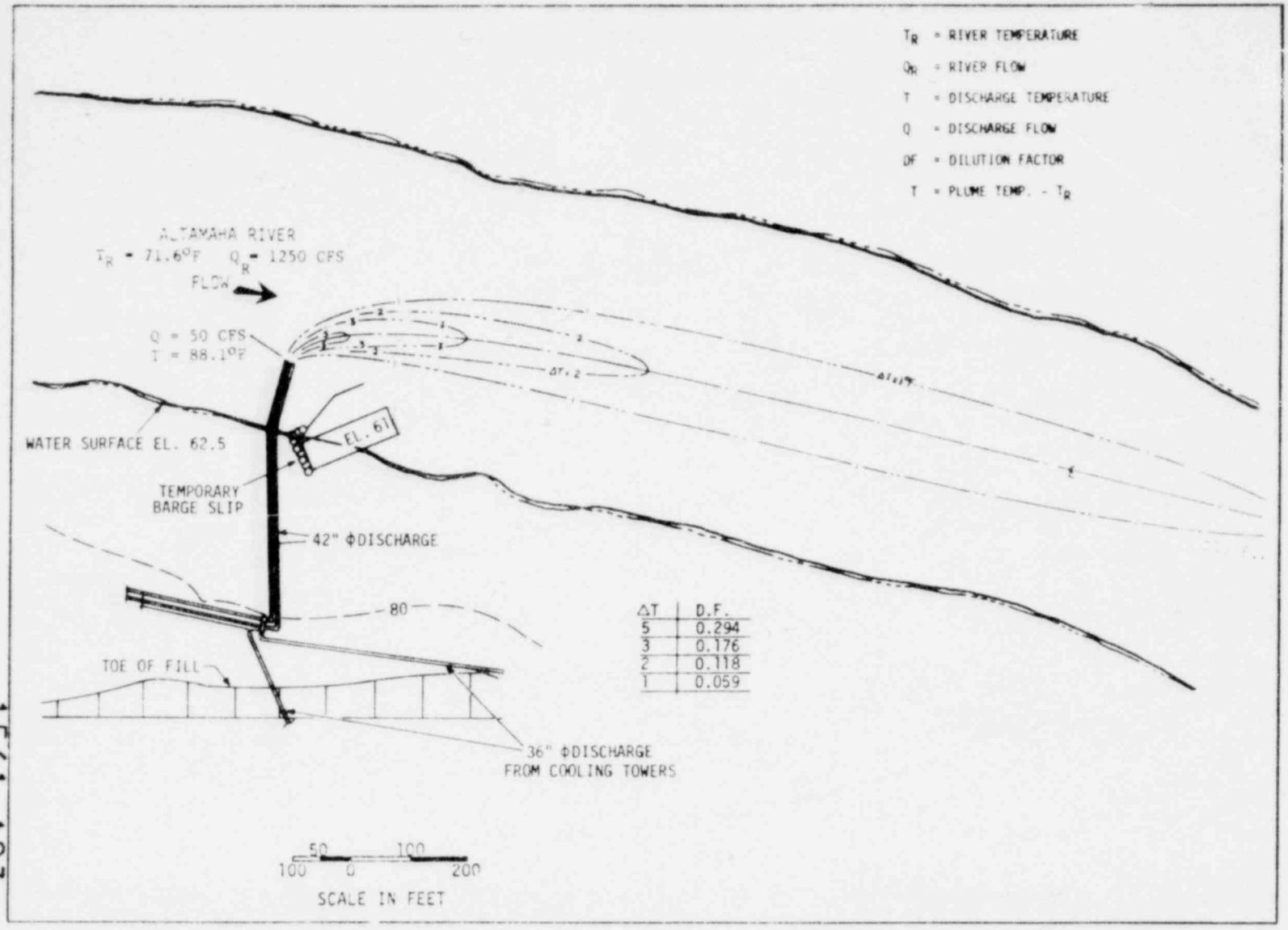

Figure 5.4-4[8] Edwin I. Hatch Nuclear Plant Unit 2: 2-Unit Operation During Extreme Summer Meteorlogical Conditions.

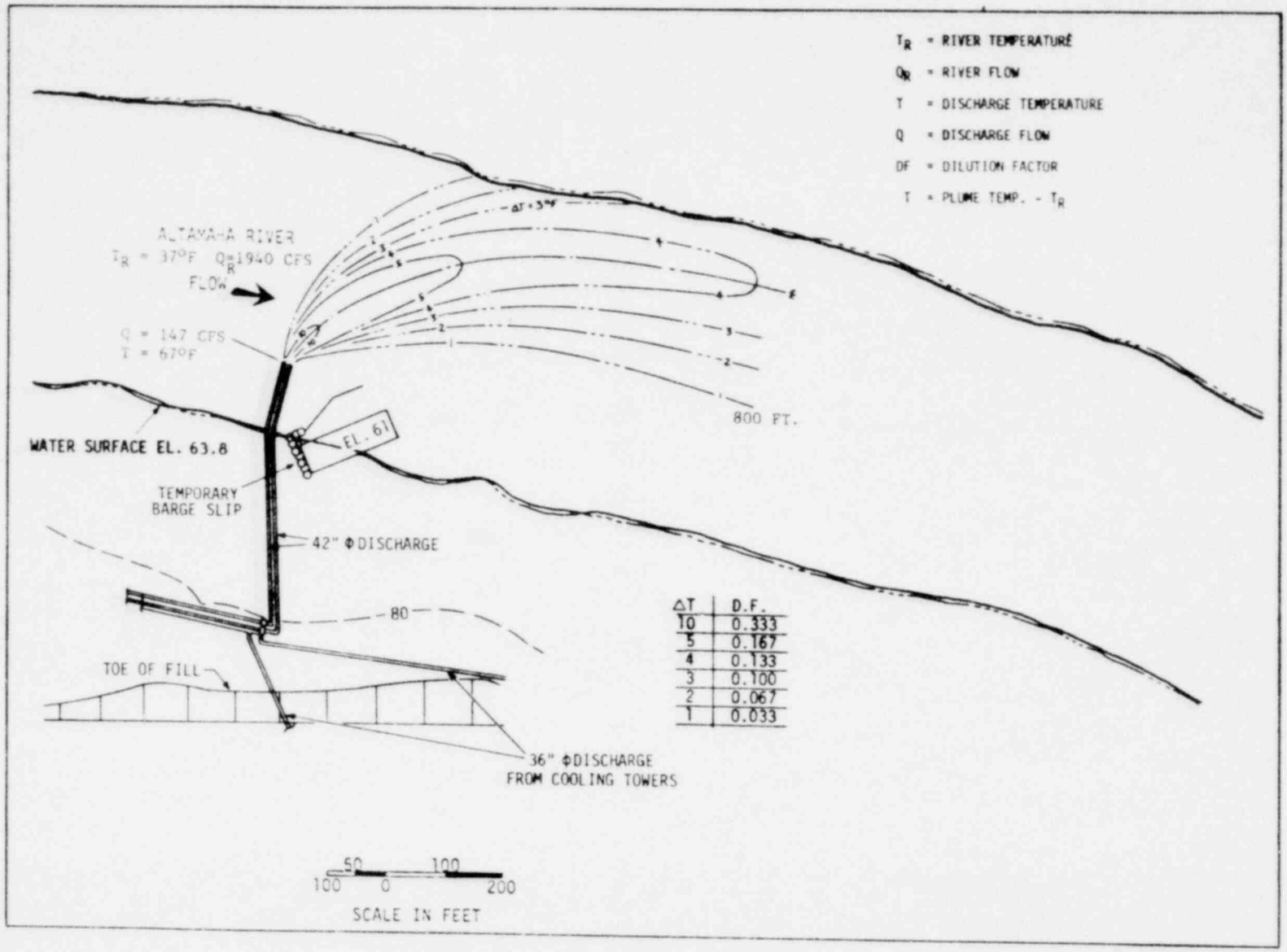

Figure 5.4-5[8] Edwin I. Hatch Nuclear Plant Unit 2: 2-Unit Cold Shutdown Without Off-Site Power During Winter With Minimum River Temperature.

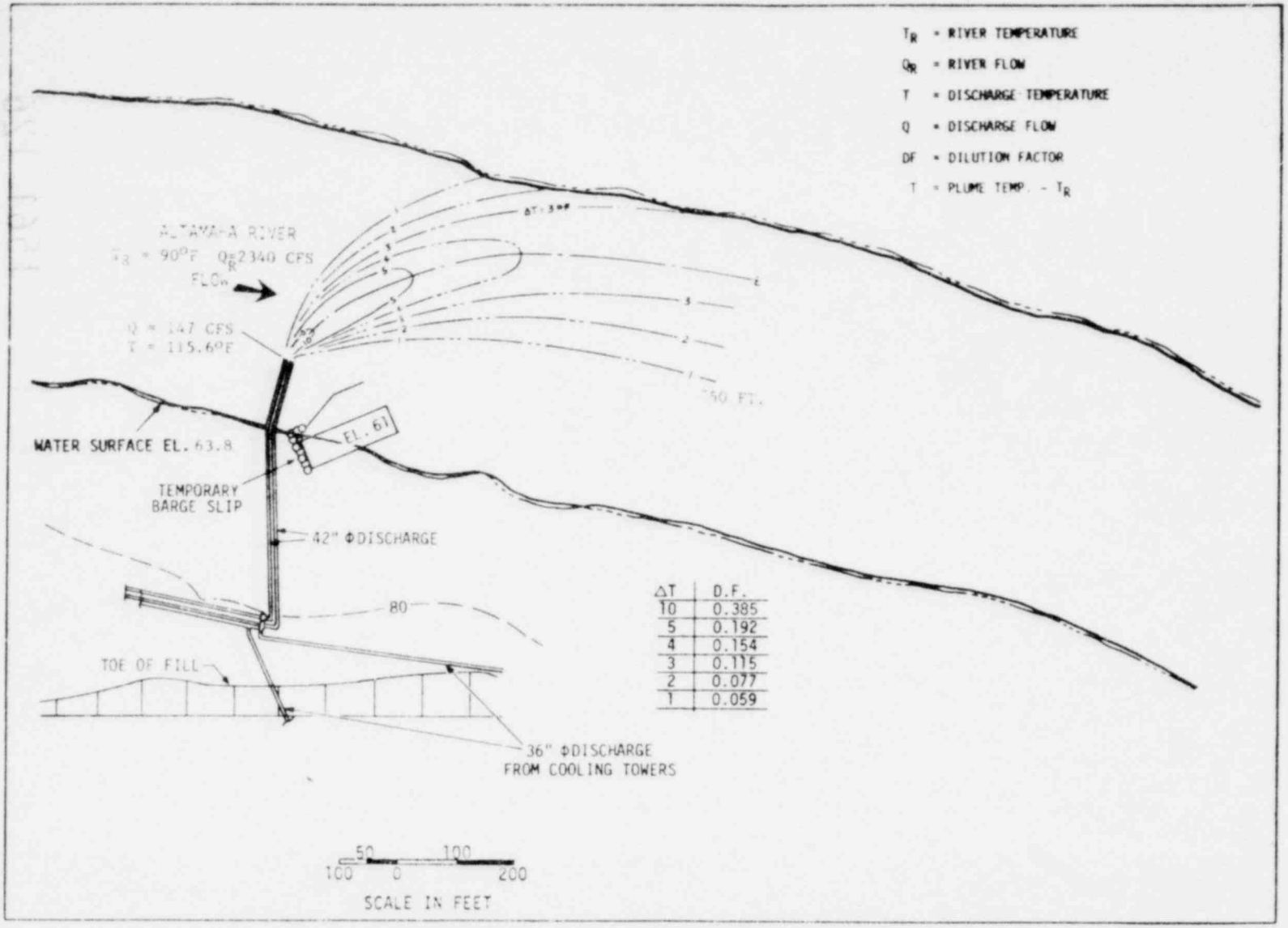

Figure 5.4-6[8] Edwin I. Hatch Nuclear Plant Unit 2: 2-Unit Cold Shutdown Without Off-Site Power During Summer With High River Temperature.

TABLE 5.4-3

THERMAL PLUME CHARACTERISTICS - TWO UNIT OPERATION UNDER NORMAL AND CONSERVATIVE CONDITIONS

Figure	Season	River Flow cfs	Discharge Flow cfs	Ambient River Temp °F	Discharge Temp °F	ΔT °F	Area 5° Isotherm Sq. Ft.	Area 5° Isotherm Acres	Area 3° Isotherm Sq. Ft.	Area 3° Isotherm Acres	Area 1° Isotherm Sq. Ft.	Area 1° Isotherm Acres
5.4-1	Winter[a]	3000	57.8	49.8	66.8	17	2832	.07	9063	.2	155205	3.6
5.4-2	Summer[a]	3000	55.8	81.6	86.3	4.7	-	-	187	.004	6797	.16
5.4-3	Winter[b]	1940	51.8	37.4	64.7	27.3	9629	.2	40784	.9	*	*
5.4-3	Summer[b]	1250	50.0	71.6	88.1	16.5	2266	.05	9629	.2	224310	5.1

*Area not calculated, the downstream limit of the 1° isotherm is undetermined.

[a]Average seasonal conditions

[b]Extreme seasonal conditions

The staff has considered the possibility of the existence of these mechanisms at the Hatch site and has concluded that due to the small size of the thermal plume even under conservative conditions, the demonstrated ability of fishes to avoid elevated temperature that may be lethal or sublethal to the fish, the lack of the possibility of a thermal blockage in the Altamaha River, the lack of temperatures in excess of the upper lethal temperature of important adult species over a significant area in the discharge plume, and the existence of ichthyoplankton of important species only during the spring when temperatures are low and the flow is high, no adverse effect on fishes is expected.

Thermal cold shock resulting from reactor shutdown during either controlled or scram conditions is considered insignificant since there is no immediate reduction of heat being discharged to the river. Approximately 24 hours are required for the discharge heat to be reduced significantly.[3]

5.5 RADIOLOGICAL IMPACTS

5.5.1 Radiological Impact on Man

The models and considerations for environmental pathways leading to estimates of radiation dose commitments to individuals are discussed in detail in draft Regulatory Guide 1.109. Similarly, use of these models, and additional assumptions, for population dose estimates are described in Appendix D of this statement.

5.5.1.1 Exposure Pathways

The environmental pathways which were considered in preparing this section are shown in Figure 5.5-1. Estimates were made of radiation doses to man at and beyond the site boundary based on NRC staff estimates of expected effluents as shown in Tables 3.2-2 and 3.2-3, site meteorological and hydrological considerations, and exposure pathways at the Hatch nuclear power station.

Inhalation of air and ingestion of food (and water) containing C-14 and radiocesium, and immersion in the gaseous plume containing radioactive noble gases are estimated to account for essentially all of the total body radiation dose commitments to individuals and the population within 50 miles of the Hatch station.

5.5.1.2 Dose Commitments from Radioactive Releases to the Atmosphere

Radioactive effluents released to the atmosphere from the Hatch facility will result in small radiation doses to the public. NRC staff estimates of the expected gaseous and particulate releases listed in Table 3.2-3, and the site meteorological considerations discussed in Section 2.4 of this statement and summarized in Table 5.5-1 were used to estimate radiation doses to individuals and populations. The results of the calculations are discussed below.

Radiation Dose Commitments to Individuals

The predicted dose commitments to "maximum" individuals at the offsite locations where doses are expected to be largest are listed in Table 5.5-2. A maximum individual is assumed to consume well above average quantities of the foods considered (see Table A-2 in Draft Regulatory Guide 1.109). The standard NRC models were used to realistically model features of the Hatch Unit No. 2 plant design and the site environs.

Radiation Dose Commitments to Populations

The estimated annual radiation dose commitment to the population (within 50 miles) for the Hatch Unit No. 2 nuclear power plant from gaseous and particulated releases were based on the project site population distribution for the Year 1992. Doses beyond the 50-mile radius were based on the average population densities discussed in Appendix D of this Statement. The annual population dose commitments are presented in Table 5.5-3. Background radiation doses are provided for comparison. The doses from atmospheric releases from the Hatch Unit No. 2 facility during normal operation represent an extremely small increase in the normal population dose from background radiation sources.

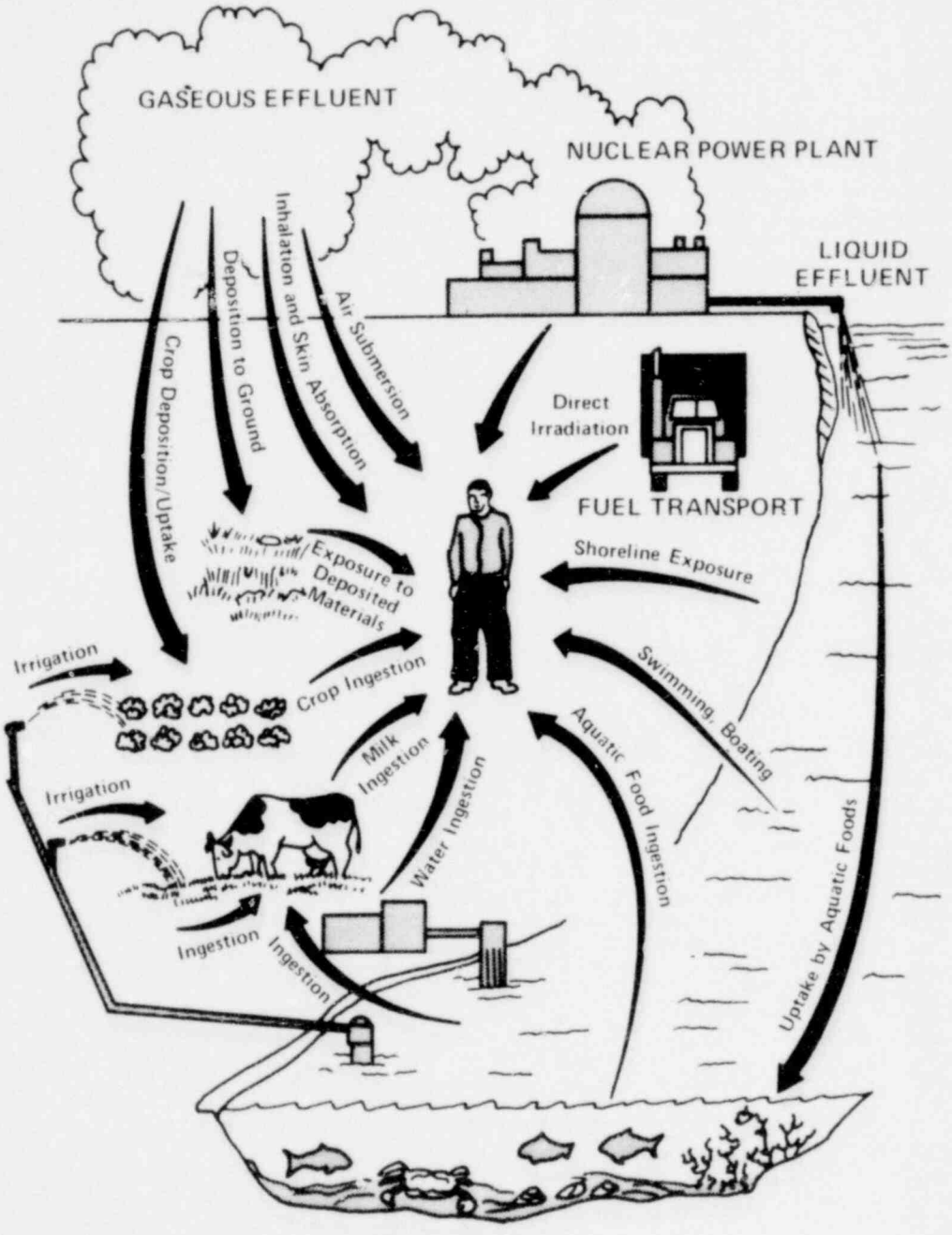

Figure 5.5-1 Exposure Pathways to Man.

TABLE 5.5-1

SUMMARY OF ATMOSPHERIC DISPERSION FACTORS AND DEPOSITION VALUES FOR SELECTED LOCATIONS NEAR THE HATCH NUCLEAR POWER STATION*

Location	Source	X/Q (sec/m^3)	Relative Deposition (m^{-2})
Nearest** Site	A	7.34E-07	1.28E-07
Water Boundary	B	1.79E-07	6.06E-08
(0.28 mi. NNW)	C	1.40E-07	3.60E-08
Nearest Site	A	1.78E-06	2.19E-08
Land Boundary	B	1.19E-07	1.37E-08
(0.94 mi WSW)	C	4.54E-07	4.61E-08
Nearest Residence	A	1.57E-06	1.50E-08
(0.99 mi SW)	B	9.81E-08	9.16E-09
	C	4.28E-07	3.58E-08
Nearest Garden/Meat	A	1.24E-06	9.15E-09
(1.2 mi SW)	B	9.09E-08	5.71E-09
	C	4.54E-07	2.63E-08
Nearest Residence,	A	2.59E-07	1.49E-09
Garden, Milk and	B	4.46E-08	1.05E-09
Meat Animals	C	2.93E-07	6.09E-09
(2.9 mi NNE)			

* The doses presented in the following tables are corrected for radioactive decay and cloud depletion from deposition, where appropriate, in accordance with Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light Water Reactors," March 1976.

** "Nearest" refers to that type of location where the highest radiation dose is expected to occur from all appropriate pathways.

Source A is a continuous ground-level release from reactor vents.
Source B is a continuous release from the 120m stack.
Source C is a periodic release from the 120m stack; 4/yr 24 hours duration.

TABLE 5.5-2

ANNUAL DOSE COMMITMENTS TO A MAXIMUM INDIVIDUAL DUE TO ATMOSPHERIC RELEASES[a]

LOCATION	PATHWAY	DOSE (mrem/yr) TOTAL BODY	GI-TRACT	BONE	LIVER	THYROID	LUNG	SKIN
Nearest* Residence (0.99 mi SW)	Plume	0.78	0.78	0.78	0.78	0.78	0.78	1.7
	Ground Deposit	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	Inhalation (Infant)	**	**	**	**	0.13	**	**
Nearest Residence/ Garden/Milk and Meat Animals (2.9 mi NNE	Plume	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Ground Deposit	**	**	**	**	**	**	**
	Inhalation (Infant)	**	**	**	**	0.02	**	**
	Meat (Child)	**	**	**	**	0.02	**	**
	Milk (Infant)	0.02	0.02	0.02	0.03	3.1	0.02	0.02
	Vegetation (Child)	0.02	0.02	0.02	0.02	0.14	0.02	0.02
Nearest Garden/ Meat Animals (1.2 mi SW)	Plume	0.60	0.60	0.60	0.60	0.60	0.60	1.4
	Ground Deposit	**	**	**	**	**	**	**
	Inhalation (Infant)	**	**	**	**	0.22	**	**
	Vegetation (Child)	0.06	0.06	0.06	0.12	0.66	0.06	0.06
	Meat (Child)	**	**	**	**	**	**	**
Nearest Site Boundary (0.94 mi WSW	Plume	0.92	0.92	0.92	0.92	0.92	0.92	1.8
	Ground Deposit	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	Inhalation	**	**	**	**	0.15	**	**

[a]The doses are for Unit No. 2 only; the dose from both units would be twice the values in this table since the units are identical.

*"Nearest" refers to that type of location where the highest radiation dose is expected to occur from all appropriate pathways.

**Less than 0.01 mrem/yr.

TABLE 5.5-3

ANNUAL POPULATION DOSE COMMITMENTS IN THE YEAR 1992[a]

Category	Population Dose Commitment (man-rem) 50 miles	U.S. Population
Natural Radiation Background[b]	23,000[c]	25,000,000[d]
Hatch Unit No. 2 Nuclear Power Plant Operation		
Plant Work Force	**	500
General Public (Total)	1	29
Noble Gases Submersion	*	3.7
Inhalation	*	*
Ground Deposition	*	*
Terrestrial Foods	*	24
Drinking Water	*	*
Aquatic Foods	*	*
Recreation	*	*
Transportation of nuclear fuel and radioactive wastes	**	3

[a]The dose commitments shown are for the Unit No. 2 only; the commitment from both units would be twice the values in this table since the units are identical.

[b]"Natural Radiation Exposure in the United States," U.S. Environmental Protection Agency, ORP-SID 72-1 (June 1972).

[c]Using the average Georgia state background dose (100 mrem/yr) in (a), and year 1992 projected population of 230,000.

[d]Using the average U.S. background dose (102 mrem/yr) in (a), and year 1990 projected U.S. population from "Population Estimates and Projections," Series II, U.S. Ept. of Commerce, Bureau of Census, Series P-25, No. 541 (Feb. 1975).

*Less than 1 man-rem/yr

**Included in the U.S. population, since some exposure is received by persons residing outside 50 mile radius.

5.5.1.3 Dose Commitments from Radioactive Liquid Releases to the Hydrosphere

Radioactive effluents released to the hydrosphere from the Hatch Unit No. 2 facility during normal operation will result in small radiation doses to individuals and populations. NRC staff estimates of the expected liquid releases listed in Table 3.2-2, and the site hydrological considerations discussed in Section 2.3 of this statement and summarized in Table 5.5-4 were used to estimate radiation dose commitments to individuals and populations. The results of the calculations are discussed below.

Radiation Dose Commitments to Individuals

The estimated dose commitments to individuals at selected offsite locations where exposures are expected to be largest are listed in Table 5.5-5. The standard NRC models given in Draft Regulatory Guide 1.109 were used for these analyses.

Radiation Dose Commitments to Populations

The estimated population radiation dose commitments to 50 miles for the Hatch Unit No. 2 facility form liquid releases, based on the use of water and biota from the Altamaha River, are shown in Table 5.5-3. Dose commitments beyond 50 miles were based on the assumptions discussed in Appendix D.

Background radiation doses are provided for comparison. The dose commitments from liquid releases from the Hatch Unit No. 2 facility represent small increases in the population dose from background radiation sources.

5.5.1.4 Direct Radiation

Radiation from the Facility

Radiation fields are produced in nuclear plant environs as a result of radioactivity contained within the reactor and its associated components. Although these components are shielded, dose rates around the plants have been observed to vary from undetectable levels to values of the order of 1 rem/year.

Doses from sources within the plant are primarily due to nitrogen-16, a radionuclide produced in the reactor core. For boiling water reactors, nitrogen-16 is transported with the primary coolant to the turbine building. The orientation of piping and turbine components in the turbine building determines, in part, the exposure rates outside the plant. Because of variations in equipment layout, exposure rates are strongly dependent upon overall plant design.

Based on the radiation surveys which have been performed around several operating BWR's, it appears to be very difficult to develop a reasonable model to predict direct shine doses. Thus, older plants should have actual measurements performed if information regarding direct radiation and skyshine rates is needed.

For newer BWR plants with a standardized design, dose rates have been estimated using sophisticated Monte Carlo techniques. The turbine island design proposed in the Braun SAR[1] is estimated to have direct radiation and skyshine dose rates of the order of 20 mrem/year/unit at a typical site boundary distance of 0.4 mile from the turbine building. This dose rate is assumed to be typical of the new generation of boiling water reactors. The integrated population dose from such a facility would be less than one man-rem/year/unit.

Low level radioactivity storage containers outside the plant are estimated to contribute less than 0.01 mrem/year at the site boundary.

Occupational Radiation Exposure

Based on a review of the applicant's safety analysis report, the staff has determined that the applicant is committed to design features and operating practices that will assure that individual occupational radiation doses (occupational dose is defined in 10 CFR Part 20) and individual and total plant population doses will be as low as is reasonably achievable.[2] For the purpose of portraying the radiological impact of the plant operation on all onsite personnel, it is necessary to estimate a man-rem occupational radiation dose. For a plant designed and proposed to be operated in a manner consistent with the 10 CFR Part 20, there will be many variables which influence exposure and make it difficult to determine a quantitative total occupational radiation dose for a specific plant. Therefore, past exposure experience from operating nuclear power stations[3] has been used to provide a widely applicable estimate to be used for all light

TABLE 5.5-4

SUMMARY OF HYDROLOGIC TRANSPORT AND DISPERSION FOR LIQUID RELEASES FROM THE HATCH UNIT NO. 2 NUCLEAR POWER PLANT

LOCATION	TRANSIT TIME (Hours)	DILUTION FACTOR
Nearest Drinking Water Intake (River Well) (8 mi downstream)	9.7	40
Nearest Sport Fishing Location (0.28 mi NNW)**	0.01	3.4
Nearest Shoreline (2 mi downstream)	2.5	2.7

*See Regulatory Guide 1.112, "Analytical Models for Estimating Radioisotopes Concentrations in Different Water Bodies," (1976).

**Assumed for purposes of an upper limit estimate-detailed information not available.

TABLE 5.5-5

ANNUAL INDIVIDUAL DOSE COMMITMENTS DUE TO LIQUID EFFLUENTS[a]

LOCATION	PATHWAY	DOSE (mrem/yr) TOTAL BODY	BONE	LIVER	THYROID	LUNG	GI TRACT
Nearest River Water Use (river well) (@ 8 mi downstream)	Drinking Water	**	**	**	0.02	**	**
Nearest Fish Production (0.28 mi NNW)*	Fish (Outfall Area)	1.1	2.0	1.5	0.09	0.16	0.34
Nearest Shoreline (2 mi downstream)	Sediments	**	**	**	**	**	**

[a]The doses shown are for Unit No. 2 only; the dose from both units would be twice the values in this table since the units are identical.

*Assumed for purposes of an upper limit estimate-detailed information on usage and productivity not available.

**Less than 0.01 mrem/yr.

water reactor power plants of the type and size for Hatch Unit No. 2. This experience indicates a value of 500 man-rem per year per reactor unit. On this basis, the projected occupational radiation exposure impact of the Hatch Unit No. 2 is estimated to be 500 man-rem per year.

Transportation of Radioactive Material

The transportation of cold fuel to a reactor, of irradiated fuel from the reactor to a fuel reprocessing plant, and of solid radioactive wastes from the reactor to burial grounds is within the scope of the NRC report entitled, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants." The environmental effects of such transportation are summarized in Table 5.5-6.

5.5.1.5 Site Specific Data

The applicant's site and environmental data provided in the EROL and in subsequent answers to NRC staff questions was used extensively in the dose calculations. Any additional data received which could significantly affect the conclusions reached in this draft statement will be used in preparing the final statement for the operating license for this plant.

5.5.1.6 Evaluation of Radiological Impact

The radiological impact of operating the proposed Hatch Unit No. 2 Nuclear Power Plant is presented in terms of individual dose commitments in Tables 5.5-2 and 5.5-5. The annual individual dose commitments resulting from routine operation of the plant are a small fraction of the dose limits specified in 10 CFR Part 20. The population dose commitments presented in Table 5.5-3 are small fractions of the dose from natural environmental radioactivity. As a result, the staff concluded that there will be no measurable radiological impact on man from routine operation of the Hatch Unit No. 2 plant.

Since Unit Nos. 1 and 2 are identical plants, the radiological impact due to the operation of the two-unit station would be twice that determined for Unit No. 2. However, the conclusions with regard to Unit No. 2 operation also are valid for both units during normal operation due to the small dose commitments.

5.5.1.7 Comparison of Calculated Doses with NRC Design Objectives

Tables 5.5-7 and 5.5-8 show a comparison of calculated doses from routine releases of liquid and gaseous effluents from the Hatch Unit No. 2 plant with the design objectives of Appendix I to 10 CFR 50 and with the proposed staff design objectives of RM-50-2.

5.5.2 Radiological Impact on Biota Other Than Man

The models and considerations for environmental pathways leading to estimates of radiation doses to biota are discussed in detail in Volume 2, "Analytical Models and Calculations" of WASH-1258.4

5.5.2.1 Exposure Pathways

The environmental pathways which were considered in preparing this section are shown in Figure 5.5-2. Dose estimates were made for biota at the nearest land and water boundaries of the site, and in the aquatic environment at the point where plant's liquid effluents mix with the Altamaha River. The estimates were based on estimates of expected effluents as shown in Tables 3.2-2 and 3.2-3, site meteorological and hydrological considerations, and the exposure pathways anticipated at the Hatch Unit No. 2 Nuclear Power Plant.

5.5.2.2 Doses to Biota from Radioactive Releases to the Biosphere

Depending on the pathway (as discussed in Draft Regulatory Guide 1.109), terrestrial and aquatic biota will receive doses approximately the same or somewhat higher than man receives. Dose estimates for some typical biota at the Hatch Unit No. 2 site are shown in Table 5.5-9. Doses to a greater number of similar biota in the offsite environs will generally be much lower.

TABLE 5.5-6

ENVIRONMENTAL IMPACT OF TRANSPORTATION OF FUEL AND WASTE TO AND FROM ONE LIGHT-WATER-COOLED NUCLEAR POWER REACTOR[a]

Normal conditions of transport	
Heat (per irradiated fuel cask in transit)	250,000 Btu/hr
Weight (governed by Federal or State restrictions)	73,000 lb. per truck; 100 tons per cask per rail car
Traffic density	
Rail	< 1 per day
	< 3 per month

Exposed population	Estimated number of persons	Range of doses to exposed individuals (millirems per reactor yr)	Cumulative dose to exposed population (man-rems per reactor yr)[c]
Transportation			
Worker	200	0.01 to 300	4
General Public			
Onlookers	1,100	0.003 to 1.3	
Along Route	600,000	0.0001 to 0.06	3

Accidents in transport	
Radiological effects	Small[d]
Common (nonradiological) causes	1 fatal injury in 100 reactor years; 1 nonfatal injury in 10 reactor years; $475 property damage per reactor year

[a] Data supporting this table are given in the Commission's Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants, WASH-1238, December 1972, and Supp. I, NUREG 75/038, April 1975.

[b] The Federal Radiation Council has recommended that the radiation doses from all sources of radiation other than natural background and medical exposures should be limited to 5,000 millirems/year for individuals as a result in occupational exposure and should be limited to 500 millirems/year for individuals in the general population. The dose to individuals due to average natural background radiation is about 102 millirems/year.

[c] Man-rem is an expression for the summation of whole-body doses to individuals in a group. Thus, if each member of a population group of 1,000 people were to receive a dose of 0.001 rem (1 millirem), or if 2 people were to receive a dose of 0.5 rem (500 millirems) each, the total man-rem in each case would be 1 man-rem.

[d] Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single reactor or a multi-reactor site.

TABLE 5.5-7

COMPARISON OF CALCULATED DOSES TO A MAXIMUM INDIVIDUAL FROM HATCH UNIT NOS. 1 & 2 OPERATION WITH GUIDES FOR DESIGN OBJECTIVES PROPOSED BY THE STAFF[a]

CRITERION	RM-50-2 DESIGN OBJECTIVE	CALCULATED DOSE
Liquid Effluents		
Dose to total body or any organ from all pathways	5 mrem/yr	4.0 mrem/yr
Noble Gas Effluents (at site boundary)		
Gamma dose in air	10 mrad/yr	0.92 mrad/yr
Beta dose in air	20 mrad/yr	3.0 mrad/yr
Dose to total body of an individual	5 mrem/yr	1.8 mrem/yr
Dose to skin of an individual	15 mrem/yr	3.6 mrem/yr
Radioiodine and Particulates[b]		
Dose to any organ from all pathways	15 mrem/yr	6.3 mrem/yr

[a]Guides on Design Objectives proposed by the NRC staff on February 20, 1974; considers doses to individuals from all units on site. From "Concluding Statement of Position of the Regulatory Staff," Docket No. RM-50-2, Feb. 20, 1974, pp. 25-30, U.S. Atomic Energy Commission, Washington, D.C.

[b]Carbon-14 and tritium have been added to this category.

TABLE 5.5-8

COMPARISON OF CALCULATED DOSES TO A MAXIMUM INDIVIDUAL FROM HATCH UNIT NO. 2 OPERATION WITH APPENDIX I DESIGN OBJECTIVES[a]

CRITERION	APPENDIX I DESIGN OBJECTIVE	CALCULATED DOSES
Liquid Effluents		
Dose to total body from all pathways	3 mrem/yr	1.1 mrem/yr
Dose to any organ from all pathways	10 mrem/yr	2.0 mrem/yr
Noble Gas Effluents (at site boundary)		
Gamma dose in air	10 mrad/yr	0.46 mrad/yr
Beta dose in air	20 mrad/yr	1.5 mrad/yr
Dose to total body of an individual	5 mrem/yr	0.92 mrem/yr
Dose to skin of an individual	15 mrem/yr	1.8 mrem/yr
Radioiodines and Particulates[b]		
Dose to any organ from all pathways	15 mrem/yr	3.1 mrem/yr

[a]Appendix I Design Objectives from Sections II.A, II.B, II.C of Appendix I, 10 CFR Part 50; considers doses to maximum individual per reactor unit. From Federal Register V. 40, p. 19442, May 5, 1975.

[b]Carbon-14 and tritium have been added to this category.

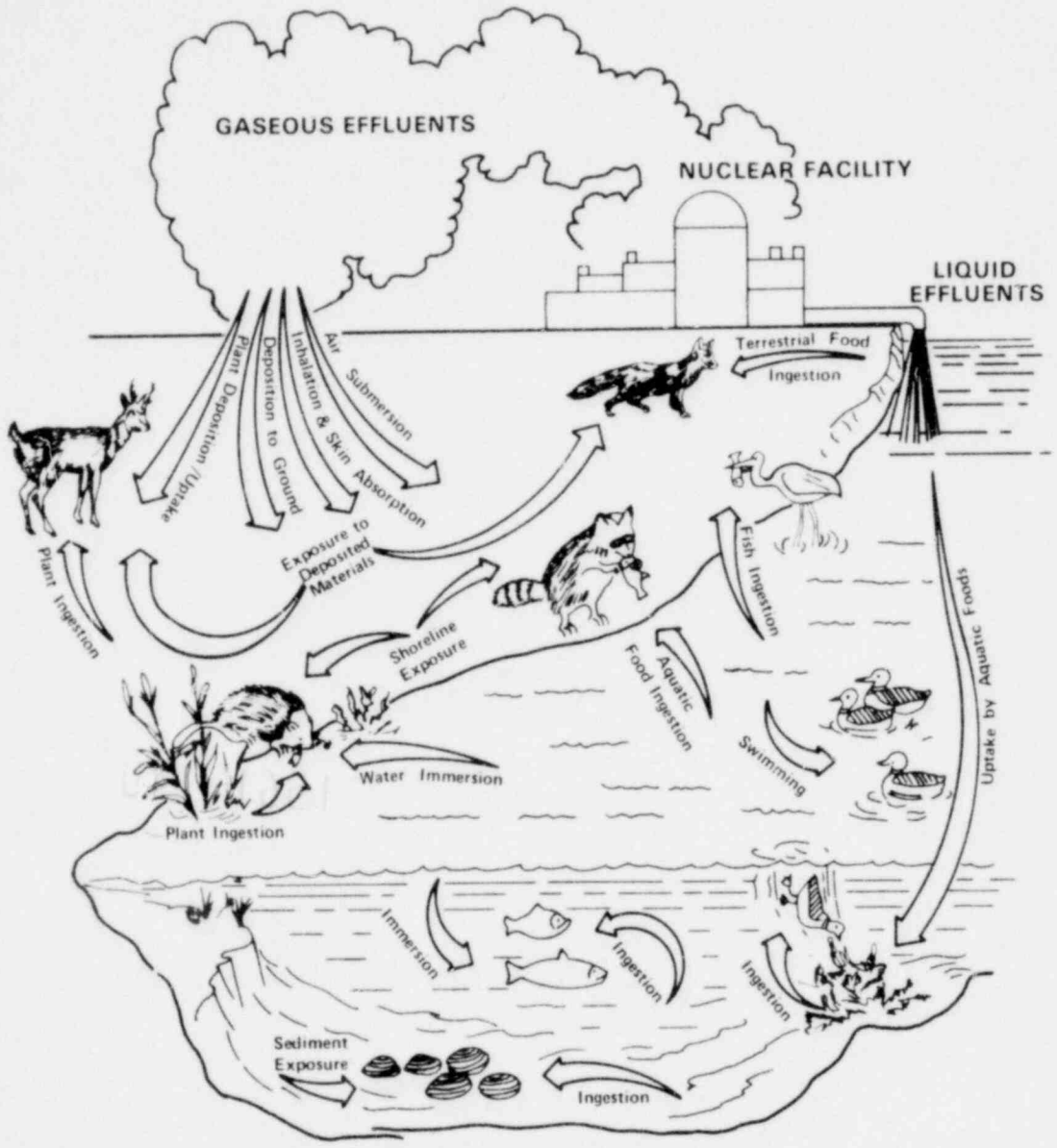

Figure 5.5-2 Exposure Pathways to Biota Other Than Man.

TABLE 5.5-9

DOSE ESTIMATES FOR TYPICAL BIOTA AT THE HATCH UNIT NO. 2 SITE

BIOTA	LOCATION	PATHWAY	DOSE (mrad/yr)
Deer	Nearest Site Land Boundary (0.94 mi WSW)	Atmospheric	0.65
Fox	"	"	0.70
Terrestrial Flora	"	"	0.60
Raccoon	Nearest Site Water Boundary (0.28 mi NNW)	Atmospheric Hydrosphere	5.5
Muskrat	"	"	50
Heron	"	"	110
Duck	Plant Outfall (100 ft downstream)	"	50
Fish	"	Hydrosphere	13
Invertebrates	"	"	110
Algae	"	"	49

NOTE: Atmospheric doses include estimates of plume dose, ground deposition dose, inhalation dose, and ingestion doses where appropriate. Hydrospheric doses include estimates of immersion dose, dose from consumption, and sediment dose where appropriate.

5.5.2.3 Doses to Biota from Direct Radiation

Although many of the terrestrial species may be continuously exposed and thereby receive higher doses than man, aquatic species and some terrestrial species may receive somewhat lower doses depending on shielding by water or soil (e.g., burrows). As a result of these uncertainties, it was assumed that the direct radiation doses to biota at the site boundary will be about the same as for man. As discussed in Section 5.5.1.4, direct radiation doses will generally be on the order of 20 mrad/yr.

5.5.2.4 Evaluation of the Radiological Impact on Biota[5]

Although guidelines have not been established for desirable limits for radiation exposure to species other than man, it is generally agreed that the limits established for humans are also conservative for other species. Experience has shown that it is the maintenance of population stability that is crucial to the survival of a species, and species in most ecosystems suffer rather high mortality rates from natural causes. While the existence of extremely radiosensitive biota is possible and while increased radiosensitivity in organisms may result from environmental interactions with other stresses (e.g., heat, biocides, etc.), no biota have yet been discovered that show a sensitivity (in terms of increased disease or death) to radiation exposures as low as those expected in the area surrounding the Hatch Unit No. 2 nuclear power plant. The "BEIR" Report[6] concluded that the evidence to date indicates that no other living organisms are very much more radiosensitive than man. Therefore, no measurable radiological impact on populations of biota is expected from the radiation and radioactivity released to the biosphere as a result of the routine operation of the Hatch Unit No. 2 Nuclear Power Plant.

5.5.3 Environmental Effects of the Uranium Fuel Cycle

On March 14, 1977, the Commission presented in the FEDERAL REGISTER (42FR13803) an interim rule regarding the environmental considerations of the uranium fule cycle. It is effective through September 13, 1978 and revises Table S-3 of 10 CFR Part 51. Final rulemaking proceedings will be conducted so as to allow for additional public comment and specific details with respect to time, place, and format of such proceedings shall be presented in a subsequent FEDERAL REGISTER notice.

The interim rule reflects new and updated information relative to reprocessing of spent fuel and radioactive waste management as discussed in NUREG-0116, Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle and NUREG-0216 which presents staff responses to comments on NUREG-0116. The rule also considers other environmental factors of the uranium fuel cycle including mining and milling, isotopic enrichment, fuel fabrication, and management of low and high level wastes. These are described in the AEC report WASH 1248, Environmental Survey of the Uranium Fuel Cycle.

Specific categories of natural resource use are included in Table S-3 of the interim rule and are reproduced in this Statement as Table 5.5-10. These categories relate to land use, water consumption and thermal effluents, electrical energy use, fossil fuel combustion, chemical and radioactive effluents, burial of transuranic and high/low level wastes, and radiation doses from transportation and occupational exposures. The contributions in Table 5.5-10 for reprocessing, waste management, and transportation of wastes are maximized for either of the two fuel cycles (uranium only and no recycle); that is, the cycle which resulted in the greater impact was used.

In accordance with the interim rule, the assessment of the environmental impacts of the fuel cycle as related to the operation of the Edwin I. Hatch Nuclear Plant Unit No. 2 is based upon the values given in Table 5.5-10. For the sake of consistency, the analysis of fuel cycle impacts other than that due to land use has been cast in terms of a model 1000 MWe LWR. Our conclusions regarding the effects of these impacts would not be altered if the analysis was based on the net 803 MWe electrical power capacity of the Hatch Unit No. 2 plant.

The total annual land requirements for the fuel cycle supporting a model 1000 MWe LWR is approximately 100 acres (94 acres temporarily committed and 7.1 acres permanently committed). Over the 30-year operating life of the plant, this amounts to about 2100 acres,[1/] which is less than one-third of the total land commitment for the Hatch plant itself.

To cast the land requirement into further perspective, the temporarily committed land for waste management and reprocessing activities to support a model 1000 MWe LWR during its projected 30-year operating life is some 2% of the approximately 6700 acres of land temporarily committed for operation of the Hatch plant. Considering common classes of land use in the United States, the fuel cycle land requirement related to the operation of Hatch Unit No. 2 does not constitute a significant impact.

[1/] The temporarily committed land at the reprocessing plant is not prorated over 30 years, since the complete temporary impact accrues regardless of whether the plant services one reactor for one year or 57 reactors for 30 years. (See footnote "2" to Table 5.5-10)

Table 5.5-10 SUMMARY OF ENVIRONMENTAL CONSIDERATIONS FOR URANIUM FUEL CYCLE[1]

Normalized to model LWR annual fuel requirement (WASH-1248) or reference reactor year (NUREG-0116)

Natural resource Use	Total	Maximum effect per annual fuel requirement or reference reactor year of model 1,000 MWe LWR
Land (acres):		
Temporarily committed[2]	94	
Undisturbed area	73	
Disturbed area	22	Equivalent to 110 MWe coal-fired powerplant
Permanently committed	7.1	
Overburden moved (millions of MT)	2.8	Equivalent to 95 MWe coal-fired powerplant
Water (millions of gallons):		
Discharged to air	159	<2 pct of model 1,000 MWe LWR with cooling tower
Discharged to water bodies	1,090	
Discharged to ground	124	
Total	11,373	<4 pct of model 1,000 MWe LWR with once-through cooling
Fossil fuel:		
Electrical energy (thousands of megawatt hours)	321	<5 pct of model 1,000 MWe LWR output
Equivalent coal (thousands of MT)	117	Equivalent to the consumption of a 45 MWe coal-fired powerplant
Natural gas (millions of scf)	124	<0.3 pct of model 1,000 MWe energy output
Effluents--chemical (MT):		
Gases (including entrainment):[3]		
SO_x[4]	4,400	
NO_x[4]	1,190	Equivalent to emissions from 45 MWe coal-fired plant for a year
Hydrocarbons	14	
CO	29.6	
Particulates	1,154	
Other gases:		
F_2	0.67	Principally from UF_6 production, enrichment, and reprocessing. Concentration within range of state standards--below level that has effects on human health
HCl	0.014	
Liquids:		
$SO_4^{=}$	9.9	From enrichment, fuel fabrication, and reprocessing steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. The constituents that require dilution and the flow of dilution water are:
NO_3^-	25.8	NH_3--600 ft^3/s
Fluoride	12.9	NO_3--20 ft^3/s
CA^{++}	5.4	Fluoride--70 ft^3/s
Cl^-	8.5	
NA^+	12.1	
NH_3	10.0	
Fe	0.4	
Tailings solutions (thousands of MT)	240	From mills only--no significant effluents to environment
Solids	91,000	Principally from mills--no significant effluents to environment
Effluents--radiological (curies):		
Gases (including entrainment):[5]		
Rn-222	74.5	Principally from milling operations and excludes contributions from mining
Ra-226	0.02	
Th-230	0.02	
Uranium	0.034	
Tritium (thousands)	18.1	
C-14	24	
Kr-85 (thousands)	400	
Ru-106	0.14	Principally from fuel reprocessing plants
I-129	1.3	
I-131	0.83	
Fission products and transuranics	0.203	
Liquids:[6]		
Uranium and daughters	2.1	Principally from milling--included in tailings liquor and returned to ground--no effluents; therefore, no effect on environment
Ra-226	.0034	From UF_6 production
Th-230	.0015	
Th-234	.01	From fuel fabrication plants--concentration 10 pct of 10 CFR 20 for total processing 26 annual fuel requirements for model LWR
Fission and activation products	5.9×10^{-6}	
Solids (buried on site):		
Other than high level (shallow)	11,300	9,100 Ci comes from low-level reactor wastes and 1,500 Ci comes from reactor decontamination and decommissioning--buried at land burial facilities. 600 Ci comes from mills--included in tailings returned to ground. 160 Ci comes from conversion and spent fuel storage. No significant effluent to the environment
TRU and HLW (deep)	1.1×10^{7}	Buried at Federal repository
Effluents--thermal (billions of British thermal units)	3,462	<4 pct of model 1,000 MWe LWR
Transportation (person-rem): Exposure of workers and general public	2.5	
Occupational exposure (person-rem)	22.6	From reprocessing and waste management

[1] Data supporting this table are given in the "Environmental Survey of the Uranium Fuel Cycle," WASH-1248, April 1974; the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0116 (Supp. 1 to WASH-1248); and the "Discussion of Comments Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0216 (Supp. 2 to WASH-1248). The contributions from reprocessing, waste management and transportation of wastes are maximized for either of the 2 fuel cycles (uranium only and no recycle). The contribution from transportation excludes transportation of cold fuel to a reactor and of irradiated fuel and radioactive wastes from a reactor which are considered in table S-4 of sec. 51.20(g). The contributions from the other steps of the fuel cycle are given in columns A-E of table S-3A of WASH-1248.

[2] The contributions to temporarily committed land from reprocessing are not prorated over 30 years, since the complete temporary impact accrues regardless of whether the plant services 1 reactor for 1 yr or 57 reactors for 30 yr.

[3] Estimated effluents based upon combustion of equivalent coal for power generation.

[4] 1.2 pct from natural gas use and process.

[5] Gaseous effluents from waste management contribute about 9 person-rem (total body) to offsite U.S. population per annual fuel requirements or reference reactor year for the uranium only recycle option. This contribution for the no recycle option is 170 person-rem. For comparison, all radiological gaseous effluents from fuel cycle operations contribute about 370 person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. This dose is <0.002 pct of the average natural background radiation dose to this population. Fuel reprocessing contributes about 320 person-rem (total body) of the total of 370 person-rem to offsite U.S. population. Person-rem is an expression for the summation of whole body doses to individuals in a group. Thus, if each member of a population group of 1,000 people were to receive a dose of 0.001 rem (1 millirem), or if 2 people were to receive a dose of 0.5 rem (500 millirem) each, the total person-rem dose in each case would be 1 person-rem. The dose to the offsite U.S. population due to average natural background radiation is about 2×10^7 person-rem per year. The Commission's final environmental statement on use of mixed-oxide fuel in LWR's (NUREG-0002) indicates a maximum release of about 4800 Ci of Rn-222 when contributions from mining are included. NUREG-0002 also indicates that mining contributes about 500 person-rem (total body) and that milling contributes about 100 person-rem (total body) of a total of about 610 person-rem (total body) to offsite U.S. population per annual fuel requirement.

[6] Liquid radiological effluents from reprocessing and waste management activities in the fuel cycle contribute 1.4×10^{-4} person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. For comparison all radiological liquid effluents from fuel cycle operations contribute about 100 person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. This dose is <0.0005 pct of the average natural background radiation dose to this population.

The annual total water usage and thermal effluents associated with fuel cycle operations to support a 1000 MWe LWR are given in Table 5.5-10. Since the Hatch plant utilizes cooling towers, it can be compared to the model 1000 MWe plant with cooling towers referenced in Table 5.5-10. Thus, the amount of water discharged to the air related to the fuel cycle represents about 2% of the principal consumptive water use, i.e., evaporative losses to the air, for the Hatch plant. The quantity of heat discharged in fuel cycle operations is less than 4% of the thermal output from a model 1000 MWe LWR. The staff finds these quantities of indirect water consumption and thermal loadings to be acceptable relative to the use of water and thermal discharges at the power plant.

Electrical energy and process heat are required during various phases of the fuel cycle process. The electrical energy is usually produced by the combustion of fossil fuel at conventional power plants. As indicated in Table 5.5-10, electrical energy associated with the fuel cycle represents less than 5% of the annual electrical power production of a typical 1000 MWe nuclear plant. Process heat is primarily generated by the combustion of natural gas. As noted in Table 5.5-10, this gas consumption if used to generate electricity would be less than 0.3% of the electrical output from a 1000 MWe plant. The staff finds therefore, that both the direct and indirect consumption of electrical energy for fuel cycle operations to be small and acceptable relative to the net power production of the power plant.

The quantities of chemical gaseous and particulate effluents associated with fuel cycle processes are given in Table 5.5-10. The principal species are SO_x, NO_x and particulates. Based upon data in a CEQ Report,* the staff finds that these emissions constitute an extremely small additional atmospheric loading in comparison to the same emissions from the stationary fuel combustion and transportation sectors in the U.S., i.e., approximately .02% of the annual (1974 base) national releases for each of these species. The staff believes such small increases in releases of these pollutants are acceptable.

Liquid chemical effluents produced in fuel cycle processes are related to fuel enrichment, fabrication and reprocessing operations and may be released to receiving waters. These effluents are usually present in dilute concentrations such that only small amounts of dilution water are required to reach levels of concentration that are within established standards. Table 5.5-10 specifies the flow of dilution water required for specific constituents. Additionally, all liquid discharges into the navigable waters of the United States from plants associated with the fuel cycle operations will be subject to requirements and limitations set forth in an NPDES permit issued by an appropriate state or Federal regulatory agency.

Tailings solutions and solids are generated during the milling process. These solutions and solids are not released in significant quantities to create an impact upon the environment.

Radioactive effluents released to the environment estimated to result from reprocessing and waste management activities and other phases of the fuel cycle process are set forth in Table 5.5-10. It is estimated that the overall gaseous dose commitment to the U.S. population from the total fuel cycle for a 1000 MWe reference reactor would be approximately 370 man-rem per year. This dose is less than .002% of the average natural background dose of approximately 20,000,000 man-rem to the U.S. population. Based on Table 5.5-10 values, the additional dose commitment to the U.S. population from radioactive liquid effluents due to all fuel cycle operations would be approximately 100 man-rem per year for a 1000 MWe reference reactor. Thus, the overall estimated annual involuntary dose commitment to the U.S. population from radioactive gaseous and liquid releases due to these portions of the fuel cycle for a 1000 MWe LWR is approximately 470 man-rem. The occupational dose attributable to the reprocessing and waste management portions of the fuel cycle is 22.6 man-rem per reference reactor year. This represents approximately 5% of the occupational dose associated with operation and maintenance of the reactor.

The quantities of buried radioactive waste material (low level, high level and transuranic wastes) are specified in Table 5.5-10. For low level wastes, which are buried at land burial facilities, the Commission notes in Table S-3 of 10 CFR 51.20 that there will be no significant effluent to the environment. For high level and transuranic wastes, the Commission notes that these are to be buried at a Federal Repository and, in accordance with Table S-3 of 10 CFR 51.20, no release to the environment is associatec with such disposal. NUREG-0116 which provides background and context for the new values established by the Commission, indicates that these buried wastes, which are placed in the geosphere, are not released to the biosphere and no radiological environmental impact is anticipated from them.

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*"The Seventh Annual Report of the Council on Environmental Quality," September 1976, Figures 11-27 and 11-28, pp. 238-239.

The transportation dose to workers and the public is specified in Table 5.5-10. This dose is small and is not considered significant in comparison to the natural background dose.

The use of a fuel cycle entailing no recycle (neither plutonium nor uranium) would not affect the discussion above, since as described in footnote 1 of Table 5.5-10, the Commission has considered such a cycle in developing the values given in Table 5.5-10 with respect to reprocessing, waste management, and transportation of wastes.[2/]

In a September 21, 1977 memorandum to James Yore, Chairman, Atomic Safety and Licensing Board Panel (ASLBP), Dr. Walter H. Jordan, a member of the ASLBP, indicated that Table S-3 of 10 CFR 51 presents a value of 74.5 curies per RRY[3/] of Radon-222 released to the atmosphere which does not accurately represent all sources of radon releases from the uranium fuel cycle.

A number of staff affidavits have been prepared which identify the basis for the value of 74.5 curies per RRY set forth in Table S-3 and which provide current staff assessments of radon release, including releases from mining and from stabilized mill tailings piles, (two sources not covered by the 74.5 curies per RRY entry set forth in Table S-3), as well as a consideration of the radiological impact from such radon releases.

The staff estimates of Radon-222 releases from mining and milling operations for the uranium fuel cycle in terms of Ci/RRY are 74.5 from active milling operations only, 4060 from mining operations, 780 from active mill tailings stabilization pile, 350 from interim tailings pile (inactive mills; drying prior to stabilization), 1-10 from stabilized tailings pile (for several hundred years) and 110 from stabilized tailings pile (beyond several hundred years).

Current staff estimates of projected population doses attributable to Radon-222 releases associated with the uranium fuel cycle to support the operation of one RRY considers the 4060 Ci/RRY from mining, the 1130 Ci/RRY from mill operations at an active pile and subsequent drying of the pile prior to stabilization, and the 1-110 Ci/yr/RRY from the stabilized pile. The population dose from all radon releases associated with the uranium fuel cycle is not distinguishable from the normal and expected variations in natural background.[4/]

5.6 SOCIO-ECONOMIC IMPACTS

The staff considered the environmental effects of station construction in the community in the FES-CP.[1] It was concluded that the City of Baxley and several nearby communities would bear the brunt of an influx of 1300 to 1500 construction workers. The staff noted that schools and recreation facilities in particular would be stressed but provisions by the applicant to supplement local resources would ease the impact.

During the operation phase, the staff concludes that the small size of the additional operating staff for Hatch Unit No. 2--estimated to be 45--will have an insignificant effect on regional housing resources and community facilities. Taxes on the plant will greatly benefit the school district and the County.[2] As well, the annual payroll for 275 permanent operating personnel of approximately $3.2 million is expected to have a significant impact on the regional gross product.[3] It is expected that these components of long-term economic impact will increase the potential for future residential and industrial growth.

2/ As noted in Table 5.5-10 the entry for radon 222 excludes the contribution from mining. Footnote 5 to Table 5.5-10 indicates a maximum release of about 4800 Ci of radon 222 when contributions from mining are considered. This in turn, would increase the estimated dose commitment for the total fuel cycle by some 600 man-rem per reference reactor year, maximized for the no recycle case. Although this is larger than the dose commitment due to other elements of the fuel cycle, it is still small compared to the natural background exposure level of some 20,000,000 man-rem per year.

3/ RRY - Reference Reactor Year (a 1000 MWe light water reactor operating at 80% capacity factor for one year). Synonymous with one annual fuel requirement (AFR) with the same capacity factor.

4/ This evaluation of the environmental effects is based on the staff's more recent estimates of the Radon release. The Atomic Safety and Licensing Appeal Board in Metropolitan Edison Company et al (Three Mile Island Nuclear Station, Unit No.2), ALAB-456 (1978) ruled that the staff as a matter of law was bound to accept the value of 74.5 curies of Radon-222 released to the atmosphere per RRY as set forth in revised Table S-3. Thus, the principal portion of section 5.5.3 discusses environmental impacts on the basis of 74.5 Ci/RRY contained in Table S-3.

REFERENCES FOR SECTION 5

References for Section 5.2

1. Georgia Power Company, Supplement 1 to Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report-Operating License Stage, January 1976, Question 5.1-5.

2. H. N. Scherer, Jr., D. J. Ware, C. H. Shih, "Gaseous Effluents Due to EHV Transmission Line Corona," I.E.E.E., "Transmissions on Power Apparatus and Systems." Vol. Pas. 92(3), Pages 1043-1049 (1973).

3. M. Frydman, A. Levy, and S. E. Miller, Ibid., Pages 1141-1148.

4. F. A. Jenkins, L. W. Long, "EHV Transmission Lines-Fences and Things." Paper presented to Southeastern Electric Exchange Meeting. September 22, 1972.

5. "Biological Effects of High Voltage Electric Fields: State-of-the-Art Review and Program Plan." Prepared by IIT Research Institute for Electric Power Research Institute, November 1975.

References for Section 5.3

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 1, Annual Environmental Surveillance Report No. 2, January 1 - December 31, 1975.

2. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report - Operating License Stage, July 1975, p. 3.7-1.

3. Ibid, p. 5.1-1.

4. Ibid, Table 5.4-1.

5. U.S. Atomic Energy Commission, Final Environmental Statement for Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2, Docket Nos. 50-321 and 50-366, October 1972, p. III-18.

6. Op. cit., Reference 2, p. 5.4-2.

7. Op. cit., Reference 2, p. 3.6-1.

8. Op. cit., Reference 2, Tables 2.5-3 and 2.5-4.

9. Op. cit., Reference 2, p. 5.1-1.

10. W. A. Brungs, "Effects of Residual Chlorine on Aquatic Life," Journal, Water Pollution Control Federation, Vol. 45, No. 10, pages 2180-2193, October 1973.

11. "Water Quality Criteria 1972," A Report of the Committee on Water Quality Criteria, Environmental Studies Board, National Academy of Sciences, National Academy of Engineering, Washington, D.C., 1972. (Published by the Environmental Protection Agency as EPA-R3-73-033, March 1973.)

References for Section 5.5

1. NRC Staff's Brief in Support of Exception and Motion to Supplement the Record; Before the Atomic Safety and Licensing Board - In the Matter of Northern States Power Company (Minnesota) and Northern States Power Company (Wisconsin) - Tyrone Energy Park, Unit 1, Docket No. 50-484, January 23, 1978.

References for Section 5.4

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 1, Annual Environmental Surveillance Report No. 2, January 1 - December 31, 1975.

2. Georgia Power Company, Supplement 1 to Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, January 1976, Question 5.1-5.

3. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report - Operating License Stage, July 1975.

4. U.S. Atomic Energy Commission, Final Environmental Statement for Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2, Docket Nos. 50-321 and 50-366, October 1972.

5. Georgia Power Company, Edwin I. Hatch Nuclear Plant - Unit 1 Semi-Annual Environmental Surveillance Report No. 1, Period Ending December 31, 1974.

6. Georgia Power Company, Supplement 2 to Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report - Operating License Stage, April 1976.

7. Storr, John F., 1974, Plankton Entrainment by Condenser Systems of Nuclear Power Stations on Lake Ontario, In: Symposium on Thermal Ecology, J. W. Gibbons and R. R. Sharitz (Eds.), Technical Information Center, Oak Ridge, Tennessee, 291-295.

8. Op. cit., Reference 3, Figures 5.1-1 to 5.1-6.

References for Section 5.5

1. Braun Safety Analysis Report, Docket No. STN 50-532, p. 12.1-56 (June 27, 1975).

2. 10 CFR Part 20, Standards For Protection Against Radiation.

3. NUREG 75/032, Occupational Radiation Exposure to Light Water Cooled Reactors, 1969-1974 (June 1975).

4. FES, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Practicable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, WASH-1258, July 1973.

5. S. T. Auerbach, "Ecological Considerations in Siting Nuclear Power Plants. The Long Term Biota Effects Problems," Nucl. Safety 12:25 (1971).

6. "The Effects on Population of Exposure to Low Levels of Ionizing Radiation," NAS-NRC, 1972. ("BEIR" Report)

References for Section 5.6

1. U.S. Atomic Energy Commission, Final Environmental Statement for Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2, Docket Nos. 50-321 and 50-366, October 1972, Section IV.B.3.

2. Georgia Power Company, Edwin I. Hatch Nuclear Plant Environmental Report - Construction Permit Stage, Amendment 1, April 27, 1972, pp. 11.14-18F - 11.14-19F.

3. Georgia Power Company, Supplement 2 to Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report - Operating License Stage. April 1976, p. 13.

6. ENVIRONMENTAL MONITORING

6.1 RÉSUMÉ

A survey of the background levels of various chemical, radiological, thermal and biological parameters for the Hatch site and the adjacent Altamaha River was initiated in 1968. Since that time, the study has been modified appropriately to reflect program objectives. Certain aspects of the preoperational monitoring program may be modified or deleted if analyses of collected data show no adverse environmental impacts. The operational monitoring program is essentially identical to the preoperational study except the scope includes measurement and assessment of impacts upon the environment due to two-unit operation.

6.2 PREOPERATIONAL MONITORING PROGRAMS

6.2.1 Onsite Meteorological Program

The onsite meteorological program has been in operation since 1970[1] in conjunction with the Unit No. 1 licensing process. The meteorological data is collected on a 150 tower southeast of the plant structures about 1000 feet away.

Wind speed and direction are collected at the 75 and 150 foot levels while delta-T for atmospheric stability is determined between 150 and 33 feet. Some deterioration of the data retrieval rate has been observed during the course of the four years of data acquisition, but a program to insure retrieval greater than 90 percent has been instituted by the applicant.

6.2.2 Water Quality Monitoring

The preoperational monitoring studies were in progress at the time of the issuance of the FES-CP. These studies are discussed in the EROL[2], and results of the studies have been reported as part of the annual environmental surveillance reports for Hatch Nuclear Plant Unit No. 1.[3,4,5] Since Unit No. 1 is in operation, the preoperational program currently in progress for Unit No. 2 addresses potential impacts which also include the influence of Unit No. 1 operation.

6.2.3 Groundwater Monitoring

Samples of well water were collected from the two deep onsite wells and from the onsite subsurface drainage ditch for the purpose of establishing preoperational levels of radioactivity. An offsite sample was collected about 2 miles upstream near the Altamaha River in order to establish an unaffected background level. Samples were analyzed for gross beta, gross alpha, and tritium levels. Quarterly or yearly analyses of tritium were performed using enrichment techniques, since the levels in the unconcentrated samples were undetectable.[6]

6.2.4 Radiological Environmental Monitoring

The preoperational phase of the monitoring program provides for the measurement of background levels and their variations along the anticipated important pathways in the area surrounding the plant, the training of personnel and the evaluation of procedures, equipment, and techniques. This is discussed in greater detail in NRC Regulatory Guide 4.1, Rev. 1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants."

The applicant has proposed a radiological environmental monitoring program to meet the needs discussed above. It is based on a continuation of the operational program for Unit No. 1. A description of the applicant's proposed preoperational program (as described in the Technical Specifications for Unit No. 1) is summarized in Tables 6.2-1 and 6.2-2. Detailed information on the applicant's preoperational radiological environmental monitoring program for Unit No. 2 is presented in the applicant's environmental technical specifications for Unit No. 1.

TABLE 6.2-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

Phase	Sample Medium	Number of Stations		Regime*			Analysis**
		Indicator	Background	III	II	I	
	Airborne Dust	8	6	C-1	C-2	S-4	B, N-13, S-13
	Airborne Iodine	8	6	C-1	C-2	S-4	I
Discharge	Precipitation	8	6	C-4	C-4	S-4	B, N-13, S-13
to the	External Radiation	30	6	R-13	R-13	R-13	R
Atmosphere	Milk	1	2	G-1	G-4	-	I, S
	Vegetation	2	2	G-1	G-4	-	I
	Water	2	1	G-4	G-4	S-4	B, N-13, T-13
Discharge	Benthos	2	1	G-13	G-26	-	N, S
to the	Fish	2	1	G-13	G-26	-	N, S
River	Vegetation	Not Available		-	-	-	-
	Sediment	2	1	G-13	G-52	-	N, S
Discharge to the Ground	Ground Water	1	1	U-13	U-52	-	T, N

NOTES:

*The symbols under Regime mean:

C - sample continuously
R - expose thermoluminescent dosimeter continuously
G - grab sample
S - sample and discard without analysis
U - take grab sample in the event of accident or unusual circumstances

The number following each of the letters defined above indicates the duration in weeks, of the sampling period. For example, the number 13 means 13 weeks or a calendar quarter which may actually be 12 to 16 weeks, depending on weather, availability, and the schedule demands of associated samples.

**The symbols under analysis mean:

B - gross beta count
N - gamma spectrum analysis
I - analysis for iodine-131
R - read the radiation dose accumulated by the dosimeter
T - analysis for tritium
S - analysis for strontium-89 and/or -90 if discharge to that phase of the environment is measurable.

The numbers which follow some of these symbols indicate the interval in weeks over which the samples are composited for analysis. The absence of a number indicates that each sample is analyzed.

TABLE 6.2-2

ANALYTICAL SENSITIVITIES

Sample Media	Analysis	Lower Limit of Detection	Sample Size	Collection Efficiency	Sample Sensitivity
Airborne Dust	Gross β	1.0 pCi/sample	600 m^3	100%	2×10^{-3} pCi/m^3
Airborne Dust	γ-Spec	40 pCi/sample	600 m^3	100%	7×10^{-2} pCi/m^3
Airborne Dust	Sr-89, 90	1.0 pCi/sample	600 m^3	100%	2×10^{-3} pCi/m^3
Charcoal Filter	I-131	20 pCi/sample	600 m^3	75%	5×10^{-2} pCi/m^3
Precipitation	Gross β	1.0 pCi/sample	1 liter	100%	1.0 pCi/l
Precipitation	γ-Spec	40 pCi/sample	1 liter	100%	40 pCi/l
Precipitation	Sr-90	1.0 pCi/sample	1 liter	100%	1.0 pCi/l
External Radiation	Read-out	<10 mrem/period	4 weeks	100%	<10 mrem/4 weeks
Milk	I-131	0.5 pCi/sample	2 liters	100%	.25 pCi/l
Milk	Sr-89, 90	1.0 pCi/sample	1 liter	100%	1.0 pCi/l
Vegetation	I-131	1.0 pCi/sample	25 g	100%	4×10^{-2} pCi/gm
River Water	Gross β	1.0 pCi/sample	1 liter	100%	1.0 pCi/l
River Water	γ-Spec	40 pCi/sample	1 liter	100%	40 pCi/l
River Water	H-3	5.0 pCi/sample	.005 liter	100%	1.0×10^3 pCi/l
Aquatic Life	γ-Spec	40 pCi/sample	500 g	100%	.08 pCi/g wet
Aquatic Life	Sr-89, 90	1.0 pCi/sample	1 g (ashed)	100%	1.0 pCi/g (ashed)
Sediment	γ-Spec	40 pCi/sample	500 g	100%	.08 pCi/g
Sediment	Sr-89, 90	1.0 pCi/sample	10 g	100%	0.1 pCi/g
Ground Water	H-3	5.0 pCi/sample	.005 liter	100%	1.0×10^3 pCi/l
Ground Water	γ-Spec	40 pCi/sample	1 liter	100%	40 pCi/l

The Staff concludes that the Regime III preoperational monitoring program proposed by the applicant for Unit No. 2 is generally acceptable. However, consistent with Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants," the following changes are recommended to improve the effectiveness of the program:

1. Precipitation sampling is not needed to comply with Regulatory Guide 4.8.

2. Surface water samples should be collected using equipment which is capable of collecting an aliquot at time intervals which are very short (e.g., hourly) relative to the compositing period. Gross beta measurement is no longer necessary for surface and ground water samples.

3. Bottom sediments should be analyzed for Sr-90 semiannually.

4. One semiannual sample of shoreline sediment (from nearest downstream area of existing or potential recreational value) should be analyzed for gamma isotopic and Sr-90 content.

5. The vegetation sampling program should include fruits, tuberous and root vegetables where available at the time of harvest. Where harvest is continuous, samples should be analyzed monthly. Radioiodine analyses need only be performed on green leafy vegetables.

6. The soil sampling should be carried out once every three years to determine long-term buildup of Sr-90 only.

7. The applicant should institute semiannual sampling of meat, poultry and eggs within 10 miles downwind with gamma isotopic analyses and sample one major game species where these may provide an important source of dietary protein.

8. The "lower levels of detection" (LLD) should be comparable to Regulatory Guide 4.8. The applicant must provide the basis for assumed collection efficiencies.

6.2.5 Aquatic Biological Monitoring

The preoperational aquatic monitoring program for Hatch Unit No. 2 is in essence the program described in the Environmental Technical Specifications issued for the Unit No. 1 plant. Initial preoperational biological surveys of macroinvertebrate fauna of the Altamaha River began in 1971, and the program was later expanded to include studies of periphyton, drift, benthic organisms and fishes. The operational phase of the biological monitoring program for Unit No. 1 was initiated in the fall of 1974. Data from this study will be compared to Unit No. 2 operational data to assess two-unit impacts upon the aquatic environment.

6.3 OPERATIONAL MONITORING PROGRAMS

6.3.1 Onsite Meteorological Program

The meteorological monitoring program for the operational phase will be identical to that described in the preoperational stage (Section 6.2.1). Meteorological monitoring shall continue during the operational lifetime of the plant.

6.3.2 Water Quality Monitoring

The monitoring of water quality changes due to plant operation is required by the NPDES permit issued by the State of Georgia and will be included in the NRC environmental technical specifications. Since it was concluded that water quality effects will be negligible, extensive site measurements in the Altamaha River will not be needed to follow effects of plant operation.

The one possible exception to the above would result if corrosion were more significant than anticipated by the applicant. Any release of corrosion products or use of corrosion inhibitors could justify measurements of concentration in the river water and sediments below the station. Such studies need not be included in the initial monitoring program.

Certain water quality data must be collected to aid in interpreting observations of aquatic biota. Proposed studies of temperature and dissolved oxygen distribution are included in the applicant's proposed program. Samples for other water quality parameters including pH, turbidity, dissolved solids, hardness, phosphate, and nitrogen should also be collected at the time of biological sampling.

6.3.3 Groundwater Monitoring

No discharge of radioactivity to the groundwater is planned. Environmental surveillance of the groundwater will be conducted on a routine basis. Monitoring will be conducted only at the background well two miles upstream from the site near the Altamaha River.

6.3.4 Chemical Effluents Monitoring

Specifications within the NPDES permit and the environmental technical specifications require that a monitoring program will include at the minimum, the determination of pH and total residual chlorine in the cooling system blowdown and monitoring of pH in the low volume waste streams.

The applicant has proposed extensive chlorine monitoring during initial operation to establish a relationship between chlorine usage and discharge concentration. Thereafter, usage will be controlled to assure compliance with discharge limits. The relationship between usage and concentration will be checked periodically. It has been the usual practice of the regional EPA office and the Georgia DEP to require multiple grab samples once per week. The initial study program will also include observations of cooling tower cleanliness. This study could verify if the total residual chlorine level in the combined discharge was less than the 0.2 mg/l value judged necessary to protect aquatic biota. The difference in tower designs between Unit No. 1 and Unit No. 2 results in different chlorination requirements. The initial period of two-unit operation should provide a good comparison of actual chlorination requirements.

The applicant has proposed a monitoring program for cooling tower blowdown.[1] The parameters to be monitored are affected by the concentrating effect of the closed cycle evaporative cooling system rather than by direct addition of chemicals. Therefore, they reflect make-up water quality and cycles of concentration in the cooling system. Interpretation of the significance of any of the substances would require knowledge of receiving water quality. The proposed data would be more valuable in the interpretation of the results of biological studies if an indication of cycles of concentration could be recorded simultaneously so that make-up water quality (and thus receiving water quality) could be estimated by calculation. However, it is the general conclusion of the staff analysis that the maximum concentrations indicated for the proposed parameters will not result in an environmental impact.

The Georgia Power Company does not anticipate any corrosion within the cooling system. However, because of the potential toxic effect of corrosion products, it is recommended that monitoring be included to confirm the anticipated result. The monitoring should be scheduled to coincide with occurrence of water quality conditions most conducive to corrosion. The details related to the corrosion monitoring program shall be presented in the environmental technical specifications.

6.3.5 Aquatic Biological Monitoring

The applicant's proposed operational monitoring program for Unit No. 2 is substantially different from the Unit No. 1 operational studies which also served as the Unit No. 2 preoperation studies. Based on the results of two years of operational data, the applicant has requested, and the NRC staff has granted, the termnation of the majority of the aquatic biological monitoring studies.

Aquatic biological monitoring that has been proposed by the applicant after Unit No. 2 begins commercial operation includes studies designed to detect and quantify any effect that the thermal plume may have on benthic organisms in the Altamaha River, and studies to quantify impingement and entrainment associated with the intake structure.

Sampling stations, frequency and type of gear are indicated in Table 6.3-1 and locations are shown in Figure 6.3-1.

Benthos

Samples for benthic organisms will be collected using both Dendy multi-plate samplers and the Petersen dredge. Samples will be taken quarterly at three stations, RM 116.6, RM 115.9, and RM 115.5. Six Dendy multi-plate samplers will be located at each sampling station, five Petersen dredge samples will be obtained in a transect between the north and south banks at each station. Organisms collected will be identified to the lowest practicable taxon and enumerated. Qualitative and quantitative comparisons of the taxa will be made at each station. Community structure will be characterized by a diversity index.

Impingement

The applicant has proposed monthly sampling for impingement at the intake structure. Each sample shall be of twenty-four hours duration and all fish collected during the sample shall be identified to the lowest possible taxon, enumerated, weighed and total length determined. The staff requires that impingement sampling be conducted on a frequency of once per week rather than once per month. Impingement sampling for Unit No. 1 was conducted once a week. Consistency between studies will allow a comparative analyses of the incremental effects on the fish populations associated with the operation of Unit No. 2.

Entrainment

The applicant has proposed monthly diel sampling for entrainment of ichthyoplankton at the intake structure commencing in March and continuing until late summer until densities warrant terminacant plans to evaluate the efficiency of the large net used in the past to obtain ichthyoplankton samples in the Altamaha River, a smaller net, a pump sampler, and possibly an in-plant sampling point. The staff requires that weekly diel entrainment samples be taken at the intake structure during the months of February through May. Monthly sampling, as proposed by the applicant, is too infrequent to detect peak spawning periods which for some species are as short as two weeks duration. Replicate samples shall be collected immediately in front of the intake structure during both day and night sampling periods. Gear employed for sampling ichthyoplankton will be specified in the environmental technical specifications. Fish eggs and larvae will be identified to the lowest possible taxon and enumerated.

TABLE 6.3-1

AQUATIC SAMPLING FREQUENCIES ON THE ALTAMAHA RIVER

RIVERMILE AND SHORE	STATION DESCRIPTION	SAMPLE	
		Preoperational	Proposed Post-operational
117.8NS	North and South shore Altamaha River, 1.4 rivermiles upstream from intake structure	2a, 2b, 4a	-
117.6S	South shore Altamaha River, 1.2 rivermiles upstream from intake structure	1b	-
117.4S	South shore Altamaha River, 1.0 rivermiles upstream from intake structure	1a	-
116.7	Altamaha River, .3 rivermiles upstream from intake structure	1c, 3a	-
116.6NS	North and South shore Altamaha River, .2 rivermiles upstream from intake structure	2a, 2b, 4a	2a, 2b
116.5	Altamaha River, .1 rivermiles upstream from intake structure	1c, 3a	-
116.4	Intake Structure	5a	5a, 6a
116.4	Altamaha River, just downstream from intake structure	1c, 3a	-
116.3	Altamaha River, .1 rivermiles downstream from intake structure and just upstream of discharge structure	1c, 3a	-
116.2	Altamaha River, .2 rivermiles downstream from intake structure and .1 rivermiles downstream of discharge structure	1c, 3a	-
116.1	Altamaha River, .3 rivermiles downstream from intake structure and .2 rivermiles downstream of discharge structure	1c, 3a	-
115.9NS	North and South shore Altamaha River, .4 rivermiles downstream of discharge structure	2a, 2b, 4a	2a, 2b
115.5NS	North and South shore Altamaha River, .8 rivermiles downstream of discharge structure	-	2a, 2b
115.4NS	North and South shore Altamaha River, .9 rivermiles downstream of discharge structure	2a, 2b, 4a	-
114.2N	North shore Altamaha River, 2.1 rivermiles downstream from discharge structure	1b	-
113.8N	North shore Altamaha River, in oxbow, 3.1 rivermiles downstream from discharge structure	2a*, 2b*	-
113.4N	North shore Altamaha River, 2.9 rivermiles downstream from discharge structure	2a*, 2b*	-
113.4S	South shore Altamaha River, 2.9 rivermiles downstream from discharge structure	1a, 2a*, 2b*	-

TABLE 6.3-1 (Cont'd)

AQUATIC SAMPLING FREQUENCIES ON THE ALTAMAHA RIVER

Sample and Frequency Code

1. Fishes
   a. Adult - gill net - quarterly
   b. Juvenile - seine - monthly, May - September
   c. Ichthyoplankton - Plankton net - weekly, February - June

2. Benthos
   a. Dendy multi-plate samplers - quarterly, 6 week immersion
   b. Petersen dredge - quarterly

3. Macroinvertebrate Drift
   a. Plankton net - quarterly

4. Periphyton
   a. Artificial substrates - quarterly, 6 week immersion

5. Impingement
   a. Actual count - 1-24 hr sample/week

6. Entrainment
   a. See text - replicate diel samples, weekly, February - May

*Discontinued during preoperational sampling period.

Density will be calculated and statistical confidence applied to the resulting values for each weekly sample.

6.3.6 Terrestrial Monitoring Program

The environmental technical specifications for Unit No. 1 (Section 3.1.5) describe a program of aerial photography coupled with ground investigations that is adequately monitoring the terrestrial environment. The photographs will provide historical information that can be referred to at any time to assess changes. The duration for the program is specified as four years for Unit No. 1. The staff recommends the specification as stated be applied to Unit No. 2 with the four year period to begin with commercial operation of Unit No. 2. Termination of the vegetative sampling program at the end of this period will be contingent on review and approval by the staff. It is anticipated that the aerial photography program will be reduced to once a year at the time of termination of the sampling program.

Periodic maintenance activities or severe weather conditions may cause minor instances along the transmission line corridors where re-seeding will be necessary. The staff recommends that for a four (4) year period or until the Hatch-Bonnsire corridor is certified as stabilized that a surveillance program be conducted to determine any evidences of erosion and/or vegetational damage or other environmental degradation and that reasonable steps be taken to stabilize such occurrences.

6.3.7 Radiological Environmental Monitoring

Radiological environmental monitoring programs are established to provide data on measurable levels of radiation and radioactive materials in the site environs. Appendix I to 10 CFR Part 50 requires that the relationship between quantities of radioactive material released in effluents during normal operation be evaluated, including anticipated operational occurrences and resultant radioactive doses to individuals from principal pathways of exposure. Monitoring programs are conducted to verify the in-plant controls used for controlling the release of radioactive materials and to provide public reassurance that undetected radioactivity will not build up in the environment. Surveillance is established to identify changes in the use of unrestricted areas to provide a basis for modifications of the monitoring programs.

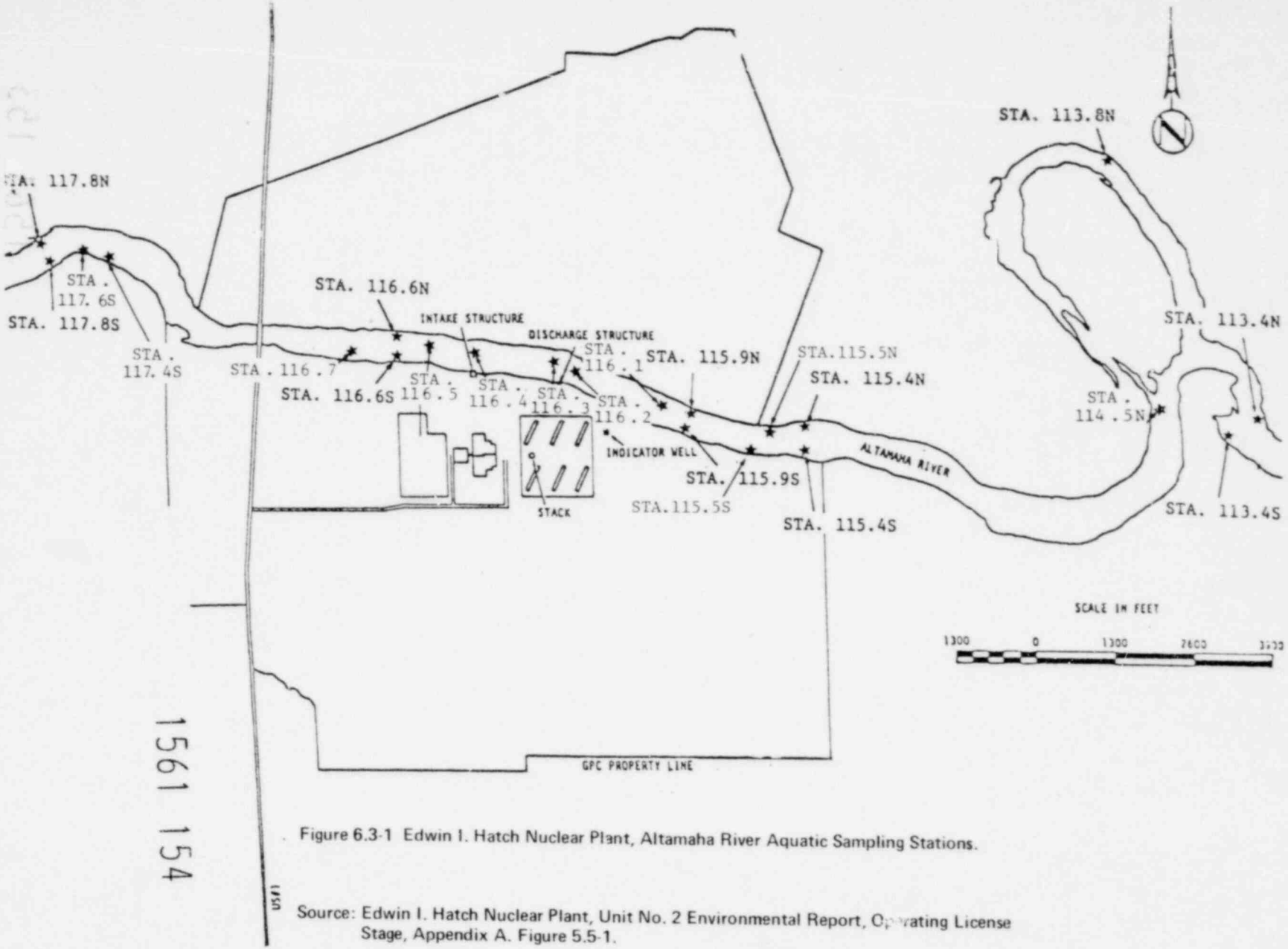

Figure 6.3-1 Edwin I. Hatch Nuclear Plant, Altamaha River Aquatic Sampling Stations.

Source: Edwin I. Hatch Nuclear Plant, Unit No. 2 Environmental Report, Operating License Stage, Appendix A. Figure 5.5-1.

The operational offsite radiological monitoring program is conducted to measure radiation levels and radioactivity in the plant environs. It assists and provides backup support to the detailed effluent monitoring (as recommended in NRC Regulatory Guide 1.21, "Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants") which is needed to evaluate individual and population exposures and verify projected or anticipated radioactivity concentrations.

The applicant plans essentially to continue the proposed preoperational program during the operating period. However, refinements may be made in the program to reflect changes in land use or preoperational monitoring experience.

An evaluation of the applicant's proposed operational monitoring program will be performed during the operating license review, and the details of the required monitoring program will be incorporated into the environmental technical specifications for the operating license. NRC Regulatory Guide 4.8 also provides detailed information on operational programs for nuclear power plants.

REFERENCES FOR SECTION 6

References for Section 6.2

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2, Environmental Report - Operating License Stage, July 1975, p. 2.6-5.

2. Ibid., Volume 1 - Section 6.1, Volume 2 - Appendix A.

3. Op cit., Reference 1, Volume 2 - Appendix A.

4. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 1, Semiannual Environmental Surveillance Report No. 1, Period ending December 31, 1974.

5. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 1, Annual Environmental Surveillance Report No. 2, January 1 - December 31, 1975.

6. Op cit., Reference 3.

References for Section 6.3

1. Georgia Power Company, Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, Table 6.2-2.

7. ENVIRONMENTAL IMPACT OF POSTULATED PLANT ACCIDENTS

7.1 RESUMÉ

The EROL has been reviewed with respect to the environmental effects of plant accidents (Section 7.1). The results of this review are that the conclusions about environmental risks due to accidents remain as previously presented in the FES-CP stage. The transportation accident section has been updated to reflect the results of the Commission's "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," WASH-1238.

7.2 ENVIRONMENTAL IMPACT OF POSTULATED ACCIDENTS

The NRC has performed a study to assess more quantitatively the environmental risks due to accidents. The initial results of these efforts were made available for comment in draft form on August 20, 1974* and released in final form on October 30, 1975.** This study, called the Reactor Safety Study, is an effort to develop realistic data on the probabilities and consequences of accidents in water-cooled power reactors, in order to improve the quantification of available knowledge related to nuclear reactor accident probabilities. The Commission organized a special group of about 50 specialists under the direction of Professor Norman Rasmussen of MIT to conduct the study. The scope of the study has been discussed with EPA and described in correspondence with EPA which has been placed in the NRC Document Room (letter, Doub to Dominick, dated June 5, 1973).

As with all new information developed which might have an effect on the health and safety of the public, the results of these studies will be assessed on a timely basis within the Regulatory process on generic or specific bases as may be warranted.

7.3 TRANSPORTATION ACCIDENTS

The transportation of cold fuel to the plant, of irradiated fuel from the reactor to a fuel reprocessing plant, and of solid radioactive wastes from the reactor to burial grounds is within the scope of the AEC report entitled, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," December 1972. The environmental risks of accidents in transportation are summarized in Table 7.1.

TABLE 7.1[1]

ENVIRONMENTAL RISKS OF ACCIDENTS IN TRANSPORT OF FUEL AND WASTE TO AND FROM A TYPICAL LIGHT-WATER-COOLED NUCLEAR POWER REACTOR

	Environmental Risk
Radiological effects	Small[2]
Common (nonradiological) causes	1 fatal injury in 100 years; 1 nonfatal injury in 10 years, $475 property damage per reactor year.

[1] Data supporting this table are given in the Commission's "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," WASH-1238, December 1972 and Supp. I, NUREG 75/038, April 1975.

[2] Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single reactor or a multi-reactor site.

*"Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants, Draft," WASH-1400, August 1974.

**"Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," WASH-1400 (NUREG 75/014), October 1975.

8. NEED FOR PLANT

8.1 RESUME

Subsequent to the issuance of the FES-CP in July 1972, the nation experienced extensive increases in fuel prices and a period of economic recession. The original Georgia Power Company (GPC) load forecasts have thus been revised to reflect these energy changes within the GPC service area. Edwin I. Hatch Nuclear Plant Unit No. 2 is scheduled to begin commercial operation in 1978 and will provide approximately 803 MWe net electrical energy capacity to the Georgia Power distribution system. The Hatch Nuclear Plant, Unit No. 2, is owned jointly by the GPC (50.1%), the Oglethorpe Electric Membership Corporation (30.0%), the Municipal Electric Authority of Georgia, an instrumentality of the State (17.7%), and the City of Dalton (2.2%).

8.2 APPLICANT'S SERVICE AREA AND REGIONAL RELATIONSHIPS

8.2.1 Applicant's Service Area

The Georgia Power Company supplies retail and wholesale electricity to 1.1 million residential, commercial, industrial, and other customers throughout the State of Georgia (see Figure 8.2-1). Its service area includes 153 counties, 50 municipalities, and 39 rural electric corporations. GPC estimates that their system currently serves nearly 95% of the State's population and that, by 1980, GPC will serve an additional 570,000 people.[1]

Data in Table 8.2-1 indicate the total sales of electricity, the number of customers covered, and average consumption figures for the past 13 years. It should be noted from the data that the increase in energy sales was due primarily to increased consumption; the long term rate of sales per customer was considerably greater than the increase in customers.

TABLE 8.2-1

ENERGY CONSUMPTION IN THE GEORGIA POWER COMPANY SERVICE AREA: 1963-1975

	1963	1975	% Change
Total Sales (Millions of kWh)	13,565	39,010	188
Customers served	782,440	1,083,646	38
Average Energy Sales Per Customer (kWh)	17,000	36,000	112

SOURCE: Data for 1963 from E. I. Hatch Unit No. 2 Environmental Report - Operating License Stage, July 1975, Table 1.1-2; 1975 data from the Southern Company, Annual Report 1975 (Atlanta: The Southern Company, 1976), p. 13.

8.2.2 Regional Relationships

The Applicant's service area is within the Federal Power Commission (FPC) Southeastern Power Survey Region (SPSR) and is located entirely within FPC's power supply area, PSA 23 (see Figure 8.2-2). The Applicant is a party to the Southeastern Electric Reliability Council (SERC), which is one of the Nation's nine regional reliability councils. SERC encompasses the same areas as the SPSR, and is divided into four subregions: Florida (PSA 24), Southern Companies (PSA 22 and 23), Tennessee Valley (PSA 20), and the Virginia - Carolinas (PSA 18 and 21). Areas of load concentration within SERC are shown in Figure 8.2-2. This figure indicates that within PSA 23, the load concentration is within the Applicant's service.

GPC is also one of the four producing affiliates of the Southern Company System, an integrated and fully coordinated generation and transmission system serving most of Georgia, Alabama, the northwestern portion of Florida, and southeastern Mississippi.

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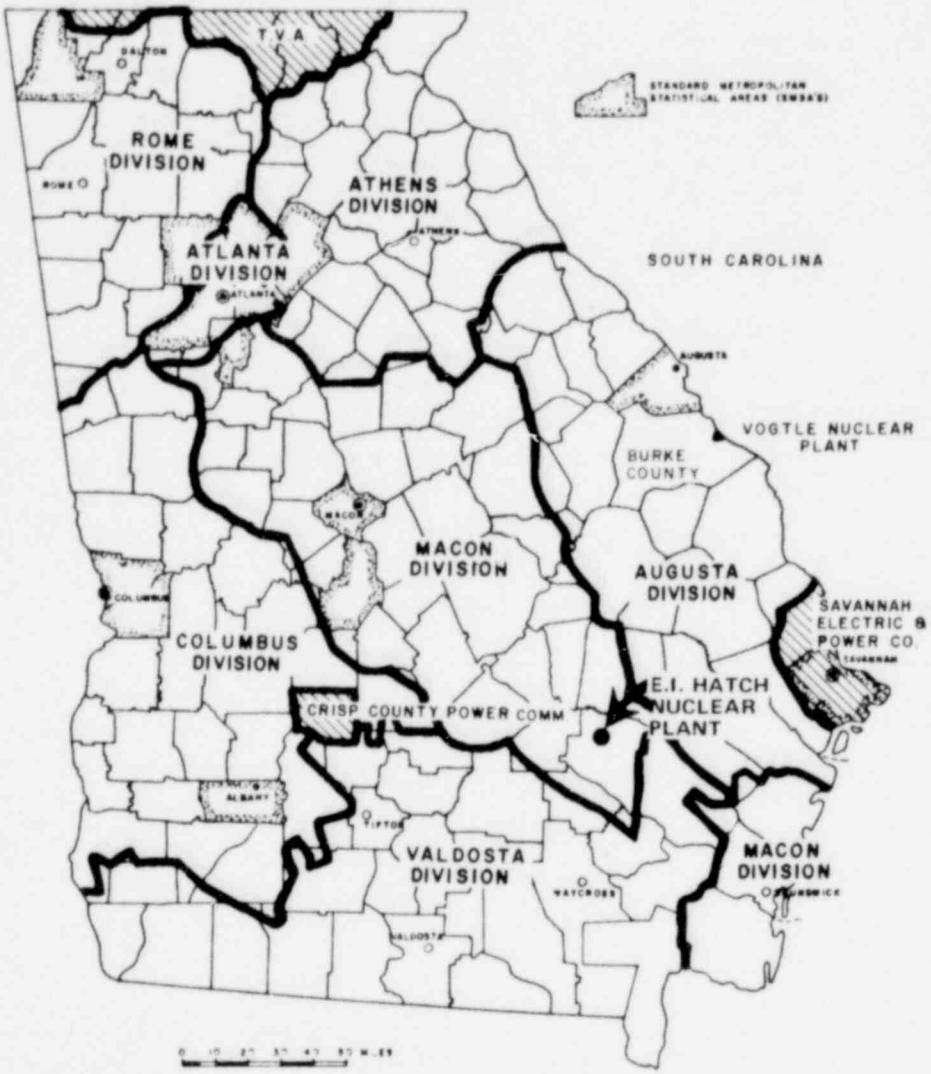

Figure 8.2-1 Georgia Power Company Service Area and Divisions.

Source: Final Environmental Statement - A. W. Vogtle Nuclear Plant, March 1974.

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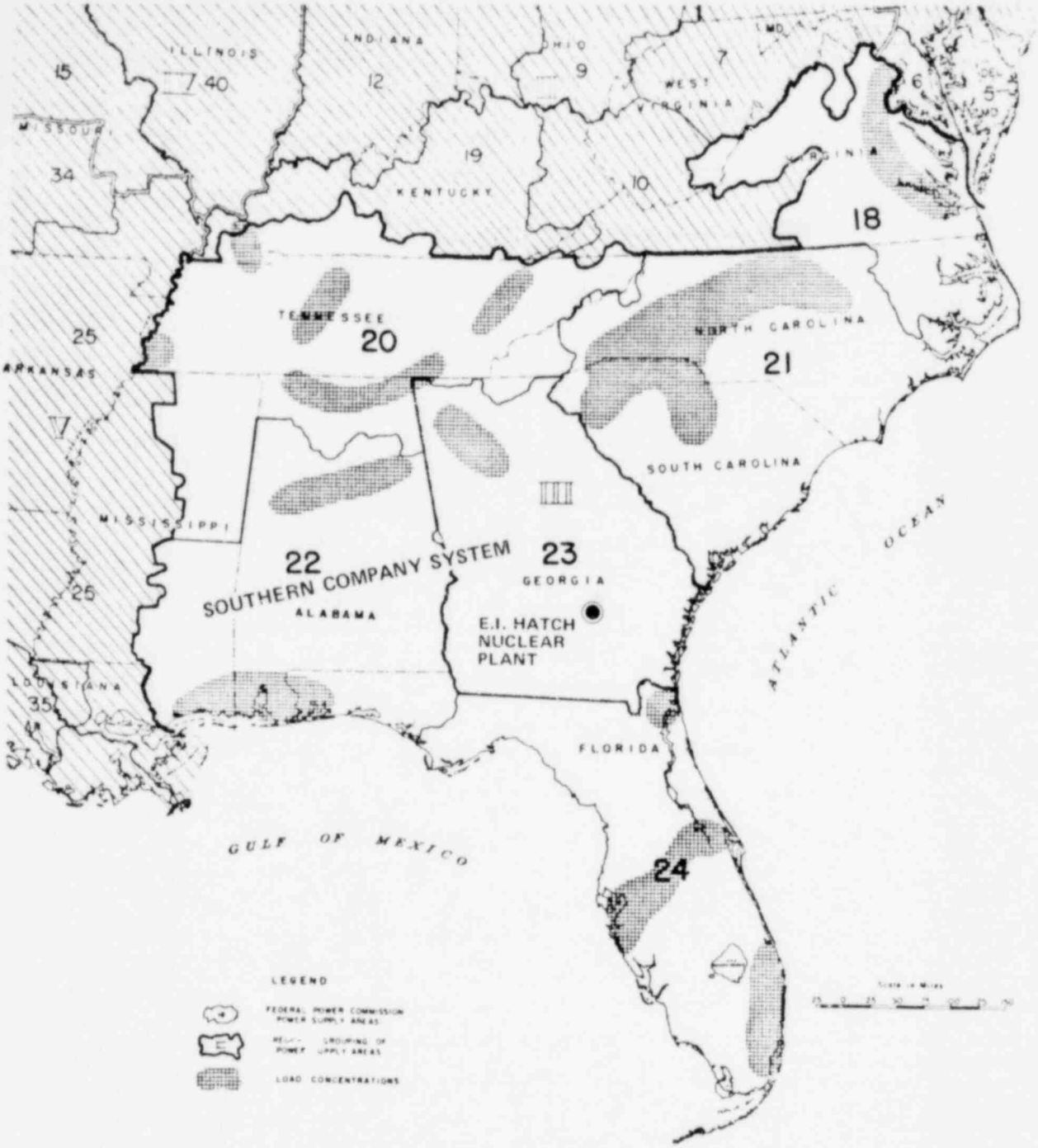

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Figure 8.2-2 Federal Power Commission's Southeast Regional Advisory Committee - Region III - Load Concentration Areas.

8.3 BENEFITS OF OPERATING THE PLANT

Hatch Unit No. 2 is being constructed by the Applicant to provide an economic source of baseload generation energy for 1979 and following years, and will be utilized to provide power for the service area described above.

8.3.1 Minimization of Production Costs

Capital expenditures for Hatch Unit No. 2, for the most part, are considered sunk costs and are not a relevant factor in determining whether or not the plant should operate. The important decision variables are fuel, operating, and maintenance costs because these expenses can be avoided if the Applicant chooses not to operate the plant. The decision criterion is to operate Hatch Unit No. 2 if system production expenses are reduced by doing so.

Production cost of Hatch Unit No. 2 in 1979 is estimated by the Applicant to be 5.99 mills/kWh at a 47% capacity factor. The lowest cost baseload plant in the Georgia Power generation system is anticipated to be the Hatch Unit No. 1 plant with 1979 production costs of 3.98 mills/kWh.[2] As Hatch Unit No. 2 is one of the least expensive baseload plants in the Georgia Power System to operate, significant cost savings will be realized by bringing Hatch Unit No. 2 on line as scheduled. The staff, after reviewing the applicant's data finds the estimated increase in system production costs to be $37.9 million if Hatch Unit No. 2 is not available in 1979. Increased production costs would result from the increased use of available coal-fired units which have substantially higher production costs to meet load requirements. Table 8.3-1 shows a sample calculation of output and production costs using the applicant's 1979 estimate of energy required. Should the plant not be operated, these production cost savings would be lost. In the unlikely event that demand should fall drastically from the 1975 level, the savings realized by operating Hatch Unit No. 2 instead of other fossil-fired plants would be substantial. Moreover, the staff assessment concludes that overriding external social and environmental impacts would not be a factor in delaying or denying the operation of Hatch Unit No. 2.

In examining the issue of operating the plant, the staff has considered other energy sources not previously evaluated, particularly solar and geothermal energy. Neither energy source is commercially available and cannot, therefore, be reasonably considered as a replacement for Hatch Unit No. 2 generation.

8.3.2 Energy Demand

Although cost savings in system production costs alone are a sufficient basis to justify operation of Hatch Unit No. 2, the plant will also be required to meet the expected growth in energy demand. In addition, the plant will provide important benefits in terms of increased system reliability. Since the issuance of the FES-CP, load forecasts have been updated and revised to reflect changes in the overall energy situation. In line with these changes, peak load forecasts for the late 1970's have been revised downward twice, once by 10.6% and once by 12%, and Hatch Unit No. 2 scheduled for 1978 was rescheduled accordingly.

Table 8.3-2 shows the most recent load forecasts for the Georgia Power generation system, and Table 8.3-3 shows system capability, reserves, and reserve margins assuming Hatch Unit No. 2 comes on line as scheduled. Reserve margins increased dramatically in 1976 reflecting the addition of 2,195 MW to the system. If Hatch Unit No. 2 is delayed beyond the 1979 summer peak, reserve margins for the Georgia Power would be reduced from 13.4% to 6.5%. It should be noted that the projected reserve margin is below the acceptable standard of 15-25% recommended by the Federal Power Commission.[3]

Projections of the demand for electricity are both technically difficult to make and subject to rapidly changing and often indeterminate factors. However, recent long-term projections as presented in Table 8.3-4 indicate that the State of Georgia will experience a growth rate which is higher than the rate expected in the United States and higher than all states except Florida in the southeastern part of the Nation.

TABLE 8.3-1

COMPARISON OF SELECTED SYSTEM PRODUCTION COSTS FOR 1979,
WITH AND WITHOUT HATCH UNIT NO. 2

	Total Production	Variable Fuel	Variable O&M	Fixed O&M	Total Operating Costs	
	(Millions of MW)	(Mills/kWh)	(Mills/kWh)	(Mills/kWh)	(Millions of Dollars)	(Mills/kWh)
With HNP 2	105.4	11.32	0.65	0.81	1,347.0	12.78
Without HNP 2	105.4	11.69	0.67	0.78	1,385.0	13.14

SOURCE: Supplement 2 to E. I. Hatch Unit No. 2 Environmental Report - Operating License Stage, April 13, 1976, p. 17.

TABLE 8.3-2

FORECASTED BASE, INTERMEDIATE, AND PEAKING LOADS FOR GEORGIA POWER SERVICE AREA, 1975-1981

(IN MEGAWATTS)

Year	Base	Intermediate	Peaking	Total Demand At Peak
1975	3,782	2,744	2,269	8,795
1976	4,214	3,058	2,528	9,800
1977	4,558	3,307	2,735	10,600
1978	4,902	3,557	2,941	11,400
1979	5,332	3,869	3,199	12,400
1980	5,805	4,212	3,483	13,500
1981	6,235	4,524	3,741	14,500

SOURCE: Supplement 2 to E. I. Hatch Unit No. 2 Environmental Report - Operating License Stage, April 13, 1976, Figs. 8.0-9A, 8.0-9B.

TABLE 8.3-3

SYSTEM CAPABILITY, RESERVES, AND RESERVE MARGINS FOR GEORGIA POWER SERVICE AREA, 1975-1981

Year	System Capability (MW)	Reserves (MW)	Reserve Margins (%)
1975	10,222	1,427	16.2
1976	12,417	2,617	26.7
1977	12,350	1,750	16.5
1978	13,210	1,810	15.9
1979	14,064	1,664	13.4
1980	14,676	1,176	8.7
1981	15,926	1,426	9.8

SOURCE: Supplement No. 2 to E. I. Hatch Unit No. 2 Environmental Report - Operating License Stage, April 13, 1976, Table 1.1-5.

TABLE 8.3-4

POPULATION PROJECTIONS FOR GEORGIA, SOUTHEASTERN U.S., AND THE UNITED STATES, 1970-2020

	1970	2020	% Change
Georgia	4.6	7.5	62.8
Southeastern U.S.*	32.4	53.0	63.6
United States	203.9	297.1	45.8

SOURCE: U.S. Water Resources Council, 1972 OBERS Projections, Regional Economic Activity in the U.S., Vol 4, States (Washington, D.C.: Government Printing Office, 1974).

*Composed of the following states: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.

REFERENCES FOR SECTION 8

1. Georgia Power Company, Supplement 2 to Edwin I. Hatch Unit No. 2 Environmental Report-Operating License Stage, April 13, 1976, p. 15.

2. Ibid., Table 8.0-10.

3. Federal Power Commission, The 1970 National Power Survey, Part 1 (Washington, D.C.: Government Printing Office, 1971), p. I-15-7.

9. EVALUATION OF THE PROPOSED ACTION

9.1 ADVERSE EFFECTS WHICH CANNOT BE AVOIDED

The staff has re-assessed the physical, social and economic impacts that can be attributed to the operation of Hatch Unit No. 2. Inasmuch as the Unit is currently under construction, many of the predicted and expected adverse impacts of the construction phase are evident. The Applicant has committed to a program of restoration and redress of the plant site that will begin at the termination of the construction period. The staff has not identified any additional adverse effects from that presented in the FES-CP that will be caused by the operation of the Unit. Consequently, the operation phase of Hatch Unit No. 2 will include restoration, reparation and maintenance with the possibility of enhancing the environs as they existed prior to construction.

9.2 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The staff's evaluation of the use of land for the site of the Hatch Nuclear Power Plant and associated transmission lines has not changed since the preconstruction environmental review. The presence of this plant in Appling County will continue to influence the future use of other land in its immediate environs as well as the continued removal of county land from agricultural and timber use as the result of any increased industrialization.

9.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

There has been no change in the staff's assessment of this impact since the earlier review except that the continuing escalation of costs has increased the dollar values of the materials used for construction and fueling of the plant.

9.4 DECOMMISSIONING AND LAND USE

In the long term, beyond the useful life of the proposed generating station, this site may continue to be used for the generation of electrical energy. At the termination of such use, the land areas occupied by the nuclear facilities would be removed from productive use, unless decommissioning measures included removal of all radioactive equipment. Although the details of decommissioning may not be finalized for several years, such actions should not negatively affect the proposed licensing of the plant. The range of beneficial uses of the site by future generations will not be curtailed, provided the Applicant has the capability for removing all radioactively contaminated equipment if and when that step may be desirable.

NRC regulations prescribe procedures whereby a licensee may voluntarily surrender a license and obtain authority to dismantle a facility and dispose of its component parts.[1] Such authorization would normally be sought near the end of the nuclear plant's useful life. In any event, the Commission requires that a qualified licensee maintain valid licenses appropriate to the type of facility and materials involved. Under current regulations, the Commission generally requires that all quantities of source, special nuclear, and byproduct materials not exempt from licensing under Parts 30, 40, and 70 of Title 10, Code of Federal Regulations, either be removed from the site or secured and kept under surveillance.

Unit No. 2 of the Hatch Nuclear Power Plant is designed to operate for 40 years, and the operating license for Unit No. 2 will be issued for no more than 40 years from the date of issuance of the construction permit, thus terminating in approximately the year 2012. The applicant has made no firm plans for decommissioning but assumes that the following steps would be taken as minimum precautions for maintaining a safe condition:

A. Removing spent fuel from the site.
B. Decontaminating auxiliary systems.
C. Disposing of chemical c eaning and flushing water and other radioactive waste water.
D. Disposing of resins and filters by offsite burial.
E. Sealing containment and other buildings containing contaminated process piping and components.
F. Performing a radiatior survey to determine the level of decontamination achieved.
G. Isolating the area with a security fence and alarms.[2]

A decision as to whether the facility would be further dismantled would require an economic study involving the value of the land and scrap value versus the cost of complete demolition and removal of the complex. However, no additional work would be done unless it is in accordance with NRC rules and regulations in effect at the time.

In addition to personnel required to guard and secure the facility, concrete and steel would be used to prevent ingress into any building, particularly the radioactive areas.

The estimated cost of decommissioning either unit of the Hatch Plant, excluding common or shared facilities, is $4.7 million/unit; subsequent annual maintenance is estimated to be $188,000/unit. Decommissioning of the common facilities, which would occur with the decommissioning of the second unit, is estimated to cost an additional $1.5 million. Subsequent annual maintenance for the common facilities is estimated to cost an additional $11,000.[3] Although these costs are estimates, the actual costs of decommissioning which would be borne at the end of the plant's economic life represent an insignificant factor in the production cost of energy when discounted to its present value.

All of the site, except the area within the security perimeter, could be made available for other uses, including further power generation development, following decommissioning. However, the specific use of the site will depend upon various factors which cannot be determined at this time.

REFERENCES FOR SECTION 9

1. Title 10, "Atomic Energy," Code of Federal Regulations, Part 50, Licensing of Production and Utilization Facilities, Section 50.82, "Applications for Terminations of Licenses."

2. Edwin I. Hatch Nuclear Plant Unit No. 2 Environmental Report - Operating License Stage, July 1975, P. 5.9-1.

3. Ibid.

10. BENEFIT-COST ANALYSIS

10.1 RÉSUMÉ

Minor changes in the cost-benefit ratio have occurred since the issurance of the FES-CP. However, these changes do not alter the staff's findings of a positive benefit-cost ratio.

10.2 BENEFITS

The direct benefits of Hatch Unit No. 2 include the 4.9 billion kWh the plant will produce annually at a 69% capacity factor, the addition of 803 MWe to the system generation capacity and the favorable effect on reserve margins, the saving of $37.9 million in production costs in 1979 if the unit comes on line as scheduled, and cost savings in subsequent years.

The economic benefits to the community include the tax revenues which during the operation period will amount to more than $2.2 million annually. These taxes have already permitted improvements in the school system, county police equipment and other county services.

Other secondary benefits include the employment of 45 operating personnel at Unit No. 2. Their salaries will amount to approximately $520,000 annually. A portion of the annual operation and maintenance budget (excluding payroll) will be spent within the State of Georgia.

10.3 ECONOMIC COSTS

The total capital cost of Hatch Unit No. 2 is presently estimated at $512.6 million. Table 10.3-1 summarizes the major cost categories of the plant. These cost estimates include provisions for escalation and contingencies incurred during the construction phase.

TABLE 10.3-1

CAPITAL COST OF HATCH UNIT NO. 2
(Millions of Dollars)

Land and Land Rights	0.0
Structures and Improvements	125.0
Reactor Plant Equipment	236.6
Turbogenerator	104.0
Accessory Electrical Equipment	42.0
Miscellaneous Power Plant Equipment	50.0
Total Nuclear Production Plant	512.6

SOURCE: U.S. Energy Research and Development Administration, "Quarterly Progress Report on Status of Reactor Construction" (Mimeo Form HC-254), December 8, 1975.

The operation and maintenance budget has been estimated by the staff to be $4,410,000 per year for Unit No. 2, or approximately .90 mills/kWh. Fuel costs for Unit No. 2 are expected to be 4.00 mills/kWh in 1980. An additional cost of Unit No. 2 operation is the cost of decommissioning. The applicant has estimated this cost to be $4.7 million for Unit No. 2 with an annual maintenance cost of $188,000. However, because this cost is not borne until 2009, its present value is insignificant as a cost factor.

10.4 ENVIRONMENTAL COSTS

There have been no significant changes to the evaluation presented in the FES-CP with regard to the environmental costs of land use, water use and biological effects. Table 10.4-1 presents a summary of the benefits and costs associated with the operation of the E. I. Hatch Nuclear Plant Unit No. 2.

10.5 SOCIETAL COSTS

No significant economic or social costs are expected from either Unit No. 2 operation or from operating personnel living in the area.

10.6 ENVIRONMENTAL COSTS OF THE URANIUM FUEL CYCLE

The contribution of environmental effects associated with the uranium fuel cycle is indicated in Table 5.5-10 and described in Section 5.5.3. The staff has evaluated the environmental impacts of the fuel cycle releases presented in Table 5.5-10 as well as those due to the increment in Radon-222 releases and has found these impacts to be sufficiently small so that, when they are superimposed upon the other environmental impacts assessed with respect to the operation of the plant, they would not alter the cost-benefit balance against issuance of the operating license.

10.7 ENVIRONMENTAL COSTS OF URANIUM FUEL TRANSPORTATION

The contribution of environmental effects associated with the transportation of fuel and waste to and from the facility are summarized in Section 5.5.1.4 and Table 5.5-6. These effects are sufficiently small as not to affect significantly the conclusion of the Benefit-Cost Balance.

10.8 SUMMARY OF BENEFIT-COST

As the result of this second review of potential environmental, economic, and social impacts, the staff has been able to forecast more accurately the effects of operating Unit No. 2. No new information has been acquired that would alter the staff's previous position related to the overall balancing of the benefits of Unit No. 2 versus the environmental costs. Consequently, it is the staff's belief that Unit No. 2 can be operated with only minimal environmental impacts. The staff finds that the primary benefits of minimizing system production costs and/or the addition to baseload generating capacity greatly outweigh the environmental and social costs.

TABLE 10.4-1

BENEFIT-COST SUMMARY*

Summary impact & population or resource affected	Unit of measure	Magnitude of impact
	Direct Benefits	
Energy	kWh/yr	4850×10^6
Capacity	kW	803×10^3
	Economic Costs	
Operating		
Fuel	$/yr	19,600,000
Operations & Maintenance	$/yr	4,410,000
Decommissioning	$	4,700,000
Maintenance following Decommissioning	$/yr	188,000
	Environmental Costs	
1. Impact on water		
1.1 Water consumption		
1.1.1 People	gal/yr	172×10^6
1.1.2 Property	acre-ft/yr	16,773
1.2 Thermal discharges to Altamaha River		
1.2.1 Plant thermal discharge	BTU/hr	5.71×10^9
1.2.2 Aquatic biota		Insignificant
1.3 Chemical discharges to Altamaha River		
1.3.1 People		Negligible
1.3.2 Aquatic biota		Negligible
1.3.3 Chemical discharges and water quality		Consistent with NPDES Permit and State water quality standards
1.4 Radionuclide discharges to Altamaha River	µCi/yr	Total except tritium-3.2×10^5, tritium-32×10^6
1.5 Changes in groundwater levels		Negligible
1.6 Chemical discharges to groundwater		Negligible
1.7 Radionuclide discharges to groundwater		Negligible
1.8 Biological effects from cooling system and intake/discharge structures		Insignificant
1.9 Natural water drainage		
1.9.1 Flood control		Acceptable
1.9.2 Erosion control		Acceptable
2. Impact on air		
2.1 Chemical discharges to ambient air		
2.1.1 Air quality		Negligible

TABLE 10.4-1 (Cont'd)

Primary impact & population or resource affected	Unit of measure	Magnitude of impact
2.2 Salts discharged from cooling towers		
2.2.1 People		Negligible
2.2.2 Plants		Negligible
2.2.3 Property		Negligible
2.3 Noise from cooling towers		Acceptable
2.4 Fogging and icing		
2.4.1 Ground transportation		Acceptable
2.4.2 Air transportation		Not discernible
2.4.3 Water transportation		Not discernible
2.4.4 Plants		Not discernible
2.5 Calculated maximum individual dose from gaseous radioactive effluents		
2.5.1 Noble gas effluents [a]	mrem/yr	0.92
2.5.2 Radioiodine and particulates [b]	mrem/yr	3.1
3. Total body doses to U.S. population (general public)	man-rem/yr (year 1992)	29
Societal Costs		
1. Operational fuel disposition		
1.1 Fuel transport (new)	trucks/yr	18 initially, 5 to 7 thereafter
1.2 Fuel storage		Acceptable
1.3 Fuel transport (spent) and waste products	trucks/yr	106 initially, 70-78 thereafter
1.4 Fuel cycle		Acceptable
2. Plant labor force		No significant societal impact
3. Historical and archeological sites		No effect
4. Aesthetics		Acceptable

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* Refer to Appendix E for explanations and calculations regarding entries in table.

[a] Total body dose

[b] Dose to any organ from all pathways

11. DISCUSSION OF COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL STATEMENT

Pursuant to 10 CFR Part 51, the Draft Environmental Statement for the Edwin I. Hatch Nuclear Plant, Unit No. 2, was transmitted, with a request for comments, to:

Advisory Council on Historic Preservation
Department of Agriculture
Soil Conservation Service, USDA
Forest Service, USDA
Department of the Army, Corps of Engineers - Savannah District
Department of Commerce
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Department of Transportation
Department of Transportation - Regional Office
Energy Research and Development Administration
Environmental Protection Agency
Environmental Protection Agency - Regional Office
Federal Energy Administration
Federal Power Commission
Georgia Public Service Commission
Georgia Department of Natural Resources - Game and Fish Division
Georgia Department of Natural Resources - Environmental Protection Division
Office of the Attorney General, State of Georgia
Office of Planning and Budget, State of Georgia
Altamaha Georgia Southern Area Planning and Development Commission
Appling County Commissioners
Appling County Chamber of Commerce
Appling County Police Department
Appling County School Superintendent
The Mayor, City of Baxley, Georgia
City Manager, City of Baxley, Georgia

In addition, the NRC requested comments on the Draft Environmental Statement from interested persons by a notice published in the Federal Register on May 6, 1977 (42 FR 23189). In response to the request referred to above, comments were received from:

U.S. Department of Agriculture, Agricultural Research Service (USDA/ARS)
U.S. Department of Agriculture, Forest Service (USDA/FS)
U.S. Department of Agriculture, Soil Conservation Service (USDA/SCS)
U.S. Department of Commerce, National Oceanic and Atmospheric Administration (USDOC/NOAA)
U.S. Energy Research and Development Administration (USERDA)
U.S. Environmental Protection Agency, Region IV (USEPA)
U.S. Department of Health, Education and Welfare (USHEW)
U.S. Department of Housing and Urban Development, Region IV (USHUD)
U.S. Department of Housing and Urban Development, Atlanta Area Office (USHUDA)
U.S. Department of the Interior (USDOI)
Altamaha Georgia Southern Area Planning and Development Commission (AGSAPDC)
Appling County Chamber of Commerce (ACOC)
State of Georgia, Office of Planning and Budget (GOPB)
Georgia Power Company (GPC)

The comments are reproduced in this statement as Appendix A. The staff's consideration of the comments received and its disposition of the issues involved are reflected in part by revised text in the pertinent sections of this Final Environmental Statement (changes to the text are noted by lines in the margin) and in part by the discussion in Section 11. The comments are categorized by subject and are referenced by the use of the abbreviations indicated above. The organization of Section 11 corresponds to the ordering of sections in the body of the FES; e.g., discussion pertinent to Section 5.2 would be presented in

Section 11.5.2. The pages in Appendix A on which copies of the respective comments appear are indicated by each subject title comment within Section 11 and in the index to Appendix A.

11.1.1 and Summary and Conclusions: Subject of Comment: Construction Status (GPC, A-16)

These sections have been revised to reflect the NRC estimate of the January 1978 status of construction of Hatch Unit No. 2.

11.1.1 Subject of Comment: Ownership Interests (GPC, A-17)

In Amendment No. 1 to the ER (November 1976), the applicant updated information on the ownership of Hatch Unit No. 2. This information was not included in the DES text but has been included in Section 8 of the FES.

11.2.0 Subject of Comment: Misspellings (GPC, A-17)

The appropriate spelling corrections have been made in the FES.

11.2.2.2 Subject of Comment: Changes in Land-Use (USDA/FS, A-2)

Section 2.2.2 of the FES has been revised to reflect this comment.

11.2.2.3 Subject of Comment: Local Economy and Population Changes Related to Construction of Hatch Unit No. 2 (USHEW, A-11)

After reviewing data on economic growth for Appling County, the staff concluded in the DES that "the data in Table 2.2-4 suggest that the economic impact of the Hatch nuclear power plant on Appling County and the City of Baxley has been substantial" (DES, page 2-3). The staff reached this conclusion because other generators of growth in the region were not evident. However, the task of establishing a causal relationship between Unit No. 2--the subject of the staff's analysis--and indicators of economic growth would involve in-depth studies of the individual permits, licenses, and water connections granted. Because such studies would be costly to undertake and would not provide information central to the decisions being made by NRC at the operating license stage, the staff cannot justify the effort and finds the assessment regarding local economic effects and population changes to be adequate as developed in the DES.

11.2.5.1 Subject of Comment: Soils Description (USDA/SCS, A-3)

Section 2.5.1 has been revised to reflect this comment.

11.2.5.2 Subject of Comment: Reference (GPC, A-16)

Reference 19 has been modified to reference the paper, "Invasion of the Asiatic Clam in the Altamaha River, Georgia."

11.2.5.2 Subject of Comment: Location of Hawkinsville (GPC, A-16)

The text of Section 2.5.2 has been revised to reflect the staff's agreement with the comment.

11.3.2.1 Subject of Comment: Cooling Tower Water Use (GPC, A-17)

The average water withdrawal rate given in Section 3.2.1 has been revised from 22,600 to 22,550.

11.3.2.2 Subject of Comment: Typographical Error (GPC, A-17)

Figure 3.2-1 has been revised to correct the typographical error.

11.3.2.3 Subject of Comment: Various Comments on Radioactive Waste Treatment Systems (GPC, A-17)

Section 3.2.3 has been appropriately revised to reflect the correct ventilation system flows and the fact that the liquid radwaste system is not a shared system except for laundry wastes.

11.5.2.2 Subject of Comment: Transmission Line Inspection Program (GPC, A-17)

Section 5.2.2 has been revised to include a limiation on the duration of monitoring along the Hatch-Bonnaire corridor as well as a specific reporting requirement.

11.5.3.1.1 Subject of Comment: Mixing Zone Definition in NPDES Permit (GPC, A-18)

Subsequent to the issuance of the DES, the NPDES permit was issued for the Hatch plant by the State of Georgia. Section 5.3.1.1 of the DES has been revised to reflect the definition of the mixing zone given in the NPDES permit.

11.5.3.4 Subject of Comment: Cleanup Wastes (GPC, A-18)

The applicant has selected one of the two alternative methods recommended by the staff in the DES to dispose of cleanup wastes. Since such wastes will be disposed of offsite there will be no requirement to route them through the radwaste system.

11.5.3.4 Subject of Comment: Corrosion Inhibitors (GPC, A-18)

It is the policy of NRC to review impacts, including those due to chemical releases, where changes in operating procedures are made at operating stations. Where NPDES permit changes are required to allow changes in chemical discharge, NRC approval is not needed. Pursuant to the environmental technical specifications any changes in the NPDES proposed by the applicant shall be provided to the NRC. The NRC staff will provide the results of their review to the permitting authority (i.e., State of Georgia, Department of Natural Resources, Environmental Protection Division).

11.5.3.4 Subject of Comment: Langelier Index (GPC, A-18)

The concentrating effect of the evaporative cooling system will reduce the corrosive tendency of the circulating water. Close attention to the Langelier Index of the circulating water will "minimize the potential for scaling or corrosion of the condenser."

A monitoring program shall be established to assure NRC that proper control is being achieved. The NPDES permit does not address copper monitoring. Although NRC policy is to require that information be made available to indicate the nature and extent of environmental impacts, imposition of any effluent limitations would be the responsibility of the State of Georgia.

11.5.3.5 Subject of Comment: Corrosion Products (USDOC/NOAA, A-4)

The NRC staff has not found any problems associated with products from corrosion within cooling towers at other sites. Furthermore, cooling towers for the most part are fabricated from non-corrodible materials. The applicant has provided a response which describes the material used in the construction of cooling towers at the Hatch Nuclear Plant, Unit No. 2. This response is reproduced below to provide the reader with a better understanding of cooling tower construction.

> "The amount of corrosion in the Hatch 2 cooling towers is expected to be negligible. The cooling tower basins are concrete; the structures are concrete with stainless steel hardware; the tower fill and drift eliminators are polyvinyl chloride (PVC); the fill support hangers are PVC-coated; the tower water distribution system components are either fiber glass, stainless steel, or polypropylene-lined; the steel drift eliminator supports are cold-tar epoxy-coated; and the fan blades are fiber glass. The only tower components considered to be subject to corrosion are the fan motor, gear box, and supports; however, these constitute a very small amount of surface area and are located in the upper portion of towers and are not in contact with the circulating water. The cooling tower manufacturer is not aware of any problems due to corrosion products in towers of similar design and construction."

11.5.3.5 Subject of Comment: Review of Chemicals for Corrosion Protection (GPC, A-18)

Following licensing, the NRC will continue to review any changes in operating practices which have the potential for increasing environmental impact at the station. This will include review of usage of chemicals different from those reviewed in the EIS. Any such review will be coordinated with the U.S. EPA and the State.

11.5.4.1 Subject of Comment: Duration of Aerial Surveillance Program (GPC, A-18)

Based upon staff evaluation of the monitoring program data for Hatch Unit No. 1, the monitoring program for Unit No. 2 shall continue for a period of at least four years.

11.5.4.2.1 Subject of Comment: Entrainment Versus River Flow (GPC, A-18)

Table 5.4-1 has been revised to reflect the staff's agreement with the comment.

11.5.4.2.2 Subject of Comment: Location of Discharge Pipes (GPC, A-18)

The text of Section 5.4.2.2 has been revised to reflect the staff's agreement with the comment.

11.5.5.1.2 Subject of Comment: Thyroid Dose (GPC, A-18)

The apparent inconsistency in thyroid doses in Tables 5.5-2, 5.5-7 and 5.5-8 was due to typographical errors in Table 5.5-2. This has been corrected in the FES.

11.5.5.1.4 Subject of Comment: Direct Radiation (USEPA, A-10)

The staff believes that its discussion in the DES with regard to direct radiation from the facility is adequate. The applicant has provided a response to this comment which is given below. Furthermore, the staff has reviewed TLD data presented in Annual Operating Reports (1975 and 1976) for Hatch Unit No. 1 and is in agreement with the conclusions reached by the applicant regarding direct radiation.

"The radiological environmental monitoring program for Hatch Nuclear Plant described in subsection 6.2.1 of the Hatch Unit No. 2 EROL includes measurements of external radiation by means of thermoluminescent dosimeters (TLDs). An evaluation of the results of the monitoring program is submitted to the NRC annually. Analysis of TLD data has not shown a measurable dose in the plant environs due to operation of Hatch Nuclear Plant.

Furthermore, subsection 12.4.3 of the Hatch Unit No. 2 FSAR indicates that, with both units operating at 100% plant capacity, the maximum annual dose to an individual at the site boundary would not be more than a few millirem due to direct radiation and skyshine."

11.5.5.2.2 Subject of Comment: Dose to Muskrat (GPC, A-18)

The Hatch site may or may not contain muskrats since the region is considered to be within the range of these mammals and certainly provides a suitable habitat. The staff noted that, although the University of Georgia did not capture any muskrats in their survey, beavers were identified, and these two rodents often occupy the same immediate habitat.

The purpose of the muskrat dose calculation was merely to demonstrate a range of doses for potential biota in the Hatch area. Certainly the potential dose to muskrats is trivial but serves to upperbound the dose to mammals due to their omnivorous behavior.

11.5.6 Subject of Comment: Recreation Effects (USDOI, A-13)

Recreation facilities within 10 miles of the plant include the Altamaha River, the Bullard Wildlife Management Area, Grays Landing, and miscellaneous sports facilities operated by the City of Baxley. With respect to the Altamaha River, a sport fishing resource that is used extensively, the staff has determined that no major effects related to construction were

determined and that, if such effects did occur as a result of construction, they were of a temporary nature (Section 4.3.2). Further, whatever impacts the construction of Hatch Unit No. 2, principally the construction of intake and discharge structures, had on accessibility were also temporary in nature. As the attractiveness of the Altamaha River for sport fishing has not been changed except for those periods of intensive construction, the staff concludes that the impact of sport fishing in the vicinity of the plant was negligible.

The staff has also concluded in Section 5.4.2.1 (Intake Effects), Section 5.4.2.2 (Discharge Effects), and Section 5.5.2.4 (Evaluation of the Radiological Impacts on Biota) that the operation of Hatch Unit No. 2 should not change the fish life in the Altamaha River. Therefore, the staff concludes that Hatch Unit No. 2 will not alter the value of the Altamaha River as a recreational resource.

With respect to the use of land-based recreational facilities, those impacts which may have occurred during the construction period have diminished as the peak of activities has passed. Based on experiences with other plants, the staff believes that such impacts would have resulted from traffic congestion caused by construction workers travelling through Baxley; such impacts would be temporary in nature, would occur during peak travel periods, and would affect a relatively small number of people.

During the operating period, the external impacts of the plant due to traffic generation and visibility will be negligible. Moreover, in-house staff evaluations of attendance data for state recreation facilities proximately located to nuclear power stations indicate no discernible, adverse change after those stations began operation. Therefore, the staff concludes that outdoor recreation should not be impacted by the operation of Hatch Unit No. 2.

Since the construction impacts on water and land-based recreational areas in the vicinity of the Hatch plant were shown to be negligible and no adverse changes are expected at such areas during the operation of the facility, inclusion of a map highlighting such unaffected recreation areas would not serve any useful purpose.

11.6.2.3 and 11.6.3.3 Subject of Comment: Groundwater Monitoring (USDOI, A-13)

Section 6.3.3 has been revised to reflect this comment. The applicant has provided a response to comments regarding permeability data presented in the Environmental Report and the detection of accidental releases to aquifers. This response has been reviewed and verified by independent calculations performed by the staff. It was found to be both accurate and responsive to the comment and as such is reproduced below.

> "...The invert elevation of the onsite subsurface drainage ditch is at about 104 feet, MSL. Groundwater which collects in the drainage ditch is derived from the shallow unconfined aquifer, which has a bottom elevation that ranges from 100 feet to 200 feet, MSL. Therefore, the shallow unconfined aquifer is the source of samples taken from the onsite subsurface drainage ditch.
>
> The water quality of groundwater in the minor shallow confined aquifer has not been monitored.
>
> A portion of the unconfined aquifer was removed during construction where excavations were made for plant structures, such as the reactor and radwaste buildings. Consequently, the base of these buildings is below the bottom of the unconfined aquifer which is adjacent to the plant. In the event of an accidental spill, the contaminants would move downward and eventually enter the minor confined aquifer. The contaminants would not migrate upward into the unconfined aquifer; therefore, computations were made to define the movement of contaminants only in the minor confined aquifer.
>
> A map showing the water level contours of the unconfined aquifer is shown in Figure 2.5-13 of the Hatch Unit 2 EROL. A water level contour map of the unconfined aquifer, which shows the location of plant structures, is shown in Figure 2.4-39 of the Hatch Unit 2 Final Safety Analysis Report (FSAR). This figure was prepared using groundwater level data collected in 1968; however, a new water level contour map of the unconfined aquifer is being prepared using data collected in 1977.
>
> A water level (potentiometric surface) contour map of the minor shallow confined aquifer was not included in the Hatch Unit 2 EROL. The contours of the potentiometric surface of the minor shallow confined aquifer are shown in Figure 2.4-40 of the Hatch Unit 2

FSAR. This figure was used to determine the hydraulic gradient of 0.0043, which was used in computing the movement of contaminants in the minor shallow confined aquifer.

The hydraulic properties of the unconfined and confined aquifers are listed as follows:

	Permeability (ft/min)	Hydraulic Gradient	Effective Porosity
Unconfined Aquifer	1.4×10^{-3}	0.0026 to 0.015	
Confined Aquifer	2.5×10^{-4} (131 ft/yr)	0.0043	0.10

...Georgia Power Company /was/ sampling quarterly groundwater in the onsite subsurface drainage ditch, but this sampling was discontinued at the end of 1977.

With regard to the detection of accidental releases to the groundwater, an accidental (or unplanned) release occurs at an unexpected time and place, but it is known to have occurred during or shortly after the event. The installation of plant monitors virtually eliminates the possibility that any plant release can go undetected. Therefore, reliance is placed on plant monitors, rather than environmental monitors, to detect plant releases for two reasons:

(1) Concentrations will be higher and nearer the point of release than they will be at an environmental monitor. As a consequence, plant monitors will be more sensitive to and would detect smaller releases than would environmental monitors.

(2) Plant monitors will indicate where and when a release occurs, thus allowing the plant operator to correct the situation much more quickly than if he were to rely on environmental monitors.

Georgia Power Company has placed in-plant monitors at strategic locations such that all accidental releases are expected to be detected. As a result, GPC contends that the use of in-plant monitors will indicate any possible need to monitor for accidental releases in the environment."

11.6.2.4 Subject of Comment: Inclusion of Fowl Game Species in Radiological Environmental Monitoring Program (USHEW, A-11)

Game species, which will be considered when the environmental technical specifications for Hatch Unit No. 2 are developed, include deer, rabbit, squirrel, oppossum, dove and mallard. The radiation doses for ingestion of game species may be somewhat higher than domestic animals on a per Kg basis. However, due to the relative short duration of the hunting season and limitations on the number of game species taken per day, generally much smaller quantities of game would be ingested year-round than would be the case for domestic animals. Therefore, the annual doses from ingestion of game species would not be expected to exceed those from domestic animals. As a result, the staff feels the judicious selection and monitoring of a single game species is adequate to assure the public health and safety.

11.6.3.2 Subject of Comment: Water Quality Monitoring (GPC, A-18)

It is the NRC position that monitoring should be performed to the extent necessary to document environmental impacts associated with licensed stations. The requirements of the NPDES permit may satisfy some of this need.

11.6.3.3 Subject of Comment: Well Water Monitoring (GPC, A-18)

Section 6.3.3 has been revised to exclude monitoring at two onsite wells.

11.6.3.4 and Summary and Conclusions: Subject of Comment: Monitoring of Corrosion Products (GPC, A-18)

The applicant has not argued against the need for monitoring of corrosion products but has instead noted that such monitoring should be a condition of the NPDES permit issued by the

State of Georgia. The permit issued by the State on June 6, 1977 does not specifically require such monitoring. For any potential issue identified during NRC's NEPA review which is not resolved at the issuance of the FES, it is the policy of NRC to require such additional data during station operation as may be necessary to provide resolution. Where such data is collected by the utility as a requirement of the NPDES permit, then NRC will not require collection of duplicate data. However, where the NPDES permit does not require the collection of information necessary for the resolution of an NEPA issue, then NRC may require such information.

If experience indicates that the corrosion rate is exceeding design objectives, then measurements of copper in the receiving water may be warranted. Should this be the case, then NRC would discuss with the State the need for subsequent information and the possible need for mitigative actions.

11.6.3.5 and Summary and Conclusions: Subject of Comment: Aquatic Monitoring Program (GPC, A-18)

The staff has reviewed the information presented in the applicant's response to questions as well as the information given in the 1976 Annual Environmental Surveillance Report No. 3 and the September 13, 1977 submittal attempting to justify in part a reduced impingement sampling effort. The staff maintains its position that impingement sampling be conducted on a frequency of one 24-hour sample per week. The basis for this decision is as follows:

A. As stated in Section 5.4.2.1, incremental impingement losses at the Hatch Nuclear Plant due to the operation of Unit No. 2 cannot be accurately made. The staff anticipates that the losses sustained by the fishery due to two-unit operation would not be significant; however, this prediction can only be verified through monitoring.

B. Comparison of impingement data collected during two-unit operation to data that has been collected during one-unit operation would allow the determination of the incremental impingement loss associated with the operation of the second unit. Valid comparisons of the data can only be made if the data are collected in a similar manner and at the same frequency.

The statistical basis for the reduced sampling effort proposed by the applicant is detailed in their September 13, 1977 submittal. The staff has reviewed the statistical approach taken by the applicant and has found it to be inappropriate. The test used is valid only for a normally distributed variable, and the number of fish impinged at the Hatch Station is not normally distributed. Furthermore, the assumption that the data is independent is false, since seasonal variation in impingement is found.

The staff, therefore, concludes that the statistical basis for a reduced sampling effort is unfounded and that the uncertainty of our prediction as well as the obvious merits of continuing a study using the same sample frequency will require impingement sampling on a weekly basis.

Section 6.3.5 of the DES has been revised in part to reflect these comments. The staff has reviewed the State of Georgia NPDES permit requirements and the explanation provided in the September 13, 1977 submittal from GPC to the NRC for the proposed ichthyoplankton entrainment monitoring program and has found the program to be acceptable in part. The staff requires that monitoring at the intake be conducted weekly from February through May rather than monthly as proposed by the applicant. Monthly sampling is too infrequent to detect peak spawning periods which for some species are as short as two weeks duration. All prior entrainment sampling has been designed to determine ichthyoplankton densities and distribution in the river, and mortality due to entrainment was determined by simple volumetric comparisons. The proposed study would not determine ichthyoplankton densities and distributions in the Altamaha River but would provide a more accurate estimation of the actual losses due to entrainment. If after one complete season of data collection the estimated number of organisms being entrained through the plant is significantly greater than the calculated volumetric densities based on the data from the two previous years, then additional riverine sampling may be required to determine if the increase was due to higher densities of organisms in the river during that year, or due to selective entrainment of a greater number of organisms than can be explained by simple volumetric proportions.

11.6.3.5 Subject of Comment: Reference to Main Channel in Altamaha River (GPC, A-18)

The text in Table 6.3-1 has been revised to reflect the staff's agreement with the comment.

11.6.3.6 Subject of Comment: Duration of Terrestrial Monitoring Program (GPC, A-18)

Section 6.3.6 has been revised to reflect the staff's findings with regard to this comment.

11.7.0 Subject of Comment: Environmental Impact of Postulated Plant Accidents (USHEW, A-11)

The FES-CP for Hatch Unit No. 2, published in October 1972, provided an assessment of the environmental impacts of postulated accidents which dealt specifically with the Hatch site, e.g., population distribution. The DES-OL for Hatch Unit No. 2 states in Section 7.1, Reśumé, that the conclusions about environmental risks due to accidents remain as previously presented in the FES-CP stage.

The Reactor Safety Study (WASH-1400) is a generic study and it was not used to reach any conclusions regarding the environmental risk from postulated accidents from the operation of Hatch Unit No. 2. Therefore, its conclusions do not alter the staff findings presented in the FES-CP nor this FES-OL with regard to environmental impacts at the Hatch site due to postulated accidents.

11.8.2.2 Subject of Comment: Location of Hatch Nuclear Plant (GPC, A-19)

Due to a graphical error, the location of the plant was incorrectly shown on Figure 8.2-1 in the DES. This has been corrected in the FES.

11.9.4 Subject of Comment: Designed Operational Lifetime for Hatch Unit No. 2 (GPC, A-19)

Section 9.4 has been revised to reflect a 40-year designed operational lifetime for Hatch Unit No. 2.

11.10.8 Subject of Comment: Radiological Dose (GPC, A-19)

The radiological dose values presented in item 2.5 of Table 10.4-1 have been revised to reflect the calculated values.

REFERENCES FOR SECTION 11

1. Georgia Power Company, Review of Comments on Draft Environmental Statement, Letter to G. W. Knighton, NRC, from C. F. Whitman, Georgia Power Company, dated September 7, 1977, Docket No. 50-366.

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APPENDIX A

COMMENTS ON DRAFT ENVIRONMENTAL STATEMENT

U.S. Department of Agriculture **Agricultural Research Service**

AGRICULTURAL RESEARCH SERVICE WASHINGTON, D.C. 20250

UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF ADMINISTRATOR

June 8, 1977

Mr. George W. Knighton
Division of Site Safety
and Environmental Analysis
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Knighton:

We have reviewed the Draft Environmental Statement related to the operation of the Edwin I. Hatch Nuclear Plant, Unit No. 2, and have no comments.

We appreciate having the opportunity to review this statement.

Sincerely,

H. L. Barrows
Deputy Assistant Administrator

771650253

U.S. Department of Agriculture **Forest Service**

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
1720 Peachtree Road, N.W.
Atlanta, Georgia 30309

8400
May 12, [illegible]

Mr. George W. Knighton, Chief
U.S. Nuclear Regulating Commission
Division of Site Safety & Environment Analysis
Washington, D.C. 20555

Dear Mr. Knighton:

We have reviewed the Draft Environmental Statement for the Edwin I. Hatch Nuclear Plant, Unit No. 2, Georgia Power Company and have one area of concern.

Regarding comments made in Section 2.2.2 - Changes in Land Use. Even though land use changes have been relatively minor, we would suggest that land areas no longer needed for temporary construction uses be returned to their former land use in so far as possible, unless land uses meeting higher needs are necessary. Section 2.2.2 - first paragraph, sentences five and six indicate that the areas cleared for construction purposes have been revegetated with grasses. An effort should be made to return as much of these lands to timber production as possible. Guidance in the selection of proper species and revegetation techniques can be obtained from the Georgia Forestry Commission, 5156 Riggins Mill Road, Macon, Georgia.

Sincerely,

THEODORE R. KAUFMANN
Area Environmental Coordinator

Copy: State Forester - Georgia

771370020

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P.O. Box 832, Athens, Georgia 30603 Telephone: 404-546-2275

June 10, 1977

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety
and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

Subject: Draft EIS, Edwin I. Hatch Nuclear Plant, Unit No. 2,
Georgia Power Company, Docket No. 50-366

After reviewing the subject draft environmental impact statement, we are enclosing a copy of the soil survey of Appling and Jeff Davis Counties, Georgia, for your use along with the following recommendations:

We recommend that you include a description of the soils of the project area in accordance with this soil survey, and include a statement that this area does have some prime farmlands. In order for you to make a determination of the prime farmland, we have placed a red check mark by the mapping units that qualify as prime farmland. These mapping units are located on the guide to mapping units which follows page 65.

If you have any questions concerning this information and our recommendations, please call Frank Lowery at: 404-546-2216.

Sincerely,

Dwight M. Treadway

Dwight M. Treadway
State Conservationist

Enclosure

U.S. Department of Commerce **Assistant Secretary for Science and Technology**

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230 (202) 377-3111

JUN 27 1977

June 16, 1977

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

This is in reference to your draft environmental impact statement entitled "Edwin I. Hatch Nuclear Plant, Unit No. 2, Georgia Power Company." The enclosed comments from the National Oceanic and Atmospheric Administration (NOAA) are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving twelve (12) copies of the final statement.

Sincerely,

for George S. Hoberman

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure: Memo from NOAA - National Marine Fisheries Service

771780121

U.S. Department of Commerce **NOAA**

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Duval Building
9450 Gandy Boulevard
St. Petersburg, FL 33702

June 3, 1977

JUN 2 6 1977

TO: Director
Ofc of Ecology & Environmental Cons, EE

THRU: for Deputy Assistant Director for
Scientific & Technical Svcs, FS

FROM: William H. Stevenson
Regional Director

SUBJECT: Comments on Draft Environmental Impact Statement - Edwin I. Hatch Nuclear Plant, Unit No. 2 (GA Power Co) (DEIS #7705.11)

The draft environmental impact statement for Edwin I. Hatch Nuclear Plant, Unit No. 2 that accompanied your memorandum of May 10, 1977, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments:

The DEIS should contain a discussion of the expected corrosion products (quality and/or quantity) from the cooling towers. Mechanical draft cooling towers are not new and the types of corrosion products found at other installations should suffice. If such a discussion is not possible, the reasons should be given.

It is requested that one copy of the Final EIS be sent our Area Supervisor, Environmental Assessment Branch, P.O. Box 570, Beaufort, NC 28516

cc:
F53 (3)
FSE611

1561 184

UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

JUN 28 1977

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety
and Environmental Analysis
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Knighton:

This is in response to your transmittal dated April 28, 1977, in which you invited the Energy Research and Development Administration (ERDA) to review and comment on the Nuclear Regulatory Commission's draft environmental impact statement related to the operation of Edwin I. Hatch Nuclear Plant, Unit No. 2, Georgia Power Company.

We have reviewed the statement and have determined that the proposed action will not conflict with current or known future ERDA programs. We have no comments to offer on the statement itself.

Thank you for the opportunity to review and comment on the draft statement.

Sincerely,

W. H. Pennington, Director
Office of NEPA Coordination

cc: Council on Environmental
Quality (5)

RECEIVED
June 29 1977
U.S. NUCLEAR REGULATORY COMMISSION

7718200??

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30308

June 16, 1977

Mr. George W. Knighton
Chief, Environmental Projects
Branch No. 1
Division of Site Safety
and Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

We have received the Draft Environmental Impact Statement on the Edwin I. Hatch Nuclear Plant, Unit No. 2 in Appling County, Georgia. Although comments from our Agency are due back to you by June 20, 1977, we regret that we shall not be able to respond within that time.

This letter is to inform you that our detailed comments will be forthcoming on or before July 5, 1977.

Sincerely yours,

Bruce D. Kelley

for Frank M. Redmond
Review Section
EIS Branch

771730018

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30308

JUN 20 1977

Mr. George W. Knighton, Chief
Environmental Projects Branch 1
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D.C. 20555

Re: E. I. Hatch Nuclear Plant
NPDES Permit No. GA0004120

Dear Mr. Knighton:

Attached are comments from the U.S. Fish and Wildlife Service relative to the above referenced facility.

Sincerely yours,

Charles H. Kaplan
Coordinator
Thermal Analysis Unit

Enclosure

771740131

United States Department of the Interior
FISH AND WILDLIFE SERVICE
17 EXECUTIVE PARK DRIVE, N. E.
ATLANTA, GEORGIA 30329

JUN 3 1977

Mr. J. L. Ledbetter
Director, Environmental Protection Division
Georgia Department of Natural Resources
270 Washington Street, S.W.
Atlanta, Georgia 30334

Dear Mr. Ledbetter:

The Fish and Wildlife Service has reviewed the proposed National Pollutant Discharge Elimination System (NPDES) Permit to the Georgia Power Company for its Edwin I. Hatch Nuclear Power Plant, Permit number GA 0004120. Our comments are submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

This proposed permit states that this power generation station is composed of two units (1630 megawatts) and operates on cooling towers with water being withdrawn from and subsequently discharged into the Altamaha River.

The Service has recently reviewed the Nuclear Regulatory Commission's Draft Environmental Impact Statement for the Hatch Plant, Unit 2, dated April 1977, which contains impingement, (Section 5.4.2.1, pages 5-7) and entrainment (Section 5.4.2.1, pages 5-8 through 5-10) data. It appears that under the present mode of operations with offstream cooling towers, this station is not causing substantial damage to indigenous aquatic biota. The Service concludes that this permit gives adequate consideration to assure the protection and propagation of balanced, indigenous populations of shellfish, fish, and wildlife in the receiving waters.

The above views constitute the report of the Department of the Interior.

Sincerely yours,

Deputy Regional Director

cc: Mr. Howard Teller, EPA, Atlanta, Georgia

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30308

JUL 18 1977

Mr. George W. Knighton
Chief, Environmental Projects
Branch No. 1
Division of Site Safety and
Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

Region IV of the U. S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement related to the operation of the Edwin I. Hatch Nuclear Plant Unit No. 2 of the Georgia Power Company.

We note that the applicant has modified the liquid, gaseous and solid radioactive waste treatment systems since the FEIS was issued for the construction permit in 1972. The plant should be capable of being operated by the applicant in such a manner to reduce radioactive effluents to meet 10 CFR 50 Appendix I design objective criteria and 40 CFR 190, Environmental Radiation Standards for Nuclear Power Operations.

The following radiological aspects are applicable to the operation of the Hatch Unit No. 2 nuclear power plant:

Reactor Accidents

We have examined the NRC's analyses of accidents and their potential risks. The analyses were developed by NRC in the course of its engineering evaluation of reactor safety in the design of nuclear plants. Since these issues are common to all nuclear plants of a given type, we concur with NRC's generic approach to accident evaluation. The NRC is expected to continue the efforts initiated by AEC to insure safety through plant design and accident analyses in the licensing process on a case-by-case basis.

In 1972, the AEC initiated an effort to examine reactor safety and the resultant environmental consequences and risks on a more quantitative basis. We continue to support this effort. On August 20, 1974, the AEC issued for public comment the draft Reactor Safety Study (WASH-1400), which was the product of an extensive effort to

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quantify the risks associated with light-water-cooled nuclear power plants. The EPA's review of this document included in-house and contractual efforts, and culminated in the release of final Agency comments on the draft report on August 15, 1975. Initial comments were issued on November 27, 1974.

EPA completed its review of the final Reactor Safety Study on June 11, 1976, and issued a public report of its findings. Most of our concerns have been resolved in our discussions with the NRC regarding the comments. Our concerns with the Reactor Safety Study may now be focused on two technical points -- a factor of 4 in latent cancer health effects and a maximum factor of 10 in the probability of BWR scram failure. We also believe that the methodology of the Reactor Safety Study should be used as a tool in the evaluation of nuclear systems that vary from the models chosen for the study and that a generic analysis should be made of the acceptability of the present risks and the necessity for increased levels of safety.

Fuel Cycle and Long-term Dose Assessments

EPA is responsible for establishing generally applicable environmental radiation protection standards to limit unnecessary radiation exposures and radioactive materials in the general environment resulting from normal operations of facilities that are part of the uranium fuel cycle. The EPA has concluded that environmental radiation standards for nuclear power industry operations should take into account the total radiation dose to population, the maximum individual dose, the risk of health effects attributable to these doses (including the future risks arising from the release of long-lived radionuclides to the environment), and the effectiveness and costs of effluent control technology. EPA's Uranium Fuel Cycle Standards are expressed in terms of dose limits to individual members of the general public and limits on quantities of certain long-lived radioactive materials released to the general environment.

A document entitled "Environmental Survey of the Uranium Fuel Cycle" (WASH-1248) was issued by AEC in conjunction with a regulation (10 CFR 50, Appendix D) for application in completing the cost-benefit analysis for individual light-water reactor environmental reviews (39 F.R. 14188). This document is used by NRC in draft environmental statements to assess the incremental environmental impacts that can be attributed to fuel cycle components which support nuclear power plants. This approach appears to be adequate for plants currently under consideration, and estimates of the incremental impacts of the Hatch Nuclear Plant Unit No. 2 are reasonable. However, as suggested in our comments on the proposed rulemaking (January 19, 1973), if this approach is to be used for future plants, it is important for NRC to periodically review and update the information and assessment techniques used.

In response to a 1976 court decision, the NRC issued a supplement to WASH-1258 (NUREG-0116) which treated the impacts from reprocessing of spent fuel and impacts from radioactive waste management. EPA has commented on the supplement.

High-level Waste Management

The techniques and procedure used to manage high-level radioactive wastes will have an impact on the environment. To a certain extent, these impacts can be directly related to individual nuclear power plants because the reprocessing of spent fuel from each new facility will contribute to the total waste. The AEC, on September 10, 1974, issued for comment a draft statement entitled "The Management of Commercial High-level and Transuranium-Contaminated Radioactive Waste" (WASH-1539). In this regard, EPA provided extensive comments on WASH-1539 on November 21, 1974. Our major criticism was that the draft statement lacked a program for arriving at a satisfactory method of "ultimate" high-level waste disposal.

EPA is cooperating with both NRC and ERDA to develop an environmentally acceptable program for radioactive waste management. In this regard, EPA will establish environmental radiation protection criteria for radioactive waste management in 1977 and environmental radiation protection standards for high-level waste in 1978. We have concluded that the continued development of the Nation's nuclear power industry is acceptable from an environmental standpoint during the period required to satisfactorily resolve the waste management question.

Transportation

In its earlier reviews of the environmental impacts of transportation of radioactive material, EPA agreed with AEC that many aspects of this program could best be treated on a generic basis. The NRC has codified this generic approach (40 F.R. 1005) by adding a table to its regulations (10 CFR Part 5) which summarizes the environmental impacts resulting from the transportation of radioactive materials to and from light-water reactors. This regulation permits the use of the impact values listed in the table in lieu of assessing the transportation impact for individual reactor licensing actions if certain conditions are met. Since the Hatch Nuclear Plant Unit No. 2 appears to meet these conditions and since EPA agrees that the transportation impact values in the table are reasonable, the generic approach appears adequate for this plant.

The impact value for routine transportation of radioactive materials has been set at a level which covers 90 percent of the reactors currently operating or under construction. The basis for the impact, or risk, of transportation accidents is not as clearly defined. At present, EPA, ERDA, and NRC are each attempting to more full assess the radiological impact of transportation risks.

The EPA will make known its views on any environmentally unacceptable conditions related to transportation. On the basis of present information, EPA believes that there is no undue risk of transportation accidents associated with the Hatch Nuclear Plant Unit No. 2.

Decommissioning

Upon completion of its useful life, a commercial light-water nuclear power plant itself becomes a form of radioactive waste. This waste possesses characteristics quite different from those generated during operation but nonetheless represents a considerable volume and radioactive inventory. Present regulations do not require consideration of a decommissioning plan until near the end of the reactor's useful life.

While EPA and other Federal agencies are actively addressing the issues involved in waste management, decommissioning and the disposal waste resulting from such activities have received little attention. Considering the size, complexity and number of commercial power reactors that are or will be licensed, it would appear prudent to begin planning for decommissioning as early in plant life as possible. For example, it may be necessary to institute design changes to facilitate eventual dismantling. In addition, evaluation of social impacts and resource commitments on present and future generations should be considered so that those receiving the benefits are those responsible for paying the necessary costs of plant retirement. We believe an orderly decommissioning procedure should be developed for each site containing a light-water nuclear power reactor well before its retirement.

In accordance with our established procedure we have assigned a rating of LO (Lack of Objections) to the project and 1 (Adequate) to the Impact Statement.

We appreciate the opportunity to review this draft environmental impact statement.

Sincerely yours,

Howard Zeller, Dep'd

for John A. Little
Acting Regional Administrator

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

July 26, 1977

Mr. George W. Knighton
Chief, Environmental Projects
Branch No. 1, Division of Site Safety and
Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

In our comments of July 18, 1977, on the Draft Environmental Impact Statement related to the operation of the Edwin I. Hatch Nuclear Plant Unit No. 2 of the Georgia Power Company we inadvertently omitted comments relative to Section 5.5.1.4. Please include the following with our original comments:

Direct Radiation

EPA is pleased to note that the DEIS does discuss the direct radiation and skyshine dose rates related to operation of boiling water reactors (BWR's). EPA has been concerned for some time about the direct and scattered gamma radiation resulting from primary coolant activity during transport to turbine building components. The FEIS should provide additional information on direct radiation from the Hatch nuclear plant site.

Inasmuch as the operating Hatch Plant No. 1 is of the same generic class of BWR design and power level, the current radiological environmental monitoring program should provide information to place the direct radiation of intended operation of Hatch Plant No. 2 in the proper perspective as it relates to the potential exposure to members of the public beyond the site boundary.

Results of an EPA field study of a 2400 $MW_{(t)}$ BWR power plant indicate that it should be possible to restrict the dose from direct radiation and skyshine to real individuals located at reasonable distances from the turbine building for realistic occupancy times to a few mrem per year.

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The potential for high doses at BWR nuclear power plants can be reduced if necessary through the provision of either restricted access or additional shielding as appropriate.

Sincerely yours,

Howard Zeller, Deputy for
John A. Little
Acting Regional Administrator

**Department of Health,
Education, and Welfare**

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

June 16, 1977

Director
Division of Site Safety
and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Thank you for the opportunity to comment on the draft Environmental Impact Statement on the Edwin I Hatch Nuclear Power Plant, Unit 2, Georgia.

A review of this current environmental statement reveals it is virtually complete and satisfactory in its content and method of presentation. It does not reveal any unforseen or unusual impacts on the populations affected through either the construction or operation of this facility. As of February 1977 construction of plant Unit No. 2 was approximately 70% complete. The actual impacts that have occurred have not varied appreciably from those predicted earlier.

The statement notes that a reassessment of construction impacts that may have been imposed on the local community, i.e., of schools over crowding, housing problems, crime increases, traffic increases, etc., indicates that the earlier assessment included in the Environmental Statement of the Applicant remains essentially unchanged. Construction workers were housed, primarily in trailer parks, and in the towns of Vidalia and Baxley. While Appling County, which includes the town of Baxley, has experienced net increases in population and expansion of the business sector since the start of construction, the NRC staff has been unable to specifically correlate these increases with the construction of the plant. This question should be reevaluated and a more firm conclusion reached in the final Environmental Statement.

The current Statement notes that environmental effects of construction on the community, were considered and it was concluded that the City of Baxley and several nearby communities would bear the brunt of an influx of 1300 to 1500 construction workers. Schools and recreation facilities in particular would be affected but the applicant will supplement local resources to ease the impact.

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With respect to the proposed Environmental Radiological Monitoring Program, eight changes are contemplated in the proposed monitoring program (P. 6-3). The seventh of these indicates that the applicant would institute semiannual sampling of meat, poultry, and eggs within 10 miles downwind of the gas gamma isotopic analyses and sample one major game species where these may provide an important source of dietary protein. In addition to major animal game species, there are also fowl game species. We recommend that at least one of each of these two types of species be sampled.

In discussing the Environmental Impact of postulated accidents at this facility the statement refers to the report prepared under the direction of Professor Norman Rasmussen of MIT as an indication of the consequences that might be expected from an accident. This is unsatisfactory in view of the fact that the Rasmussen report has not received sufficient acceptance and is generic in nature. Consequently, it does not deal specifically with the environmental features, population distribution, etc., in the vicinity of this specific plant. As a result, the discussion of the impact of postulated accidents should be rewritten.

Sincerely,

Charles Custard
Director
Office of Environmental Affairs

Department of Housing and Urban Development **Region IV**

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
REGIONAL OFFICE
PERSHING POINT PLAZA, 1371 PEACHTREE STREET, N.E.
ATLANTA, GEORGIA 30309

May 3, 1977

REGION IV

IN REPLY REFER TO:
4C

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety
and Environmental Analysis
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

We have forwarded the Draft Environmental Impact Statement (EIS) for Edwin I. Hatch Nuclear Plant, Unit No. 2, Georgia Power Company, Appling County, Georgia, to the HUD Area Office in Atlanta, Georgia, for review.

Functionally the HUD Area Offices are our reviewing body for activities within their respective states. They have been advised to send their comments directly to you.

Sincerely,

Leo J. Zuber
Director, Community Planning
and Management Division

AREA OFFICES
ATLANTA, GEORGIA · BIRMINGHAM, ALABAMA · COLUMBIA, SOUTH CAROLINA · GREENSBORO, NORTH CAROLINA
JACKSONVILLE, FLORIDA · KNOXVILLE, TENNESSEE · LOUISVILLE, KENTUCKY
Hearing Offices
Coral Gables, Florida · Memphis, Tennessee · Nashville, Tennessee · Tampa, Florida

771290095

Department of Housing and Urban Development **Region IV**

REGION IV
Pershing Point Plaza
1371 Peachtree Street, N.E.
Atlanta, Georgia 30309

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ATLANTA AREA OFFICE
PEACHTREE CENTER BUILDING, 230 PEACHTREE STREET, N.W.
ATLANTA, GEORGIA 30303

June 3, 1977

IN REPLY REFER TO:
4.1SS

Mr. George W. Knighton
Chief, Environmental Products Branch No. 1
Division of Site Safety and
Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

RECEIVED
JUN 6 1977

Dear Mr. Knighton:

Subject: Draft Environmental Impact Statement
Edwin I. Hatch Nuclear Plant, Unit No. 2
Appling County, Georgia

We have reviewed the Draft Environmental Impact Statement (EIS) and have the following comments to offer.

As far as we can determine there will be no necessity for utilization of the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970 as a result of the operation of Unit No. 2.

A significant analysis of cost/benefit ratios was presented in the Draft EIS. It is our opinion that the total economic benefits outweigh the minimal environmental and social costs.

Therefore, the Department of Housing and Urban Development supports the proposed action since energy resources are becoming increasingly critical.

Sincerely,

William A. Hartman
Area Director

cc:
Mr. Timothy Atkeson
General Counsel
Council of Environmental Quality
722 Jackson Place, N.W.
Washington, D. C. 20006

771600017

U.S. Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 77/414

JUN 29 1977

Mr. George W. Knighton
Chief, Environmental Projects
Branch No. 1
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

Thank you for your letter of April 28, 1977, transmitting copies of the Nuclear Regulatory Commission's draft environmental impact statement on the Edwin I. Hatch Nuclear Plant, Unit No.2, [Docket No. 50-366], Appling County, Georgia.

Our comments are submitted according to the format of the statement or by subject.

Groundwater

We note from pages 6-1 and 6-4, that past groundwater monitoring has been restricted to water from the deep regional confined aquifer and from an onsite "subsurface drainage ditch." It is not clear whether the ditch sample would represent the shallow unconfined aquifer and/or the shallow minor confined aquifer; this should be clarified. Past monitoring, it appears, may have neglected the minor shallow confined aquifer, which is recognized as very susceptible to accidental contamination, because it lies less than five feet below the foundation of the Unit 2 radwaste building, as indicated on page 2.5-6 of the environmental report. The environmental report, Figure 2.5-13, presents contours on the water table in the unconfined aquifer, according to the legend of the figure and the text in section 2.5.2. The hydraulic gradient obtained from this map is used in computing the movement of contaminants from any accidental spill, as discussed on page 2.5-6 of the environmental report. However, the permeability used (2.5×10^{-4} ft. min.$^{-1}$) is that given for the silty sandstone of the minor shallow confined aquifer, which is almost an order of magnitude smaller than the permeability (1.4×10^{-3} ft. min.$^{-3}$) of the unconfined aquifer, as noted on pages 2.5-5 and 2.5-6 of the environmental report.

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

771040077

This apparent mixing of properties should be explained or clarified because considerably longer travel times for contaminants result. Site well 2 appears to be located upgradient from offsite domestic wells to the south and southwest. The final statement should include properly identified water-level contours on a map showing the locations of radwaste buildings or any other potential sources of accidental contamination of groundwater and should include at least the most important hydraulic properties of the aquifers involved. The draft statement, page 6-4, states that in the future no monitoring of groundwater will be done unless an accidental release occurs. The statement should indicate how some types of accidental releases will be detected in a timely manner, particularly if they are from underground facilities, if monitoring does not occur periodically at intervals in accordance with the hydrologic properties and hydraulics of the aquifers affected.

Fish and Wildlife

In general, the environmental statement adequately describes the fish and wildlife resources of the project area and the probable impacts thereto associated with project construction and operation. Should the Georgia Power Company or the Nuclear Regulatory Commission find through further reconnaissance, monitoring, or surveillance the presence of endangered or threatened species, the Fish and Wildlife Service encourages close consultation to insure the protection of those species. The Commission should monitor the Federal Register for current listing or delisting of endangered or threatened species and the designation of critical habitat. The Commission should also consult with the Fish and Wildlife Service, Office of Endangered Species, Washington, D. C., on the status of species which are being reviewed for listing as endangered or threatened species or whose critical habitat is being evaluated for designation.

Outdoor Recreation

We recommend that an analysis of any impacts upon the recreation areas within a 10-mile radius of the project site be included in the statement along with a map depicting those areas.

We hope these comments will be helpful to you.

Sincerely,

Heather L. Ross

Deputy Assistant SECRETARY

1561 193

Altamaha Georgia Southern

Altamaha Georgia Southern

Area Planning & Development Commission

HEADQUARTERS:
P. O. BOX 376
503 WEST PARKER ST.
BAXLEY, GA. 31513
PHONE 912 367 3648

BRANCH OFFICE
P. O. BOX 477
CITY HALL
STATESBORO, GA. 30458
PHONE 912 764-6234

Baxley, Georgia
June 13, 1977

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Knighton:

The Altamaha Georgia Southern Area Planning and Development Commission has reviewed the Nuclear Regulatory Commission's Draft Environmental Statement for the Edwin I. Hatch Plant, Unit 2 of the Georgia Power Company, NUREG Docket No. 50-366.

Sophisticated methods of analysis and evaluation of this statement were not considered at the local level. However, it has been generally determined that the proposed action, subject to the conditions for the protection of the environment listed in sections 5, 6, and 7 of the report, is in accord with regional and local plans, programs and objectives as of this date.

The Altamaha Georgia Southern APDC also made this document available to the general public and to city and county officials in the area. No adverse comments have been made known.

If we may be of any further assistance, please let us know.

Sincerely,

Ralford G. Morgan
Environmental Specialist

RGM:ss

771710072

MEMBER COUNTIES

Appling County Chamber of Commerce

APPLING COUNTY CHAMBER OF COMMERCE

PART IN GEORGIA WITH NUCLEAR POWER
P.O. BOX 413 - BAXLEY, GEORGIA 31513 - PHONE (912) 367-7751

June 13, 1977

Mr. George W. Knighton
Environmental Projects, Branch No. 1
Division of Site Safety and Environmental Analysis
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

The Appling County Chamber of Commerce, as requested by you, has reviewed the Nuclear Regulatory Commissions Draft Environmental Statement for the Edwin I. Hatch Plant, Unit 2 of the Georgia Power Compnay, NUREG Docket No. 50-366.

We feel that the facility will be compatible with the environment in this area and we offer no adverse statement nor requests for modification. We feel this plant will offer the cleanest and safest method for the generation of electricity.

We appreciate the opportunity for making comments on this Draft Environmental Statement and respectfully request that you proceed with the issuance of an operation license for the startup and operation of Unit 2.

If we can be of further assistance, please contact me.

Sincerely,

Ed Sale

Ed Sale
President

ES:ss

771740177

State Clearinghouse
Office of Planning and Budget

Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Site Safety and
Environmental Analysis
Nuclear Regulatory Commission
Washington, D.C. 20555

FROM: STATE CLEARINGHOUSE
OFFICE OF PLANNING AND BUDGET
INTERGOVERNMENTAL RELATIONS DIVISION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334

DATE: May 3, 1977

SUBJECT: RECEIPT NEGATIVE DECLARATION/ENVIRONMENTAL ASSESSMENT OR DRAFT/FINAL ENVIRONMENTAL IMPACT STATEMENT

APPLICANT: Nuclear Regulatory Commission

PROJECT: Draft EIS - Edwin I Hatch - Unit 2 - Appling County

STATE CLEARINGHOUSE CONTROL NUMBER: 77-05-03-03

OFFICE OF PLANNING AND BUDGET CONTACT: C. Badger/S. Williams

The environmental information for the above project was received by the State Clearinghouse on May 3, 1977.

The State-level review on this project has been initiated and every effort is being made to insure prompt action. The document will be carefully evaluated relative to its consistency with State economic, social, physical goals, policies, plans, objectives and programs. You may expect to be informed by the State Clearinghouse of the results of the initial review by June 20, 1977.

In future correspondance regarding this document, please include the State Clearinghouse Control Number shown above. If you have any questions concerning this project, please call us at (404) 656-3855 or (404) 656-3829.

FORM SC-EIS-1
July 1975

Office of Planning and Budget
State Clearinghouse

Office of Planning and Budget
Executive Department

James T. McIntyre, Jr.
Director

GEORGIA STATE CLEARINGHOUSE MEMORANDUM

TO: Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

JUL 3 1977

FROM: Charles H. Badger, Administrator
Georgia State Clearinghouse
Office of Planning and Budget

DATE: June 30, 1977

SUBJECT: RESULTS OF STATE-LEVEL REVIEW

Applicant: NUREG-0257 Draft EIS

Project: Edwin I Hatch - Unit 2

State Clearinghouse Control Number: 77-05-03-03

The State-level review of the above-referenced document has been completed. As a result of the environmental review process, the activity this document was prepared for has been found to be consistent with those State social, economic, physical goals, policies, plans, and programs with which the State is concerned.

Additional Comments: None

The following State Agencies have been offered the opportunity to review and comment on this project:

Bureau of Industry and Trade
Bureau of Community Affairs
Department of Human Resources
Department of Natural Resources
State Soil & Water Conservation Committee
Office of Planning and Budget, Executive Dept.

CHB:dk
cc: Ray Siewert, DNR
Bruce Osborn, OPB

270 Washington St., S. W. - Atlanta, Georgia 30334

SC-EIS-4
July 1975

GEORGIA POWER COMPANY

W. E. EHRENSPERGER
SENIOR VICE PRESIDENT
POWER SUPPLY

270 PEACHTREE STREET

P. O. BOX 4545
ATLANTA, GA 30302

ATLANTA

June 17, 1977

U. S. Nuclear Regulatory Commission
Division of Site Safety and Environmental Analysis
ATTN: Mr. George W. Knighton, Chief
Environmental Projects Branch 1
Washington, D. C. 20555

NRC DOCKET 50-366
CONSTRUCTION PERMIT CPPR-90
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
REVIEW OF DRAFT ENVIRONMENTAL STATEMENT

Gentlemen:

Georgia Power Company herewith submits its comments (see attachment) on the Draft Environmental Statement related to the operation of Edwin I. Hatch Nuclear Plant Unit 2. In accordance with instructions from Mr. Clifford Haupt, we have enclosed ten (10) additional copies of these comments for staff review.

Yours very truly,

W. E. Ehrensperger

W. E. Ehrensperger

CLS/PCB/eh

Attachment

xc: Mr. I. S. Mitchell, III
Mr. R. A. Thomas
George F. Trowbridge, Esquire

77175

Attachment

Comments on Hatch DES

SUMMARY AND CONCLUSIONS

1. Page iii, item 3. As of February 1977, construction of Hatch Unit 2 was 80 percent complete, not 70 percent as indicated.

2. Page v, item 6.b.(3). Any requirement that a monitoring program be conducted for corrosion products should be imposed by the State of Georgia's Environmental Protection Division through the terms of the Hatch NPDES permit.

3. Page v, item 6.b.(4). According to the "Second Memorandum of Understanding Regarding Implementation of Certain NRC and EPA Responsibilities," review by the State of Georgia of the effects of non-radiological liquid discharges from the Hatch Nuclear Plant and subsequent requirements and limitations imposed by the terms of the Hatch NPDES permit are not to be superceded by NRC requirements. Item 3 of Appendix A to the "Second Memorandum of Understanding" specifically states that "different limitations or requirements (from those imposed pursuant to the FWPCA) will not be imposed by NRC pursuant to NEPA as a condition to any permit or license...."

The Hatch NPDES permit specifically requires that GPC conduct a biological survey (NPDES Permit No. GA0004120, Part I B.2) and a 316(b) demonstration (NPDES Permit No. GA0004120, Part I B.4). GPC has submitted for State approval study plans, as required by the NPDES permit, for both the biological survey and the 316(b) demonstration. Upon approval of these plans by the Georgia Environmental Protection Division, GPC will submit Amendment No. 2 to the EROL. This amendment will revise the aquatic biological monitoring programs for Hatch Unit 2, as discussed in the EROL, so as to conform to the requirements of the Hatch NPDES permit, specifically the biological survey and the 316(b) demonstration. Thus, the amended EROL will include only the aquatic biological monitoring programs required by the Hatch NPDES permit.

GPC firmly believes that monitoring data collected since the EROL was submitted two years ago demonstrate the insignificant effects of Unit 1 operation on the aquatic biota in the Altamaha River. The NRC staff's analysis presented in the Hatch Unit 2 DES found the additional effects due to Unit 2 operation to be as follows:

A. Impingement. "Even a tenfold increase (in fish losses due to impingement), an extremely conservative estimate, would not significantly affect the...fish populations in the Altamaha River." (DES, Section 5.4.2.1.)

B. Entrainment.

(1) Phytoplankton. "The regenerative ability (of phytoplankton) would rapidly offset...losses" even during extreme low flow conditions. (DES, Section 5.4.2.1.)

(2) Periphyton. "(Periphyton) losses will be insignificant." (DES, Section 5.4.2.1.)

(3) Macroinvertebrate drift. The mortality rate expected to result from two-unit operation is "insignificant." (DES, Section 5.4.2.1.)

(4) Fish eggs and larvae. There should be "no significant reduction in the ichthyoplankton populations." Losses to the shad population due to entrainment of eggs and larvae will be "insignificant even during the historic average low flow...." (DES, Section5.4.2.1.)

Thus, GPC asserts that compliance with NPDES permit requirements imposed pursuant to statutory authority delegated by EPA to the State of Georgia will assure adequate protection of the aquatic biota inhabiting the Altamaha River. Furthermore, data collected during the operation of Unit 1 and the staff's analysis presented in the DES indicate that the extensive monitoring requirements proposed in the DES are unnecessary.

SECTION 1

1. Page 1-1, Section 1.1. As of February 1977, construction of Hatch Unit 2 was 80 percent complete, not 70 percent as stated.

2. No mention is made of the ownership interests of OEMC and MEAG in Hatch Unit 2.

SECTION 2

1. Pages 2-13, 14, 15, 16 and 19 contain various misspellings of species names. These misspellings have been brought to the attention of Mr. Clifford Haupt.

2. Page 2-14. The personal communication with Dr. W. R. Woodall (reference 19) mentioned in paragraph five can be replaced by referencing the paper "Invasion of the Asiatic Clam in the Altamaha River, Georgia," a copy of which has been provided recently to the NRC staff.

3. Page 2-19, paragraph 2. Hawkinsville is 252 miles from the mouth of the Altamaha River, not 300 miles as stated.

SECTION 3

1. Page 3-1, Section 3.2.1. The figure 22,600 gpm given in paragraph one as the average withdrawal rate should be changed to 22,550 gpm.

2. Page 3-3, Figure 3.2-1. "River Damage Structure" should be changed to "River Discharge Structure."

3. Page 3-4, Section 3.2.3.1. The liquid radwaste system for Units 1 and 2 is not a shared system, except for laundry and "hot" shower wastes.

4. Pages 3-5 and 3-7. The titles for Figures 3.2-2 and 3.2-3 are reversed. Furthermore, Figure 3.2-2 should be titled "Gaseous Radwaste System for Hatch Nuclear Plant, Unit No. 2," not "...Unit Nos. 1 and 2."

5. Page 3-5, Figure 3.2-2. The four building ventilation systems should be corrected as follows:

   A. Reactor Building Refueling Floor. The flow rate for the two filter/adsorber paths should be 15,000 cfm each (or a total of 30,000 cfm), not 30,000 cfm each as indicated.

   B. Reactor Building Zone Control. Only one filter/adsorber path with a 6500 cfm flow rate should be shown, not two paths.

   C. Radwaste Building. Each of the two filter/adsorber paths has a flow rate of 12,000 cfm, not 24,000 cfm each as indicated.

   D. Turbine Building. Each of the two filter/adsorber paths has a flow rate of 12,500 cfm, not 25,000 cfm each as indicated.

6. Page 3-6, Section 3.2.3.2. The turbine building ventilation air exhaust is treated by two 12,500 cfm filter trains, not by "one of two 25,000 cfm filter trains."

7. Page 3-6, Section 3.2.3.3. The EROL gives the estimated quantity of wet solid wastes as 20,000 cubic feet, not 10,000 cubic feet.

8. Page 3-8, Table 3.2-1. The reactor power level should be 2537 MWt, not 2570 MWt. Also, the system flow rate should be $1.05 \times \underline{10}^7$ lb/hr., not $1.05 \times \underline{10}^5$ lb/hr.

SECTION 5

1. Page 5-2, Section 5.2.2. The staff's recommendation that erosion along transmission line rights-of-way be reported should be limited to a period of 4 years. Also, the recommendation does not state to whom this report should be transmitted.

2. Page 5-2, Section 5.3.1.1. HNP has been issued an NPDES permit which defines a 500-foot mixing zone.

3. Pages 5-4 and 5-5, paragraph 423.12(f). The staff recommends that chemical cleanup wastes either be routed through the radwaste system or be disposed of offsite. Routing chemical cleanup wastes through the radwaste system would result in fouling of the system's demineralizers and unnecessarily troublesome and expensive changes of the demineralizer resins. Therefore, GPC feels that only the offsite disposal option should be recommended.

4. Page 5-5, paragraph 423.13(i). If later operating experience demonstrates the need for corrosion (not "erosion") inhibitors, any conditions or stipulations associated with the use of corrosion inhibitors would be imposed on GPC through limitations specified in the Hatch NPDES permit. Thus, environmental review should be conducted by the State of Georgia's Environmental Protection Division, not by the NRC.

5. Page 5-5, paragraph 423.13(l). The staff believes that, based on determination of the Langelier Index, there will be a strong tendency for corrosion. This belief is based on an apparent misunderstanding of the Langelier Index's relation to operation of the cooling towers. As stated in the EROL, the cooling towers will be operated at between 2 and 5 cycles of concentration. Within this range, the cycles of concentration will be controlled, or adjusted, so as to maintain a favorable Langelier Index, minimizing the potential for scaling or corrosion of the condenser. Furthermore, if corrosion were to occur, environmental review and appropriate corrective actions would be imposed by the State of Georgia through the terms of the Hatch NPDES permit. (See comment no. 4 above.)

6. Page 5-6, Section 5.3.5. Any program for the use of corrosion inhibitors would be subject only to limitations and conditions imposed by the State of Georgia through the terms of the Hatch NPDES permit. (See previous comment nos. 4 and 5 above.)

7. Page 5-7, Section 5.4.1. The use of aerial photography as a "long-term check on drift effects" should be subject to a definite time limitation. GPC suggests that such a program of aerial photography be limited to 4 years.

8. Page 5-8, Table 5.4-1. The majority of percentage figures given in this table should be corrected as follows:

River Flow	Percent Flow Entrained By Operation of Unit No. 2	Percent Flow Entrained By Operation of Both Units
Calculated minimum	5.5%	11.8%
Observed minimum	4.2%	8.9%
Average flow	.38%	.82%
Maximum flood	.028%	.06%

The entrainment flow for both units cannot be estimated simply by doubling the Unit 2 intake rate because the intake rate for Unit 2 (50 cfs) is less than the rate for Unit 1 (56.8 cfs). Thus, the percent river flow entrained by both units was underestimated by 6.8 cfs in Table 5.4-1.

9. Page 5-11, Section 5.4.2.2. In paragraph three, the discharge pipes extend approximately 120 feet from the river bank, not 100 feet; and they are located 4 feet below the surface of the river, not 3 feet. The corrected 4-foot depth would then be consistent with paragraph one on page 3-4.

10. Page 5-22, Table 5.5-2. The maximum thyroid dose given in Table 5.5-2 (i.e., 2.45 mrem/yr at the "Nearest Garden/Meat Animals 1.2 mi SW") is not consistent with the dose value from radioiodine and particulates given in Table 5.5-7 (6.2 mrem/yr for Units 1 and 2) and Table 5.5-8 (3.1 mrem/yr for Unit 2 only).

11. Page 5-32, Table 5.5-9. There are no muskrats in the vicinity of HNP.

SECTION 6

1. Page 6-4, Section 6.3.2. The monitoring of changes in water quality should be subject only to the requirements of the Hatch NPDES permit.

2. Page 6-4, Section 6.3.3. GPC proposes to monitor at only two locations: the background well upstream from the site and the onsite subsurface drainage ditch. The two additional onsite wells mentioned were not included as a part of Unit 1 studies.

3. Page 6-5, Section 6.3.4. Monitoring for corrosion products should be required only if review by the State demonstrates that such monitoring requirements are necessary.

4. Page 6-5 through 6-9, Section 6.3.5. Aquatic biological monitoring requirements should be those specified in the State-approved biological survey and 316(b) demonstration required by the Hatch NPDES permit. (See comment no. 3 under SUMMARY AND CONCLUSIONS.)

5. Page 6-6, Table 6.3-1. The phrase "main channel" should be deleted from Station Descriptions because the location of the main channel meanders from north bank to south bank.

6. Page 6-9, Section 6.3.6. GPC believes that the record-keeping requirements of paragraph two should be limited to 4 years.

SECTION 8

1. Page 8-2, Figure 8.2-1. HNP is shown in the wrong county. It should be located in the county directly below its present incorrect position.

SECTION 9

1. Page 9-1, Section 9.4. Unit 2 is designed to operate for 40 years, not 30 years as stated.

SECTION 10

1. Page 10-4, Table 10.4-1. The magnitude of impact given for items 2.5.1 and 2.5.2 should be 2.3 and 3.1 mrem/yr, respectively. The values presently listed in this table (5 and 15 mrem/yr) are dose limits, not the calculated values given in Table 5.5-8.

APPENDIX B

FINAL ENVIRONMENTAL STATEMENT

for the

Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2

Docket Nos. 50-321 and 50-366

October 1972

(See NUREG-0257 published April 1977)

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APPENDIX C

U.S. EPA STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

EFFLUENT GUIDELINES AND STANDARDS

§ 423.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) The pH of all discharges, except once through cooling water, shall be within the range of 6.0–9.0.

(b) There shall be no discharge of polychlorinated biphenol compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(d) The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the concentration listed in the following table and dividing the product by 12.5:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(e) The quantity of pollutants discharged in fly ash sluicing shall not exceed the quantity determined by multiplying the flow of fly ash transport water times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.

(f) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(g) The quantity of pollutants discharged in boiler blowdown shall not exceed the quantity determined by multiplying the flow of boiler blowdown times the concentration listed in the following table:

Effluent characteristic	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
TSS	100 mg/l	30 mg/l.
Oil and Grease	20 mg/l	15 mg/l.
Copper, Total	1.0 mg/l	1.0 mg/l.
Iron, Total	1.0 mg/l	1.0 mg/l.

(h) The quantity of pollutants discharged in once through condenser water shall not exceed the quantity determined by multiplying the flow of once through condenser water sources times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine	0.5 mg/l	0.2 mg/l.

(i) The quantity of pollutants discharged from cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table:

Effluent Characteristic	Maximum Concentration	Average Concentration
Free available chlorine	0.5 mg/l	0.2 mg/l.

	Maximum for any one day	Average of daily values for thirty consecutive days shall not exceed
Zinc	1.0 mg/l	1.0 mg/l.
Chromium	0.2 mg/l	0.2 mg/l.
Phosphorous	5.0 mg/l	5.0 mg/l.
Other corrosion inhibiting materials	Limit to be established on a case by case basis.	

(j) Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the regional administrator or state, if the state has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level of chlorination.

(k) In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property controlled in paragraphs (a) through (j) of this section attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

(l) There shall be no discharge of heat from the main condensers except:

(1) Heat may be discharged in blowdown from recirculated cooling water systems provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculating cooling water prior to the addition of the make-up water.

(2) Heat may be discharged in blowdown from recirculated cooling water systems which have been designed to discharge blowdown water at a temperature above the lowest temperature of recirculated cooling water prior to the addition of make-up water providing such recirculating cooling systems have been placed in operation or are under construction prior to the effective date of this regulation.

(3) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that a cooling pond or cooling lake is used or is under construction as of the effective date of this regulation to cool recirculated cooling water before it is recirculated to the main condensers.

(4) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that sufficient land for the construction and operation of mechanical draft evaporative cooling towers is not available (after consideration of alternate land use assignments) on the premises or on adjoining property under the ownership or control of the owner or operator as of March 4, 1974, and that no alternate recirculating cooling system is practicable.

(5) Heat may be discharged where the owner or operator of a unit otherwise subject to this limitation can demonstrate that the total dissolved solids concentration in blowdown exceeds 30,000 mg/l and land not owned or controlled by the owner or operator as of March 4, 1974, is located within 150 meters (500 feet) in the prevailing downwind direction of every practicable location for mechanical draft cooling towers and that no alternate recirculating cooling system is practicable.

(6) Heat may be discharged where the owner or operator of a unit otherwis subject to this limitation can demon strate to the regional administrator o State, if the State has NPDES permi issuing authority, that the plume whicl must necessarily emit from a cooling tower would cause a substantial hazard to commercial aviation and that no alternate recirculated cooling water system is practicable. In making such demonstration to the regional administrator or State the owner or operator of such unit must include a finding by the Federal Aviation Administration that the visible plume emitted from a well-operated cooling tower would in fact cause a substantial hazard to commerical aviation in the vicinity of a major commercial airport.

(m) The limitation of paragraph (l) of this section shall become effective on July 1, 1981.

(n) In the event that a regional reliability council, or when no functioning regional reliability council exists, a major utility or consortium of utilities, can demonstrate to the regional administrator or State, if the State has NPDES permit issuing authority, that the system reliability would be seriously impacted by complying with the effective date set forth in paragraph (m) above, the regional administrator may accept an alternative proposed schedule of compliance on the part of all the utilities concerned providing, however, that such schedule of compliance will require that units representing not less than 50 percent of the affected generating capacity shall meet the compliance date, that units representing not less than an additional 30 percent of the generating capacity shall comply not later than July 1, 1983 and the balance of units shall comply not later than July 1, 1983.

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Source: Federal Register, October 8, 1974 (39 FR 36200-36201).

APPENDIX D

NEPA POPULATION DOSE ASSESSMENT

Population dose commitments are calculated for all individuals living within 50 miles of the facility employing the same models used for individual doses (see Draft Regulatory Guide 1.109). In addition, population doses associated with the export of food crops produced with the 50-mile region and the atmospheric and hydrospheric transport of the more mobile effluent species such as noble gases, tritium, and carbon-14 have been considered.

D-1 Noble Gas Effluents

For locations within 50 miles of the reactor facility, exposure to these effluents are calculated using the atmospheric dispersion models in Draft Regulatory Guide 1.111 and the dose models described in Section 5.1 and Draft Regulatory Guide 1.109. Beyond 50 miles, and until the effluent reaches the northeastern corner of the United States, it is assumed that all the noble gases are dispersed uniformly in the lowest 1,000 meters of the atmosphere. Decay in transit was also considered. Beyond this point, noble gases having a half-life greater than one (e.g., Kr-85) were assumed to completely mix in the troposphere of the world with no removal mechanisms operating. Transfer of tropospheric air between the northern and southern hemispheres, although inhibited by wind patterns in the equatorial region, is considered to yield a hemisphere average tropospheric residence time of about two years with respect to hemispheric mixing. Since this time constant is quite short with respect to the expected mid-point of plant life (15 yrs), mixing in both hemispheres can be assumed for evaluations over the life of the nuclear facility. This additional population dose commitment to the U.S. population was also evaluated.

D-2 Iodines and Particulates Released to the Atmosphere

Effluent nuclides in this category deposit onto the ground as the effluent moves downwind, which continuously reduces the concentration remaining in the plume. Within 50 miles of the facility, the deposition model in Draft Regulatory Guide 1.111 was used in conjunction with the dose models in Draft Regulatory Guide 1.109. Site specific data concerning production, transport and consumption of foods within 50 miles of the reactor were used. Beyond 50 miles, the deposition model was extended until no effluent remained in the plume. Excess food not consumed within the 50-mile distance was accounted for, and additional food production and consumption representative of the eastern half of the country was assumed. Doses obtained in this manner were then assumed to be received by the number of individuals living within the direction sector and distance described above. The population density in this sector is taken to be representative of the Eastern United States, which is about 160 people per square mile.

D-3 Carbon-14 and Tritium Released to the Atmosphere

Carbon-14 and tritium were assumed to disperse without deposition in the same manner as krypton-85 over land. However, they do interact with the oceans. This causes the carbon-14 to be removed with an atmospheric residence time of 4 to 6 years with the oceans being a major sink. From this, the equilibrium ratio of the carbon-14 to natural carbon in the atmosphere was determined. This same ratio was then assumed to exist in man so that the dose received by the entire population of the U.S. could be estimated. Tritium was assumed to mix uniformly in the world's hydrosphere, which was assumed to include all the water in the atmosphere and in the upper 70 meters of the oceans. With this model, the equilibrium ratio of tritium to hydrogen in the environment can be calculated. The same ratio was assumed to exist in man, and was used to calculate the population dose, in the same manner as with carbon-14.

D-4 Liquid Effluents

Concentrations of effluents in the receiving water within 50 miles of the facility were calculated in the same manner as described above for the Appendix I calculations. No depletion of the nuclides present in the receiving water by deposition on the bottom of the Altamaha River was assumed. It was also assumed that aquatic biota concentrate radioactivity in the same manner as was assumed for the Appendix I evaluation. However, food consumption values appropriate for the average individual, rather than the maximum, were used. It was assumed that all the sport and commercial fish and shell fish caught within the 50 mile area were eaten by the U.S. population.

Beyond 50 miles, it was assumed that all the liquid effluent nuclides except tritium have deposited on the sediments so they make no further contribution to population exposures. The tritium was assumed to mix uniformly in the world's hydrosphere and to result in an exposure to the U.S. population in the same manner as discussed for tritium in gaseous effluents.

APPENDIX E

REFERENCES AND EXPLANATION OF BENEFIT-COST
SUMMARY IN TABLE 10.4-1

Economic Impact of Plant Operation

Direct Benefits - Energy: 803 MWe x 8760 hr/yr x 0.69 Plant factor =
4.85×10^9 kWh/yr

Capacity: Refer to Section 10.2

Economic Costs - Fuel:

Operation and Maintenance: Refer to Section 10.3

Decommissioning:

Environmental Impact of Plant Operation

The index numbers used in this section correspond to those shown in Table 10.4-1.

1.1 - Water Consumption

1.1.1 People: Refer to Sections 2.3.1.1, 2.3.1.2 and 2.3.3

1.1.2 Property: 34,000 gpm - 22,600 gpm = 10,400 gpm consumption
= 16,773 acre ft/yr

1.2 - Thermal discharges to Altamaha River

1.2.1 Plant thermal discharge: Refer to Section 3.2.2

1.2.2 Aquatic biota: Refer to EROL, Section 5.1.3.1

1.3 - Chemical discharges to Altamaha River

1.3.1 People: Refer to FES-CP, p. V-4

1.3.2 Aquatic biota: Refer to Section 5.3.5

1.3.3 Chemical discharges and water quality: Refer to Sections 3.2.4, 5.3.2 and 5.3.5

1.4 - Radionuclide discharges to Altamaha River

Refer to Section 3.2.3.4

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1.5 - Changes in groundwater level

Refer to Section 5.3.7

1.6 - Chemical discharges to groundwater

Refer to FES-CP, p. V-4

1.7 - Radionuclide discharges to groundwater

Refer to FES-CP, p. V-4

1.8 - Biological effects from cooling system & intake/discharge structures

Refer to Section 5.1.3 of EROL, pp V-5 to V-10 of FES-CP

1.9 - Natural water drainage

1.9.1 Flood control: Refer to FES-CP, p. II-12

1.9.2 Erosion control: Refer to FES-CP, pp. IV-1 and IV-4

2.1 - Chemical discharges to ambient air

2.1.1 Air quality: Refer to EROL, p. 3.7-1, FES-CP, p. VII-2

2.2 - Salts discharged from cooling towers

2.2.1 People: Refer to EROL, p. 5.1-6, FES-CP, pp. V-1, V-3, V-5, VII-2

2.2.2 Plants: Refer to EROL, p. 5.1-6, FES-CP, pp V-3, V-5, V-6

2.2.3 Property: Refer to EROL, p. 5.1-6, FES-CP, pp V-3

2.3 - Noise from cooling towers

Refer to FES-CP, p. V-5

2.4 - Fogging and icing

2.4.1 Ground transportation: Refer to FES-CP, p. V-3 & EROL, p. 5.1-4

2.4.2 Air transportation: Refer to FES-CP, p. V-3 & EROL, p. 5.1-4

2.4.3 Water transportation: Refer to EROL, p. 5.1-4

2.4.4 Plants: Refer to EROL, p. 5.1-4

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2.5 - Calculated maximum individual dose from gaseous radioactive effluents

2.5.1 Noble gas effluents: Refer to Table 5.5-8

2.5.2 Radioiodine and particulates: Refer to Table 5.5-8

3 - Total body doses to U.S. population

Refer to Table 5.5-3

Societal Costs

1 - Operational fuel disposition

1.1 Fuel transport (new): Refer to FES-CP, p. V-25, V-27 & EROL, Section 3.8

1.2 Fuel storage: Refer to EROL, Section 3.8

1.3 Fuel transport (spent) & waste products: Refer to FES-CP, p. V-25 to V-29 and EROL, Section 3.8

1.4 Fuel cycle: Refer to Table 5.5-10

2 - Plant labor force

Refer to Section 10.2 and FES-CP, p. IV-4

3 - Historical and archaeological sites

Refer to FES-CP, p. II-7, II-12

4 - Aesthetics

Refer to FES-CP, p. III-1

Department of Natural Resources
ENVIRONMENTAL PROTECTION DIVISION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334

JOE D. TANNER
Commissioner

J. LEONARD LEDBETTER
Division Director

June 21, 1977

Mr. Voss A. Moore
Assistant Director-Environmental Projects
Division of Site Safety & Environmental Analysis
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington, D.C. 20555

Re: NPDES Permit No. Ga 0004120
Georgia Power Company
Plant Edwin I. Hatch
Docket Nos. 50-321 & 50-366

Dear Mr. Moore:

This will acknowledge receipt of your June 15, 1977, letter enclosing comments on the draft NPDES permit for the above plant. Unfortunately your comments did not arrive before conclusion of the public notice period and issuance of the final permit and therefore could not be considered in formulating final permit conditions.

Enclosed for your information and reference is a copy of the final permit as issued to the Georgia Power Company. In reviewing the N.R.C. staff comments on the draft NPDES permit we would respond in the same order as follows:

1. The limit of 0.2 mg/l free available chlorine has been made applicable to the average over a given chlorination period and not the monthly average as stated in the draft. The frequency of sampling has been changed from a single grab sample to multiple grab samples during periods of chlorination. Both these changes are reflected on page 3 of 19 in the permit.

2. As referenced, the Rules and Regulations for Water Quality Control, revised June 1974, in Chapter 391-3-6-.03(6)(c)6. include the prohibition of any toxic waste "... in concentrations that would harm man, fish and game, or other beneficial aquatic life". It should also be noted that the Rules and Regulations in Chapter 391-3-6-.03(9) stipulates that specific criteria apply to all stream flows equal to or exceeding 7-day, 10-year minimum flow on unregulated streams. The Altamaha River in the vicinity of the Georgia Power Company, Hatch Plant, would be considered unregulated. The dilution factor for the station discharge, at the 7-day, 10-year low flow, would be about 38.5. This is without considering the effects of the chlorine demand in the receiving stream and any unchlorinated river water used for diluting the station discharge prior to return to the river. Considering the various EPA recommended criteria for evaluating toxicity levels of total residual chlorine in receiving streams, one can arrive at varying values for maximum total residual chlorine that should be permitted in the station discharge. The latest criterion recommended by EPA is contained in their document entitled, "Quality Criteria for Water" which recommended a total residual chlorine level of 10.0 micrograms per liter for fresh water and marine organisms. The 1975 annual environmental surveillance report for Hatch Nuclear Plant, Unit 1, in Chapter 7 described the results of the Company's chlorination practices with the minimum, maximum, and average total chlorine residuals discharged to the Altamaha River for 1975. The average total chlorine residual reported was less than 0.1 milligrams per liter with a single maximum instance lasting for approximately 20 minutes of 0.65 milligrams per liter. If this had occurred simultaneously with the 7-day, 10-year low flow occurrence, the resultant total residual chlorine concentration in the receiving stream would still have been within the order of magnitude of the recommended criteria. It is not anticipated that the Hatch Nuclear Plant station discharge will contain sufficient residual chlorine to result in receiving stream concentrations exceeding this criteria.

3. We will look forward to reviewing and commenting upon the unified technical specifications for both Unit 1 and Unit 2 to determine consistency with any proposed or previously approved 316(b) study submitted by the permittee in compliance with requirements on page 11 of 19 of the permit.

If you have any further questions or comments, please do not hesitate to contact us.

Sincerely,

Gene B. Welsh, Chief
Water Protection Branch

GBW:mg
Enclosures

1561 207

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Georgia Power Company
Plant Hatch

Chlorine Dilution Factor

Q_R = 7 Q 10 of Altamaha before station withdrawal

Q_{SW} = station withdrawal flow

Q_{SR} = station return flow

Cl_R = total residual chlorine in Altamaha River upstream of station

Cl_{SR} = total residual chlorne in station return flow

Cl_{TLR} = Toxic limitation in mixed stream for total residual chlorine.

$$Cl_{TLR} = \frac{(Q_R - Q_{SW})(Cl_R) + (Q_{SR})(Cl_{SR})}{(Q_R - Q_{SW} + Q_{SR})}$$

Set Cl_R = O - No sources of chlorination exist upstream capable of producing a detectable residual.

Q_R = 2,050 cfs extrapolated value for station site based on upstream and downstream gages.

Q_{SW} = 100 cfs based on 45,000 gpm withdrawal rate stated in EIS

Q_{SR} = 52 cfs based on 23,200 gpm return rate stated in EIS

Then $$Cl_{TLR} = \frac{(52)\, Cl_{SR}}{(2002)}$$

$$Cl_{SR} = 38.5\, Cl_{TLR}$$

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PERMIT NO. GA 0004120

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Georgia Water Quality Control Act (Georgia Laws 1964, p. 416, as amended), hereinafter called the "State Act," the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.), hereinafter called the "Federal Act," and the Rules and Regulations promulgated pursuant to each of these Acts,

GEORGIA POWER COMPANY
Plant Hatch, Units 1 & 2
P. O. Box 4545, Atlanta, Georgia 30302

is authorized to discharge from a facility located at

Plant Hatch, Units 1 & 2, Appling County, Georgia

to receiving waters Altamaha River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on June 6, 1977.

This permit and the authorization to discharge shall expire at midnight, March 31, 1982.

Signed this 6th day of June, 1977.

J. Leonard Ledbetter
Director,
Environmental Protection Division

EPD 2.21-1

EPD 2.21-2-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

602 1951

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning effective date and lasting through June 30, 1977, the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(a) Low volume wastes (Wastewater from all sources except those for which specific limitations are otherwise required in this permit.)

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location *1
Flow-m^3/Day (MGD)	-	-	-	-	*2	*2	*2
Total suspended solids (mg/l)	-	-	50	150	2/month	Grab	Discharge line
Oil and grease (mg/l)	-	-	15	20	2/month	Grab	Discharge line

To the extent practicable, service water shall be utilized for cooling tower make-up and bypass of chlorinated service water minimized.

The pH shall not be less than 6.0 standard units nor greater than 11.0 standard units and shall be monitored twice per month by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Prior to mixing with any other waste streams.

*2 See Part III, Other Requirements, Item 10.

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EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(b) Cooling tower blowdown

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Avg.	Instantaneous Max.	Measurement Frequency	Sample Type	Sample Location
Flow-m^3/Day (MGD)	-	-	-	-	*4	*4	*4
Temperature (^oF)	-	-	-	90 or 5 above intake temp *1	1/week	In situ	*1
Free available chlorine (mg/l)	-	-	0.2 *5	0.5 *5	1/week	Multiple Grabs *2	*3

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored twice per month by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 The discharge temperature is the temperature recorded at a point approximately 500 feet downstream of the discharge pipe at the downstream limit of the defined mixing zone at a depth of 3 feet (See Attachment A). Temperature limitations do not apply during a cold shutdown. Temperature will also be monitored at plant intake. Measurements will be made between hours of 9:00 a.m. and 3:00 p.m.

*2 During periods of chlorination.

*3 Discharge from each cooling tower system prior to mixing with any other waste streams.

*4 See Part III, Other Requirements, Item 10.

*5 See Part III, Other Requirements, Item 4.

EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(c) Sewage treatment plant effluent

Effluent Characteristic	Discharge Limitations		Monitoring Requirements		
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location
BOD (mg/l)	30	45	2/year	Grab	Discharge line
Suspended solids (mg/l)	30	45	2/year	Grab	Discharge line
Fecal Coliform Bacterial (per 100 ml)	200	400	2/year	Grab	Discharge line

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored twice a year by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I
Page 4 of 19
Permit No. GA 0004120

EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(d) Liquid radwaste system

Effluent Characteristic	Discharge Limitations				Monitoring Requirements		
	kg/day (lbs/day)		Other Units (Specify)				
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location
Flow-m^3/Day (MGD)	-	-	-	-	-	-	-

Compliance with United State Nuclear Regulatory Commission (NRC) requirements applicable to this discharge will be deemed to constitute compliance with this permit relative to radwaste component of this waste stream. For other than the radwaste component this waste stream is considered to be part of the low volume wastes and shall meet the same limitations for total suspended solids, oil and grease and pH. Permittee will submit to EPD duplicate copies of the annual effluent release report and other such liquid effluent release reports as required in the Environmental Technical Specifications established by NRC. One set will be retained in the files of the Georgia EPD and the other will be forwarded to designated representatives in the U.S. Environmental Protection Agency, Region IV, office. Such reports may be submitted along with other monitoring reports required by the permit.

Part I
Page 5 of 19
Permit No. GA 0004120

EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(e) Combined plant waste streams

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Avg.	Instantaneous Max.	Measurement Frequency	Sample Type	Sample Location
Flow-m^3/Day (MGD)	-	-	-	-	*3	*3	*3
Temperature (^oF)	-	-	-	-	1/week	Grab	*1
Free available chlorine (mg/l)	-	-	-	-	1/week	Multiple grabs *2	*1
Total residual chlorine (mg/l)	-	-	-	-	1/week	Multiple grabs *2	*1

Discharge of all combined plant waste streams (a) through (d) through two 42-inch pipes to the Altamaha River is permitted with no limitations other than those shown for individual waste streams. Monitoring for additional parameters may be required upon written notification.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.

These shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Monitoring will be at the mixing chamber which is the last point before discharge to river after combining of all waste streams.

*2 During periods of chlorinated water discharge. Samplings should cover entire period from beginning to end of chlorinated water discharge.

*3 See Part III, Other Requirements, Item 10.

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EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

2. During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 003.

Such discharges shall be limited and monitored by the permittee as specified below:
(a) Intake strainer backwash

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location
Flow-m^3/Day (MGD)	-	-	-	-	-	-	-

Effluent limitations are not applicable to this discharge.

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Permit No. GA 0004120

EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

3. During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall serial number 002.

Such discharges shall be limited and monitored by the permittee as specified below:
(a) Intake screen backwash

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location
Flow-m^3/Day (MGD)	-	-	-	-	-	-	-

Effluent limitations are not applicable to this discharge.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

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EPD 2.21-3-1

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

4. During the period beginning July 1, 1977, and lasting through expiration the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:
(a) Low volume wastes (Wastewater from all sources except those for which specific limitations are otherwise required in this permit.)

Effluent Characteristic	Discharge Limitations kg/day (lbs/day		Other Units (Specify)		Monitoring Requirements		
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location *1
Flow-m^3/Day MGD	-	-	-	-	*2	*2	*2
Total suspended solids (mg/l)	*3	*3	30	100	2/month	Grab	Discharge line
Oil and grease (mg/l)	*3	*3	15	20	2/month	Grab	Discharge line

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored twice per month by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Prior to mixing with any other waste streams.

*2 See Part III, Other Requirements, Item 10.

*3 Limitations may be made applicable on mass basis once discharge flows are established.

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B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   Preliminary Engineering Report - 60 days after permit is issued

Start Construction	-	Dates to be provided 30 days after
Report on Construction	-	Preliminary Engineering Report is
Achieve Operational Level	-	approved but in no event is Achieve Operational Level to exceed July 1, 1977.

2. In order to document that the mixing zone will not create an objectionable or damaging pollution condition, a biological survey should be completed at: (1) a station upstream of the discharge, (2) a station in the mixing zone and (3) a station at the downstream edge of the mixing zone.

   The study will be completed in accordance with the following schedule:

   (i) A proposed plan and schedule for completing the study will be submitted to the Georgia Environmental Protection Division by September 1, 1977.

   (ii) The Georgia Environmental Protection Division will provide concurrence or submit comments and objections to the proposed plan by November 1, 1977.

   (iii) The Georgia Power Company will initiate work on the study not later than six (6) months following the commercial operation date for Unit 2.

   (iv) The Georgia Environmental Protection Division will review and comment on the study data within 60 days after it is submitted.

   If the study data shows that the delineated mixing zone will not create an objectionable or damaging pollution condition there will be no change in the permit; however, if in the opinion of the Director of the Georgia Environmental Protection Division the study shows that the delineated mixing zone will create an objectionable or damaging pollution condition, the permit will be revoked and reissued.

3. The Georgia Power Company will also initiate work on a study to field verify and/or fine tune their thermal plume predictive model not later than six (6) months following the commercial operation date for Unit 2. A summary report on the results with any modifications to the model will be submitted to the Georgia Environmental Protection Division not later than 15 months after initiation of the study.

4. (i) Within 90 days after the promulgation of the 316(b) guidelines, or not later than six (6) months prior to anticipated commercial operation date of Unit 2, whichever occurs first, a proposed 316(b) demonstration plan of study and completion schedule will be submitted to the Environmental Protection Division.

   (ii) The Georgia Environmental Protection Division will provide concurrence or submit comments and objections to the proposed plan within 60 days of receipt.

   (iii) The Georgia Power Company will initiate work on the study not later than six (6) months following the commercial operation date for Unit 2.

5. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

Note: EPD as used herein means the Division of Environmental Protection of the Department of Natural Resources.

C. MONITORING AND REPORTING

1. *Representative Sampling*

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. *Reporting*

Monitoring results obtained during the previous months shall be summarized for each month and reported on an Operation Monitoring Report (Form WQ 1.45), postmarked no later than the 15th day of the month following the completed reporting period. The first report is due on October 15, 1977 . The EPD may require reporting of additional monitoring results by written notification. Signed copies of these, and all other reports required herein, shall be submitted to the following address:

Georgia Environmental Protection Division
Water Quality Control Section
270 Washington Street, SW
Atlanta, Georgia 30334

3. *Definitions*

a. The "daily average" discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges by weight divided by the number of days sampled during the calendar month when the measurements were made.

b. The "daily maximum" discharge means the total discharge by weight during any calendar day.

c. The "daily average" concentration means the arithmetic average (weighted by flow value) of all the daily determinations of concentration made during a calendar month. Daily determinations of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average (weighted by flow value) of all the sample collected during that calendar day.

d. The "daily maximum" concentration means the daily determination of concentration for any calendar day.

e. "Weighted by flow value" means the summation of each sample concentration times its respective flow in convenient units divided by the sum of the respective flows.

f. For the purpose of this permit, a calendar day is defined as any consecutive 24-hour period.

4. *Test Procedures*

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(g) of the Federal Act.

5. *Recording of Results*

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. *Additional Monitoring by Permittee*

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased monitoring frequency shall also be indicated. The EPD may require more frequent monitoring or the monitoring of other pollutants not required in this permit by written notification.

7. *Records Retention*

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained by the permittee for a minimum of three (3) years, or longer if requested by the State Environmental Protection Division.

A. MANAGEMENT REQUIREMENTS

1. *Change in Discharge*

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges or pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the EPD of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. *Noncompliance Notification*

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Water Quality Control Section of EPD with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. *Facilities Operation*

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. *Adverse Impact*

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. *Bypassing*

Any diversion from or bypass of facilities covered by this permit is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage, runoff, or infiltration would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. The permittee shall operate the treatment works, including the treatment plant and total sewer system, to minimize discharge of the pollutants listed in Part I of this permit from combined sewer overflows or bypasses. The permittee shall monitor all overflows and bypasses in the sewer and treatment system. A record of each overflow and bypass shall be kept with information on the location, cause, duration, and peak flow rate. Upon written notification by EPD, the permittee may be required to submit a plan and schedule for reducing bypasses, overflows, and infiltration in the system.

6. *Removed Substances*

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State.

7. *Power Failures*

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

b. Halt, reduce or otherwise control production and/or all discharges from wastewater control facilities upon the reduction, loss, or failure of the primary source of power to said wastewater control facilities.

B. RESPONSIBILITIES

1. *Right of Entry*

The permittee shall allow the Director of EPD, the Regional Administrator of EPA, and/or their authorized representatives, agents, or employees, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

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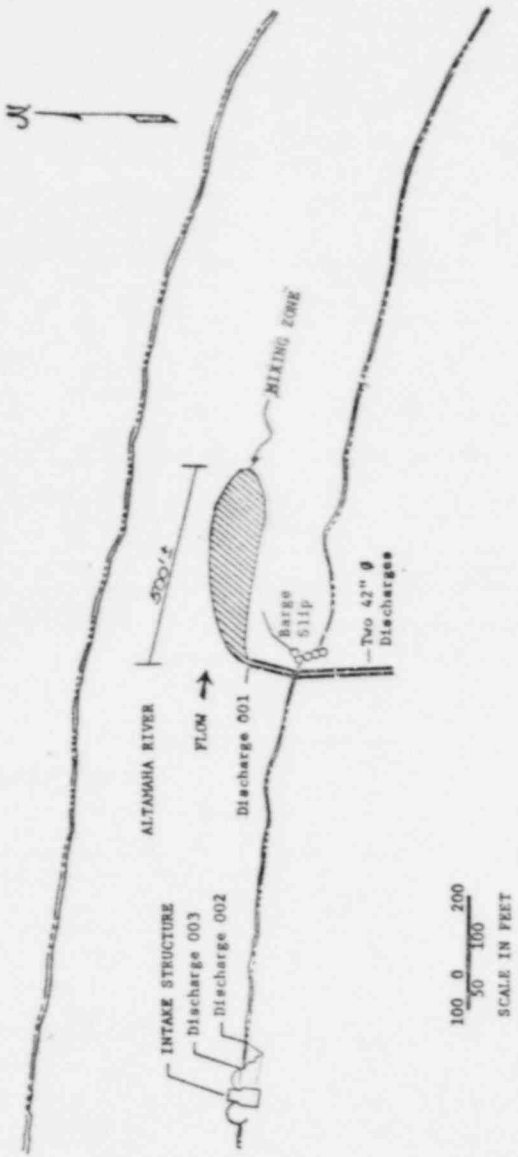
ATTACHMENT A
PLANT HATCH



b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. *Transfer of Ownership or Control*

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Water Quality Control Section of EPD.

3. *Availability of Reports*

Except for data determined by the Director of EPD to be confidential under Section 16 of the State Act or the Regional Administrator of the U.S. Environmental Protection Agency under Section 308 of the Federal Act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the Atlanta office of the EPD. Effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 22(b) of the State Act.

4. *Permit Modification*

After written notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

5. *Toxic Pollutants*

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Federal Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation on for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. *Civil and Criminal Liability*

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. *State Laws*

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Federal Act.

8. *Water Quality Standards*

Nothing in this permit shall be construed to preclude the modification of any condition of this permit when it is determined that the effluent limitations specified herein fail to achieve the applicable State water quality standards.

9. *Property Rights*

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. *Expiration of Permit*

Permittee shall not discharge after the expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information, forms, and fees as are required by the agency authorized to issue permits no later than 180 days prior to the expiration date.

11. *Contested Hearings*

Any person who is aggrieved or adversely affected by any action of the Director of EPD shall petition the Director for a hearing within thirty (30) days of notice of such action.

12. *Severability*

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

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OTHER REQUIREMENTS

1. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid. Administrative procedures shall be instituted to (1) maintain a detailed inventory of PCB use, (2) assure engineering design and construction to preclude release of PCB's to the environment, and (3) effectively detect the loss of PCB's from equipment. Detail of such procedures shall be submitted no later than 180 days prior to receipt of PCB containing equipment or if already on site, not later than 60 days after permit is issued.

2. Any metal cleaning wastes generated will be contained for further treatment or disposal in a manner to permit compliance at time of discharge with requirements listed below. This applies to any pre-operational chemical cleaning of metal process equipment also.

3. Effective July 1, 1977, the quantity of pollutants discharged in metal cleaning waste shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentrations listed below. The pH is to be in the range of 6.0-9.0 standard units.

Effluent Characteristic	Discharge Limitation (mg/l)	
	Daily Average	Daily Maximum
Total suspended solids	30	100
Oil and grease	15	20
Copper	1.0	1.0
Iron	1.0	1.0
Phosphorus*	-	1.0

* Applicable to pre-operational cleaning wastes only.

4. Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the State prior to July 1, 1978, that the units cannot operate at or below this level of chlorination.

5. The company shall notify the Director in writing not later than sixty (60) days prior to instituting use of any additional biocide or chemical used in cooling systems, other than chlorine, which may be toxic to aquatic life other than those previously reported to the Environmental Protection Division. Such notification shall include:

   (a) Name and general composition of biocide or chemical
   (b) Frequency of use
   (c) Quantities used
   (d) Proposed effluent concentrations
   (e) EPA registration number, if applicable.

6. In the event that waste streams from various sources are combined for treatment of discharge, the quantity of each pollutant or pollutant property controlled by this permit shall not exceed the specified limitations for that source.

7. If the permittee, after monitoring for at least six months, determines that he is consistently meeting the effluent limits contained herein, the permittee may request of the Director of the Georgia Environmental Protection Division that the monitoring requirements be reduced to a lesser frequency or be eliminated.

8. All effluent limitations mentioned herein shall be applied on a gross basis as of July 1 1977, unless the permittee can demonstrate prior to July 1, 1977, that such effluent limitations for any parameter should be applied on a net basis. However, credit for pollutants in intake water will not be given where these are in fact removed by the permittee either for process water purity reasons or as a consequence of treatment for pollutants which are, in fact, added by the permittee.

9. In addition to compliance with effluent limitations the company is to continue to evaluate applicable methods and available technology to reduce total residual chlorine levels. The company is to also continue to evaluate applicable methods and available technology to reduce discharge of blowdown from cooling towers within limits established by best engineering practices. The company is to provide an annual status report on its evaluations with the first report to be submitted on March 1, 1978.

10. Not later than June 1, 1977, a plan for determining the flow of the various waste streams will have been developed by the Georgia Power Company and submitted for review and approval by the Georgia Environmental Protection Division. The plan is to be implemented within 30 days of EPD's approval of the plan.

11. In the interim, pending promulgation by the Environmental Protection Agency of effluent guidelines for this waste category, construction practices and control of site runoff shall be consistent with sound engineering practices such as, but not restricted to, those contained in "Guidelines for Erosion and Sediment Control Planning and Implementation", EPA-R2-72-015 (August, 1972) or "Processes, Procedures and Methods to Control Pollution Resulting from all Construction Activity" EPA-430/9-73-007 (October, 1973). Becoming a co-operator with the Soil and Water Conservation District serving the local area and installing facilities and measures conforming to minimum design standards and specifications of the Soil Conservation Service would also be an acceptable approach. Within 90 days of repromulgation of applicable guidelines the practices being employed will be reevaluated by the permittee and a proposed implementation schedule for modification or construction of any necessary control facilities shall be submitted to the Georgia Environmental Protection Division.

PREVIOUS PERMITS

All previous State water quality permits issued to this facility, whether for construction or operation, are hereby revoked by the issuance of this permit. This action is taken to assure compliance with the Georgia Water Quality Control Act, as amended, and the Federal Water Pollution Control Act, as amended. Receipt of the permit constitutes notice of such action. The conditions, requirements, terms and provisions of this permit authorizing discharge under the National Pollutant Discharge Elimination system govern discharges from this facility.

APPENDIX G: STAFF COMMENTS ON DRAFT NPDES PERMIT FOR HATCH NUCLEAR PLANT, UNIT NOS. 1 AND 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Docket Nos. 50-321
and 50-366

Mr. Gene B. Welsh, Chief
Water Protection Branch
Department of Natural Resources
Environmental Protection Division
270 Washington Street, S. W.
Atlanta, Georgia 30334

Dear Mr. Welsh:

We have reviewed Public Notice No. 77-3 for the draft NPDES Permit in connection with the Georgia Power Company's Edwin I. Hatch Nuclear Plant, and offer the attached comments for your consideration.

Sincerely,

Voss A. Moore, Assistant Director
for Environmental Projects
Division of Site Safety and
Environmental Analysis
Office of Nuclear Reactor Regulation

Attachment:
Comments on NPDES Permit

NRC STAFF COMMENTS ON DRAFT NPDES PERMIT

1. Proposed Effluent Limitations, outfall serial number 001: Chlorine limitation in cooling tower blowdown.

   The treatment of chlorine in cooling tower blowdown (page 3 of 19) appears to be inconsistent with the NRC staff's understanding of EPA Region IV policy. The limit of 0.2 mg/l free available chlorine should be applied to the average over a given chlorination period and not the monthly average stated in the draft NPDES Permit. The proposed monitoring by single grab sample would not be adequate to determine average concentration during a chlorination period nor would it be adequate to assure that the unit does not discharge either total or free residual for more than two hours in any day (Other Requirements No. 4, page 18 of 19). Multiple grab samples are necessary for enforcement of these provisions.

2. Proposed Effluent Limitations, outfall serial number 001: Evaluation of total residual chlorine in combined waste stream.

   The permittee is to monitor total residual chlorine in the combined plant waste streams (page 6 of 19). The permit can be modified if necessary to assure compliance with State water quality standards (item 8, page 17 of 19). Applicable standards include the prohibition of any toxic waste in "concentrations that would harm man, fish and game or other beneficial aquatic life" (Rules of Georgia DNR, EPD,

391-3-6-.03 (6)(c)6.). The NRC staff would like to know whether measured values of total residual chlorine in the combined plant waste stream will be evaluated for compliance with the toxicity prohibition. If so, it may be appropriate to indicate the criterion which would be used for this evaluation.

When NRC prepared its statement for Hatch Unit 2 operation it was the feeling of the staff that the water quality standards should result in a more stringent limitation on chlorine concentration than the technology based limitations which appear in the draft permit.

3. Proposed Schedule of Compliance: Coordination of 316(b) Demonstration

On page 11 of 19 the permittee is required to submit a 316(b) demonstration to the Georgia Environmental Protection Division. The Georgia Power Company (GPC) performed both an impingement and entrainment monitoring program for Unit 1 during the years 1975 and 1976 as specified in the Environmental Technical Specifications. The results of these studies are summarized in the annual Environmental Surveillance Reports for 1975 and 1976. During the spring of 1977 the NRC reviewed and summarized the results of the 1975 data at the

request of the utility. In February of 1977 the NRC staff recommended that the studies be discontinued due to the insignificant losses sustained to the fishery from impingement and entrainment. In March of 1977 the annual Environmental Surveillance Report for 1976 was received. The data were similar to that collected in 1975. The GPC data for both the 1975 and 1976 studies and the NRC impact appraisal resulting in the determination of the studies are available.

The utility has requested that a combined set of technical specifications be adopted to cover both units when Unit 2 comes on line. At that time it is anticipated that at least one additional year of impingement and entrainment monitoring will be required to assess the combined impact of both units on the aquatic resources.

The staff suggests that the monitoring programs be designed such that they satisfy both our requirements under NEPA and the requirements of a 316(b) determination. This would provide a unified regulatory position and reduce the amount of duplication on the part of the utility. It is suggested that when the utility requests the NRC review of the unified technical specifications for both units, members of the State staff would evaluate and suggest appropriate changes to those monitoring programs required for a 316(b) study.

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