GEORGIA POWER COMPANY

EDWIN I. HATCH NUCLEAR PLANT

ANNUAL RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT

CALENDAR YEAR 1987

EDWIN I. HATCH NUCLEAR PLANT
RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT

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ACRONYMS

EPA	Environmental Protection Agency
GE	Greater Than or Equal to
GPC	Georgia Power Company
HNP	Edwin I. Hatch Nuclear Plant
LLD	Lower Limit of Detection
LT	Less Than
MDD	Minimum Detectable Difference
NA	Not Applicable
NDM	No Detectable Measurement
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculational Manual
REMP	Radiological Environmental Monitoring Program
RL	Reporting Level
s	Standard Deviation
TLD	Thermoluminescent Dosimeter
TS	Technical Specifications

EDWIN I. HATCH NUCLEAR PLANT
RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT

1.0 INTRODUCTION

The objective of the Radiological Environmental Monitoring Program (REMP) is to ascertain the levels of radiation and concentrations of radioactivity in the environs of the Edwin I. Hatch Nuclear Plant (HNP) and to evaluate any radiological impact to the environment due to plant operations. Reported herein are the program's activities for calendar year 1987.

The specifications for the REMP are provided by Section 3/4.16 of the Technical Specifications (TS) for Unit 1 and by Section 3/4.12 of the TS for Unit 2. The Unit 2 TS simply reference the Unit 1 TS. A single program serves both units.

A summary description of the program is provided in Section 2. This includes maps showing all of the sampling locations; the maps are keyed to a table indicating the distance and direction of each sampling location from the main stack.

An annual summary of the laboratory analysis results obtained from the samples utilized for environmental monitoring is presented in Section 3. A discussion of the results including assessments of any radiological impacts upon the environment is provided in Section 4.

The results of the Interlaboratory Comparison Program are presented in Section 5. The chief conclusions are stated in Section 6.

2.0 SUMMARY DESCRIPTION

A summary description of the REMP is provided in Table 2-1. This table is essentially a copy of Table 3.16.1-1 of the TS which delineates the program's requirements. Sampling locations required by Table 2-1 are described in Table 2-2 and are shown on maps in Figures 2-1 through 2-3. This description of the sample locations closely follows that found in the table and figures of Section 3.0 of the Off-site Dose Calculation Manual (ODCM).

It is stated in Section 3.16.1.a of the TS that deviations are permitted from the required sampling schedule which is delineated in Table 2-1 herein, if samples are unobtainable due to hazardous conditions, unavailability, inclement weather, malfunction of equipment, or other just reasons. Any deviations are stated in the discussions for each particular sample type in Section 4.

During 1987, all the laboratory analyses except for the reading of the thermoluminescent dosimeters (TLDs) were performed by Georgia Power Company's (GPC's) Central Laboratory in Smyrna, Georgia. The reading of the TLDs is provided by Teledyne Isotopes Midwest Laboratory in Northbrook, Illinois. The Center for Applied Isotopic Studies at the University of Georgia in Athens, Georgia and Teledyne Isotopes, Inc. of Westwood, New Jersey, who in past years had provided the bulk of the laboratory analyses, now serve as backup laboratories to the Central Laboratory.

TABLE 2-1 (SHEET 1 of 3)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Approximate Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis and Frequency
1. Airborne Radionuclides and Particulates	6	Continuous operation of sampler with sample collection weekly.	Radioiodine canister I-131 analysis weekly.
			Particulate sampler: analyze for gross beta radioactivity not less than 24 hours following filter change weekly; perform gamma isotopic analysis on affected sample when gross beta activity is 10 times the yearly mean of control samples; and composite (by location) for gamma isotopic analysis quarterly.
2. Direct Radiation	36	Quarterly	Gamma dose quarterly.
3. Ingestion			
Milk (a)	3	Biweekly	Gamma isotopic and I-131 analyses biweekly.
Fish or Clams (b)	2	Semiannually	Gamma isotopic analysis on edible portions semiannually.
Grass or Leafy Vegetation	3	Monthly during growing season.	Gamma isotopic analysis monthly (c).

TABLE 2-1 (SHEET 2 of 3)

SUMMARY DESCRIPTION OF RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Approximate Number of Sample Locations	Sampling and Collection Frequency	Type of Analysis and Frequency
4. Waterborne			
Surface	2	Composite sample collected monthly (d).	Gamma isotopic analysis monthly. Composite (by locations) for tritium analysis quarterly.
Sediment	2	Yearly	Gamma isotopic analysis yearly.
Drinking Water (e)(f)	One sample of river water near the intake and one sample of finished water from each of one to three of the nearest water supplies which could be affected by HNP discharge.	River water collected near the intake will be a composite sample; the finished water will be a grab sample. These samples will be collected monthly unless the calculated dose due to consumption of the water is greater than 1 mrem/year; then the collection will be biweekly. The collections may revert to monthly should the calculated doses become less than 1 mrem/year.	I-131 analysis on each sample when biweekly collections are required Gross beta and gamma isotopic analyses on each sample; composite (by location, for tritium quarterly.

TABLE 2-1 (SHEET 3 OF 3)

SUMMARY DESCRIPTION OF
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

NOTES

a. Up to three sampling locations within 5 miles and in different sectors will be used as available. In addition, one or more control locations beyond 10 miles will be used.

b. Commercially or recreationally important fish may be sampled. Clams may be sampled if difficulties are encountered in obtaining sufficient fish samples.

c. If gamma isotopic analysis is not sensitive enough to meet the Lower Limit of Detection (LLD), a separate analysis for I-131 may be performed.

d. Composite samples shall be collected by collecting an aliquot at intervals not exceeding a few hours.

e. If it is found that river water downstream of HNP is used for drinking, water samples will be collected and analyzed as specified herein.

f. A survey shall be conducted annually at least 50 river miles downstream of HNP to identify those who use Altamaha River water for drinking.

TABLE 2-2 (SHEET 1 OF 2)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Station Number	Station Type (a)	Descriptive Location	Direction(b)	Distance(b) (miles)	Sample Type(c)
064	O	Roadside Park	WNW	0.8	D
101	I	Inner Ring	N	1.9	D
102	I	Inner Ring	NNE	2.5	D
103	I	Inner Ring	NE	1.8	AD
104	I	Inner Ring	ENE	1.6	D
105	I	Inner Ring	E	3.7	D
106	I	Inner Ring	ESE	1.1	DV
107	I	Inner Ring	SE	1.2	AD
108	I	Inner Ring	SSE	1.6	D
109	I	Inner Ring	S	0.9	D
110	I	Inner Ring	SSW	1.0	D
111	I	Inner Ring	SW	0.9	D
112	I	Inner Ring	WSW	1.0	ADV
113	I	Inner Ring	W	1.1	D
114	I	Inner Ring	WNW	1.2	D
115	I	Inner Ring	NW	1.1	D
116	I	Inner Ring	NNW	1.6	AD
170	C	Upriver	WNW	(d)	R
172	I	Downriver	E	(d)	R
201	O	Outer Ring	N	5.0	D
202	O	Outer Ring	NNE	4.9	D
203	O	Outer Ring	NE	5.0	D
204	O	Outer Ring	ENE	5.0	D
205	O	Outer Ring	E	7.2	D
206	O	Outer Ring	ESE	4.8	D
207	O	Outer Ring	SE	4.3	D
208	O	Outer Ring	SSE	4.8	D
209	O	Outer Ring	S	4.4	D
210	O	Outer Ring	SSW	4.3	D
211	O	Outer Ring	SW	4.7	D
212	O	Outer Ring	WSW	4.4	D
213	O	Outer Ring	W	4.3	D
214	O	Outer Ring	WNW	5.4	D
215	O	Outer Ring	NW	4.4	D
216	O	Outer Ring	NNW	4.8	D
216	I	Clarks Farm	NNW	4.8	M
301	O	Toombs Central	N	8.0	D
304	C	State Prison	ENE	11.2	AD
304	C	State Prison	ENE	10.8	M
309	C	Baxley Substation	S	10.0	ADV
316	C	Thompson's	NNW	13.2	M

TABLE 2-2 (SHEET 2 OF 2)

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

NOTES

a. Station types:

C - Control
I - Indicator
O - Other

b. Direction and distance are reckoned from the main stack.

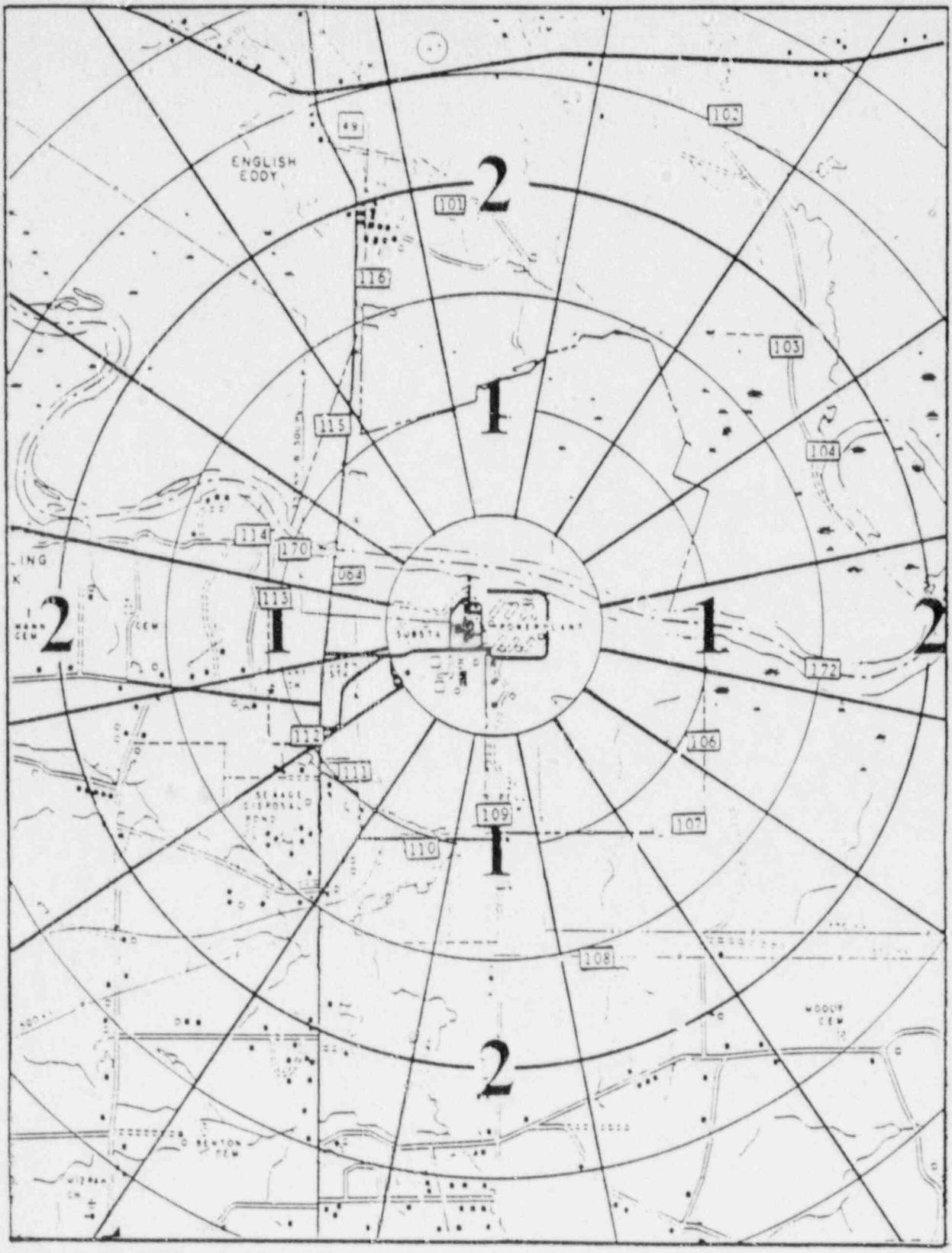
c. Sample types:

A - Airborne Radioactivity
D - Direct Radiation
M - Milk
R - River (fish or clams, shoreline sediment, and surface water)
V - Vegetation

d. Station 170 is located approximately 0.6 river miles upstream of the intake structure for river water, 1.1 river miles for sediment and clams, and 1.5 river miles for fish.

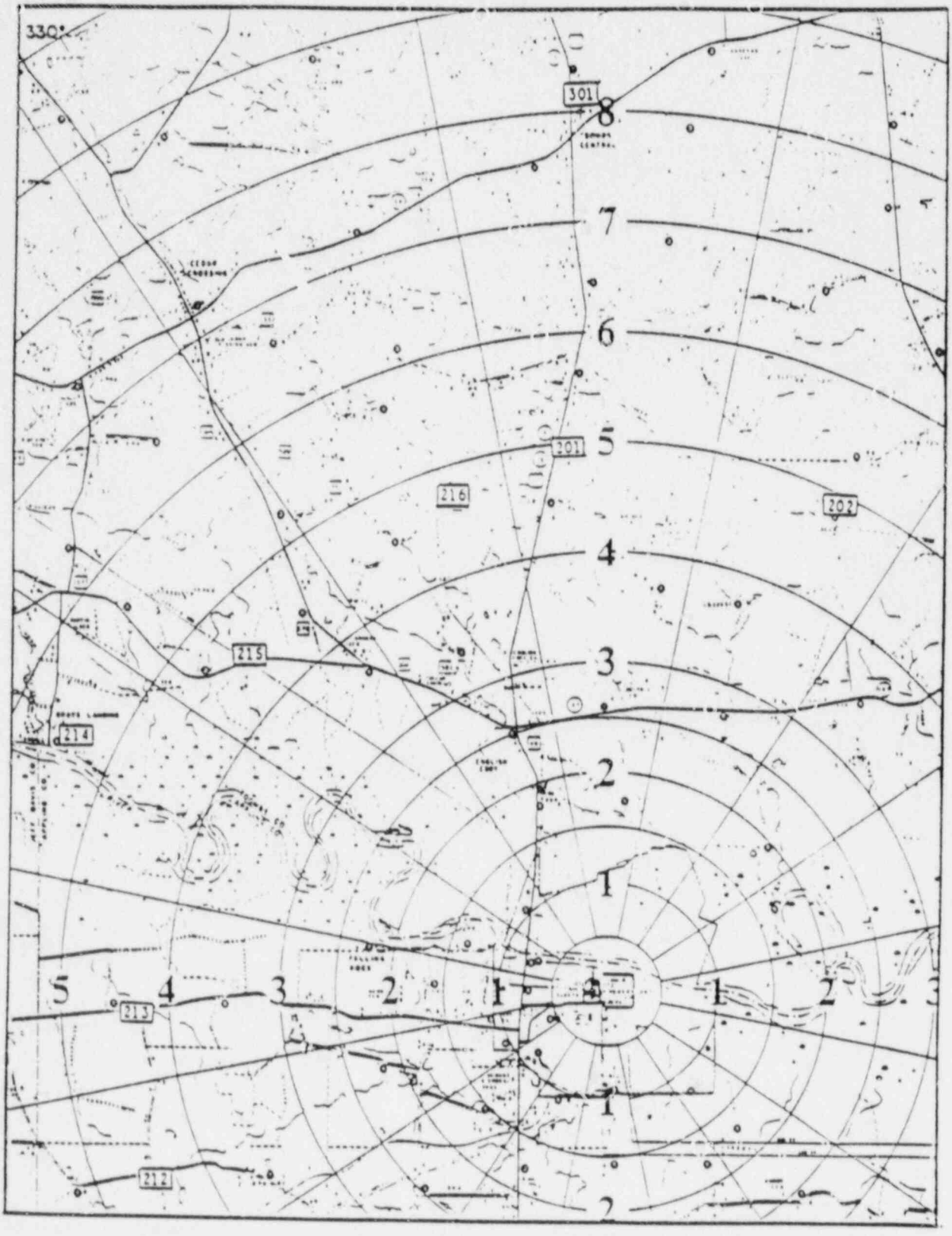
Station 172 is located approximately 3.0 river miles downstream of the discharge structure for river water, sediment and clams, and 1.7 miles for fish.

The location from which river water and sediment may be taken can be rather precisely defined. Often, the sampling locations for clams have to be extended over a wide area to obtain a sufficient quantity. High water adds to the difficulty in obtaining clam samples; high water might also make an otherwise suitable location for sediment sampling unavailable. A stretch of the river on the order of a few miles or so is generally needed to obtain adequate fish samples. The mile locations given above represent approximations of the locations where the samples are collected.



EDWIN I. HATCH NUCLEAR PLANT	RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS ON SITE PERIPHERY
	FIGURE 2-1

APR 1988

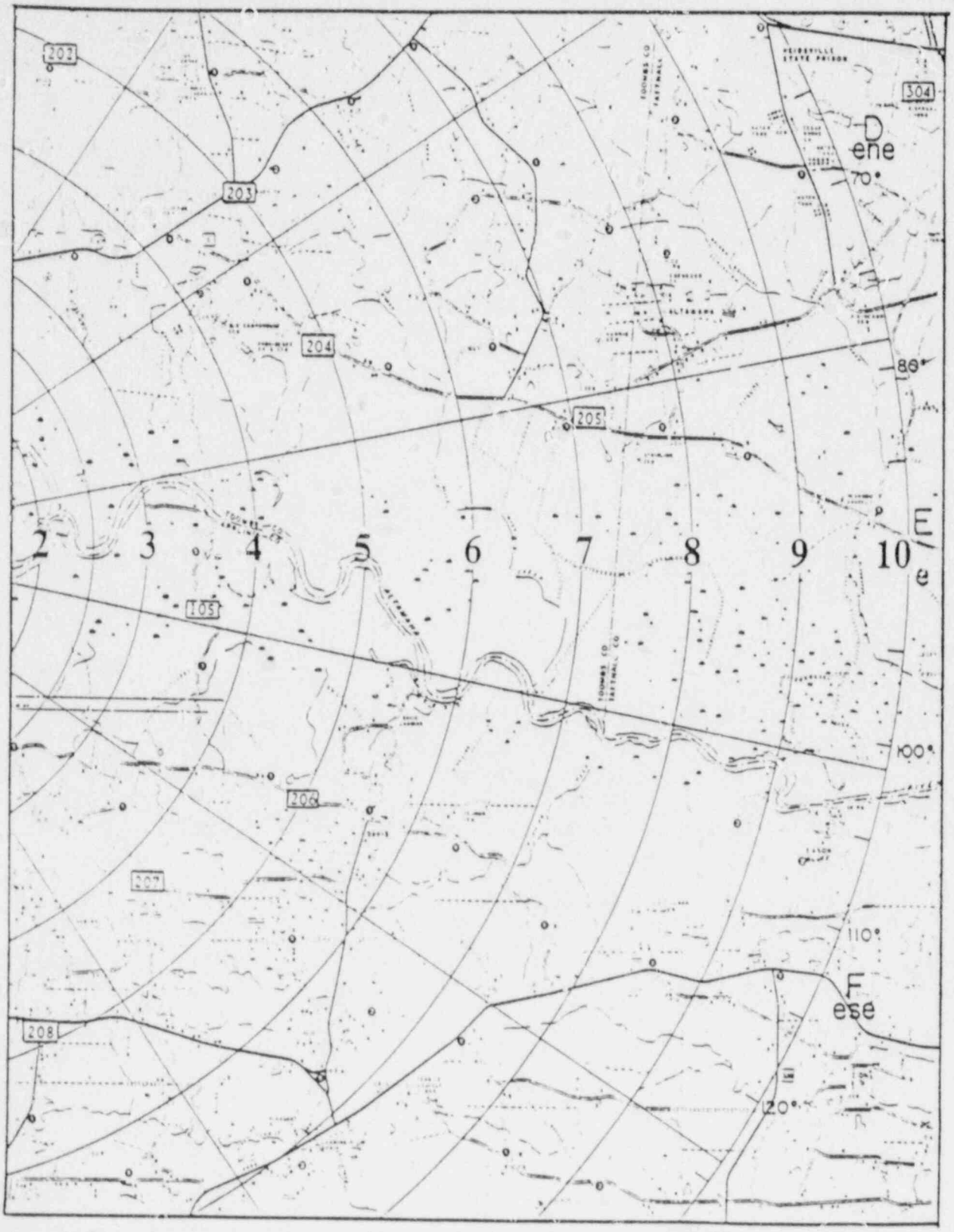


EDWIN I. HATCH NUCLEAR PLANT

RADIOLOGICAL ENVIRONMENTAL SAMPLING
LOCATIONS BEYOND SITE PERIPHERY

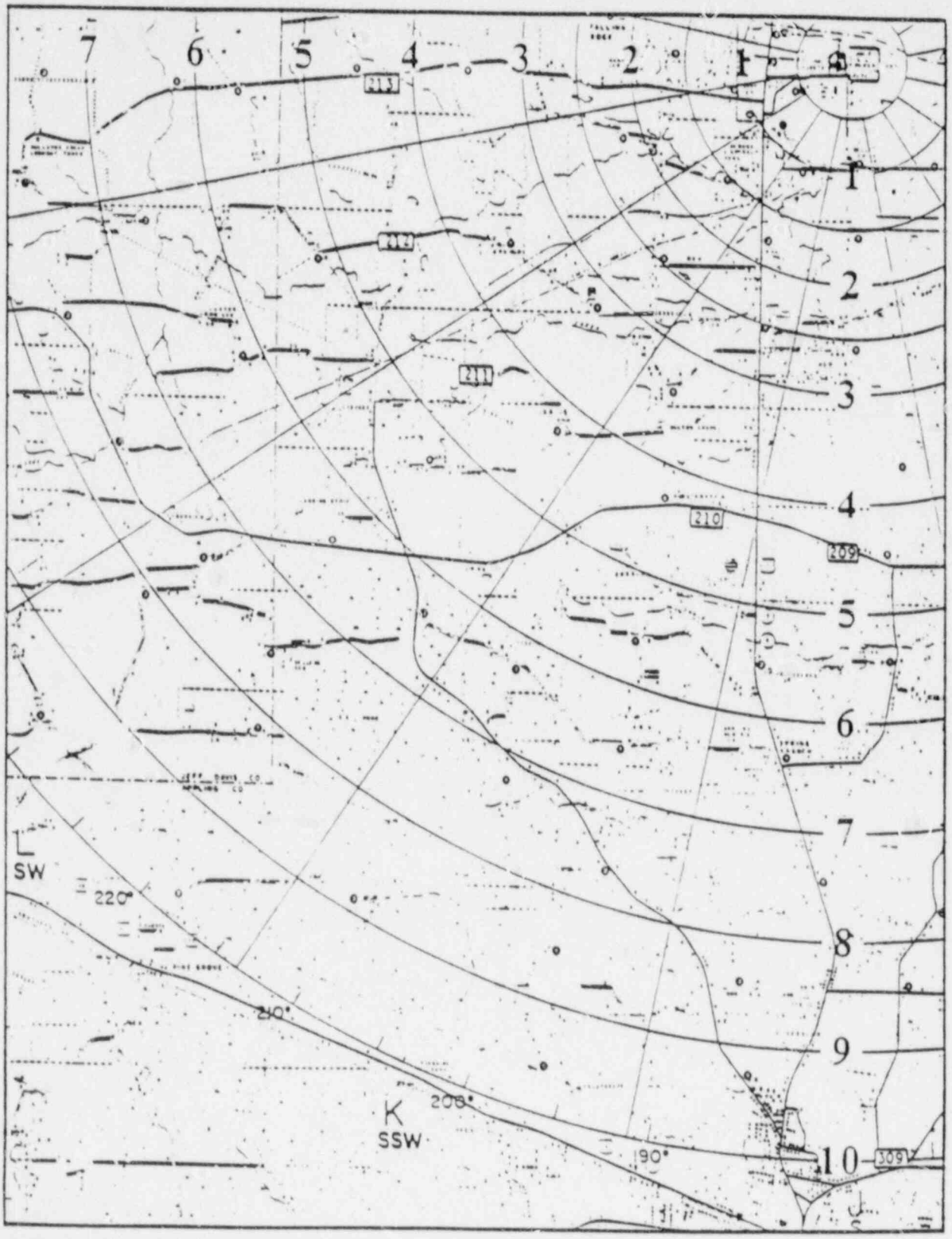
FIGURE 2-2 (SHEET 1 of 3)

APR 1988



EDWIN I. HATCH NUCLEAR PLANT	RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS BEYOND SITE PERIPHERY
	FIGURE 2-2 (SHEET 2 of 3)

APR 1988

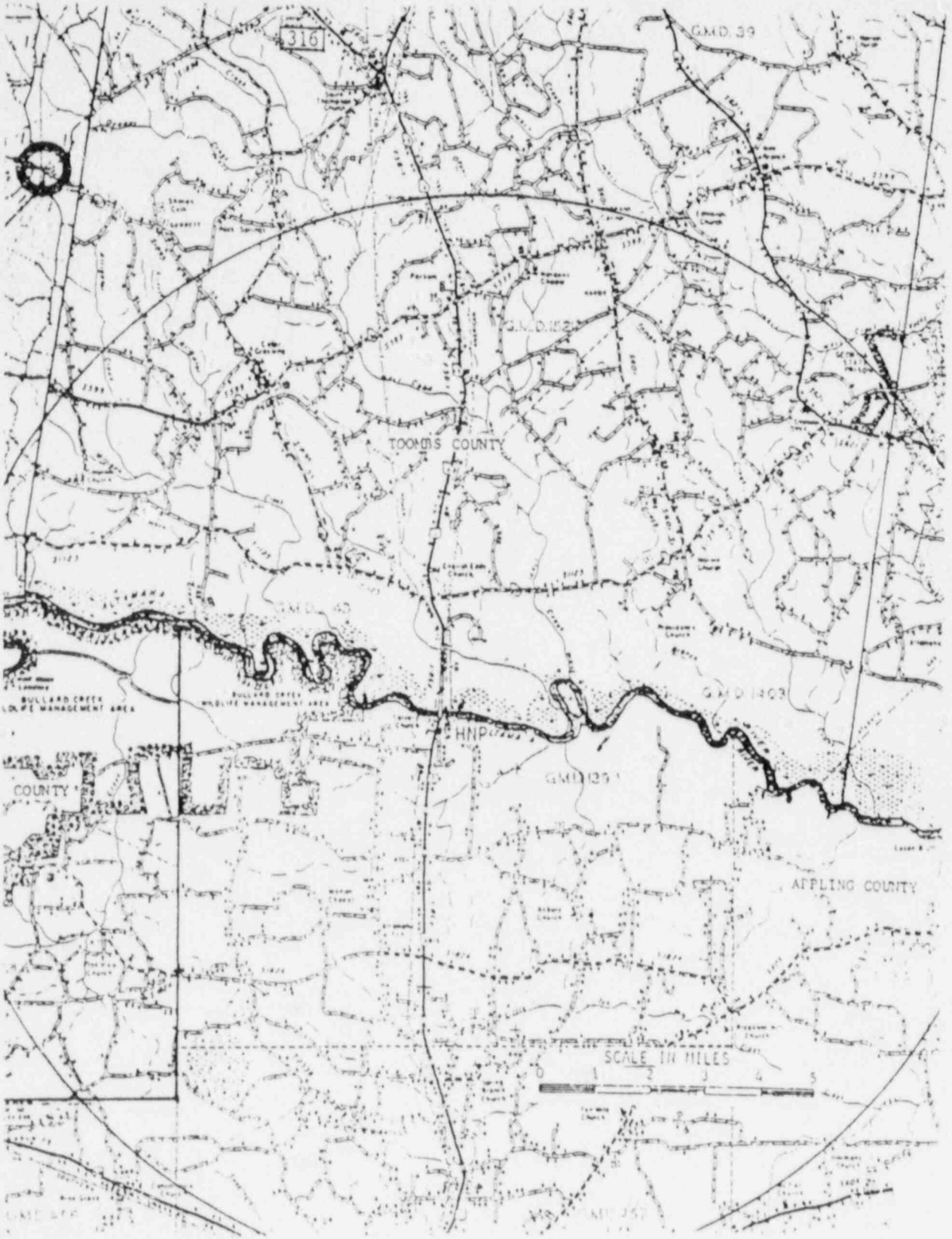


EDWIN I. HATCH NUCLEAR PLANT

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS BEYOND SITE PERIPHERY

FIGURE 2-2 (SHEET 3 of 3)

APR 1988



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LOCATION OF ADDITIONAL CONTROL STATION FOR MILK

FIGURE 2-3

APR 1988

3.0 RESULTS SUMMARY

In accordance with Section 6.9.1.7 of the TS, summarized and tabulated results of all of the regular samples collected for the year at the designated indicator and control stations are presented in Table 3-1 in the format of Table 6.9.1.7-1 of the TS. Naturally occurring radionuclides are not required to be reported. Results for samples collected at locations other than indicator or control stations or in addition to those stipulated by Table 2-1 are included in Section 4, the discussion of results section, for the type sample.

TABLE 3-1 (SHEET 1 OF 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
Edwin I. Hatch Nuclear Plant, Docket Nos. 51-321, 50-366
Appling County, Georgia, Report Period 1987

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (a) (LLD)	All Indicator Locations Mean (b) Range (Fraction)	Location with Highest Annual Mean Name Distance & Direction	Mean (b) Range (Fraction)	Control Locations Mean (b) Range (Fraction)	Number of Nonroutine Reported Measurements
Airborne Particulates (fCi/m^3)	Gross Beta 310	10	23 8-38 (206/206)	No. 116 Inner Ring 1.6 miles NNW	24 10-38 (51/51)	22 9-40 (104/104)	0
	Gamma Isotopic 24						
	Cs-134	50	NDM(c)		NDM	NDM	0
	Cs-137	60	NDM		NDM	NDM	0
Airborne Radioiodine (fCi/m^3)	I-131 310	70	NDM		NDM	NDM	0
Direct Radiation (mrem/91 days)	Gamma Dose 69	NA(d)	14.9 10.4-20.8 (61/64)	No. 104 Inner Ring 1.6 miles ENE	17.6 10.4-20.8 (4/4)	14.6 12.3-17.8 (8/8)	0
Milk (pCi/l)	Gamma Isotopic 62						
	Cs-134	20	NDM		NDM	NDM	0
	Cs-137	20	NDM		NDM	NDM	0
	Ba-140	60	NDM		NDM	NDM	0
	La-140	20	NDM		NDM	NDM	0
	I-131 62	1	NDM		NDM	NDM	0

TABLE 3-1 (SHEET 2 OF 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
Edwin I. Hatch Nuclear Plant, Docket Nos. 51-321, 50-366
Appling County, Georgia, Report Period 1987

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (a) (LLD)	All Indicator Locations Mean (b) Range (Fraction)	Location with Highest Annual Mean Name Distance & Direction	Mean (b) Range (Fraction)	Control Locations Mean (b) Range (Fraction)	Number of Nonroutine Reported Measurements
Grass (pCi/kg wet)	Gamma Isotopic 35						
	I-131	60	NDM		NDM	NDM	0
	Cs-134	60	NDM		NDM	NDM	0
	Cs-137	80	50 21-115 (6/23)	No. 106 Inner Ring 1.1 miles ESE	60 21-115 (6/11)	428 22-1200 (12/12)	0
River Water (pCi/l)	Gamma Isotopics 24						
	Mn-54	20	NDM		NDM	NDM	0
	Fe-59	30	NDM		NDM	NDM	0
	Co-58	20	NDM		NDM	NDM	0
	Co-60	20	NDM		NDM	NDM	0
	Zn-65	30	NDM		NDM	NDM	0
	Zr-95	30	NDM		NDM	NDM	0
	Nb-95	20	NDM		NDM	NDM	0
	I-131	20 (e)	NDM		NDM	NDM	0
	Cs-134	20	NDM		NDM	NDM	0
	Cs-137	20	NDM		NDM	NDM	0

TABLE 3-1 (SHEET 3 OF 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
Edwin I. Hatch Nuclear Plant, Docket Nos. 51-321, 50-366
Appling County, Georgia, Report Period 1987

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (a) (LLD)	All Indicator Locations Mean (b) Range (Fraction)	Location with Highest Annual Mean Name Distance & Direction	Mean (b) Range (Fraction)	Control Locations Mean (b) Range (Fraction)	Number of Nonroutine Reported Measurements
	Ba-140	60	NDM		NDM	NDM	0
	La-140	20	NDM		NDM	NDM	0
	Tritium 8	3000	241 241-241 (1/4)	No. 172 Downriver 3.0 miles	241 241-241 (1/4)	204 186-221 (2/4)	0
Fish (pCi/kg wet)	Gamma Isotopic 8						
	Mn-54	100	NDM		NDM	NDM	0
	Fe-59	300	NDM		NDM	NDM	0
	Co-58	100	NDM		NDM	NDM	0
	Co-60	100	NDM		NDM	NDM	0
	Zn-65	300	NDM		NDM	NDM	0
	Cs-134	100	69 15-150 (3/4)	No. 172 Downriver 1.7 miles	69 15-150 (3/4)	15 13-17 (2/4)	0
	Cs-137	200	62 32-89 (4/4)	No. 172 Downriver 1.7 miles	62 32-89 (4/4)	52 28-88 (4/4)	0

TABLE 3-1 (SHEET 4 OF 4)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
Edwin I. Hatch Nuclear Plant, Docket Nos. 51-321, 50-366
Appling County, Georgia, Report Period 1987

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (a) (LLD)	All Indicator Locations Mean (b) Range (Fraction)	Location with Highest Annual Mean Name Distance & Direction	Mean (b) Range (Fraction)	Control Locations Mean (b) Range (Fraction)	Number of Nonroutine Reported Measurements
Sediment (pCi/kg dry)	Gamma Isotopic 2						
	Cs-134	200	NDM		NDM	NDM	0
	Cs-137	200	59 59-59 (1/1)	No. 172 Downriver 3.0 miles	59 59-59 (1/1)	39 39-39 (1/1)	0

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a. The LLD is defined in table notation a of Table 4.16.1-1, of the TS. Except as noted otherwise, the values listed in the column are those found in that table.

b. Mean and range are based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis.

c. No Detectable Measurements.

d. Not Applicable.

e. Since no drinking water pathway exists, the LLD from the gamma isotopic analysis may be used. Early in the year the value listed became the objective LLD.

4.0 DISCUSSION OF RESULTS

An interpretation and evaluation, as appropriate, of the laboratory results for each type sample are included in this section. Relevant comparisons are made between the difference in average values for indicator and control stations and the calculated Minimum Detectable Difference (MDD) between these two groups at the 99-percent confidence level. The MDD is determined using the standard Student's t-test. A difference in the average values which is less than the MDD is considered to be statistically indiscernable. Pertinent results are also compared with past results including preoperations. To provide perspective, a result might also be compared with its LLD or Reporting Level (RL). Attempts are made to explain any Reporting Levels (RLs) or other high radiological levels found in the samples.

Two land use surveys were conducted during the year, first on January 20, 21, 26 and 27, and then on October 27. The location of the nearest permanent resident in each of the 16 meteorological sectors within a distance of 5 miles is tabulated in Table 4-1. The results of the annual milk animal survey are presented in Subsection 4.4. The results of the annual survey conducted downstream of the plant to determine whether water from the Altamaha River is being used for drinking purposes are presented in Subsection 4.6.

Several samples were not counted for a sufficient time to attain the LLD required by Table 4.16.1-2 of the TS. These are presented in Table 4-2. To correct this failure an administrative instruction which provided a table of counting time as a function of elapsed time since sample collection was issued. It should be noted that all the failures occurred early in the year prior to or soon after the problem was identified.

TABLE 4-1

LOCATION OF THE NEAREST
PERMANENT RESIDENCE IN EACH SECTOR
(miles)

SECTOR	JANUARY SURVEY	OCTOBER SURVEY
N	2.0	2.0
NNE	2.3	2.3
NE	3.2	3.1
ENE	4.2	4.2
E	*	*
ESE	3.7	3.7
SE	1.8	1.8
SSE	2.0	2.0
S	1.1	1.0
SSW	1.3	1.3
SW	1.1	1.0
WSW	1.5	1.1
W	1.1	1.1
WNW	1.2	1.1
NW	3.6	3.6
NNW	1.8	1.8

* None within 5 miles.

TABLE 4-2

FAILURES IN ATTAINING REQUIRED LLD

SAMPLE TYPE	DATE OR PERIOD	STATION NUMBER	RADIONUCLIDE	LLD UNITS	MAXIMUM PERMITTED	VALUE ATTAINED
Milk	2/09	316	Ba-140	pCi/l	60	69
	4/06	316	Ba-140	pCi/l	60	92
	4/06	316	La-140	pCi/l	20	39
River Water	January	170	I-131	pCi/l	20*	40
	January	172	I-131	pCi/l	20*	31
	January	170	Ba-140	pCi/l	60	75
	January	172	Ba-140	pCi/l	60	79
	January	170	La-140	pCi/l	20	32
	January	172	La-140	pCi/l	20	29
	March	170	I-131	pCi/l	20*	21
	March	170	La-140	pCi/l	20	24

* Since no drinking water pathway exists, the LLD from the gamma isotopic analysis may be used. The value listed is an objective value.

4.1 Airborne Particulates

As indicated by Table 2-2, airborne particulates and airborne radioiodine are collected at 4 indicator stations (Nos. 103, 107, 112, and 116) which encircle the site boundary and at 2 control stations (Nos. 304 and 309) which are at least 10 miles from the plant. At these locations air is continuously drawn through a dust filter and a charcoal canister in sequence to retain airborne particulates and airborne radioiodine, respectively. The filters and canisters are collected weekly.

Samples were not gathered at Station 116 on February 9 and at Station 103 on July 6 because the air pump was found unplugged. This was inadvertent in the first case and may have been due to vandalism in the second. During 1986, valid data was unavailable on three occasions.

Each of the air particulate filters is counted for gross beta activity. As seen in Table 3-1, the annual average activity for the indicator stations is 1 fCi/m^3 greater than that for the control stations. However, this difference is not discernable since it is less than the MDD which was calculated as 1.9 fCi/m^3.

The average activity for all stations during 1986 was 23 fCi/m^3. Going back to 1976 and for several years afterwards, the average annual gross beta activity for all stations was generally an order of magnitude higher than that now found. For example: it was 242 and 195 fCi/m^3 during 1977 and 1981, respectively. Those high values were shown to be the result of fallout from numerous nuclear weapons tests conducted on mainland China from 1976 to 1980. With the termination of the weapons tests, the gross beta levels in recent years has become much lower. The annual average for all stations was 33 fCi/m^3 for 1982 and this steadily decreased to 22 fCi/m^3 for 1985. However, during 1986 as a consequence to the Chernobyl incident, the average activity jumped to 37 pCi/m^3; by excluding the few week period of the Chernobyl impact, the average activity for 1986 dropped to 24 pCi/m^3.

During preoperations and during each year of operations, some manmade radionuclides had been detected in the gamma isotopic analyses of the quarterly composites of air particulate filters. However, during calendar year 1987, no manmade radionuclides were detected. In the past, numerous fission products (some at fairly significant levels) and some activation products were detected. These were generally attributed to the nuclear weapons tests. In recent years with the cessation of the tests, the number of radionuclides detected became scant and their levels became low. The positive results found during 1986 were shown to be due to the Chernobyl incident.

4.2 Airborne Radioiodine

The charcoal cartridges used for adsorbing iodine from the atmosphere are analyzed for I-131 by gamma spectroscopy. I-131 was not detected in any of the samples during the year. The maximum allowed LLD is 70 fCi/m^3; however, the LLD usually attained was about a third of this value. As mentioned above, no samples were obtained at Station 116 on February 9 and at Station 103 on July 16 due to the air pump being unplugged.

Positive results for airborne radioiodine are not normally obtained. However, during 1976, 1977 and 1978, levels of I-131 which were generally on the order of the maximum allowed LLD (that is, 70 fCi/m^3) were found in nearly all of the samples collected for a period of a few weeks after the arrival of the cloud from each of the Chinese nuclear weapons tests conducted at that time. In 1986 the same phenomenon occurred, only the positive levels were attributed to the Chernobyl incident. The highest airborne I-131 level ever found was 217 fCi/m^3 in 1977. The RL called for by Table 3.16.1-2 of the TS is 900 fCi/m^3.

The only positive measurement of I-131 which might be attributed to plant releases during nearly 14 years of operation occurred for the sample collected on April 26, 1982 at a now defunct station which was located in the roadside park (about 0.3 miles inside the site boundary) and would now be called Station 064. This sample showed a level of 37.2 fCi/m^3.

4.3 Direct Radiation

Direct (external) radiation is measured by thermoluminescent dosimeters (TLDs). Two TLD badges are placed at each station; each badge contains 4 calcium sulfate cards.

Two TLD stations are established in each of the 16 meteorological sectors about the plant. The inner ring of stations (Nos. 101 through 116) is located near the site boundary, while the outer ring (Nos. 201 through 216) is located at a distance of about 4 to 5 miles. These rings were installed at the beginning of 1980. However, each of the stations in the east sector is at a radius which is a few miles greater than the other stations in its ring; flood plains in this sector prevent easy access on a year-round basis to the site boundary and to the 4 to 5 mile annulus. The 16 stations forming the inner ring are designated as the indicator stations. The 2 control stations (Nos. 304 and 309) are at least 10 miles from the plant. Stations 064 and 301 accommodate special interest areas. Station 064 is located in an onsite roadside park while Station 301 is located adjacent to Toombs Central School. Station 210 in the outer ring is located adjacent to the Altamaha School, the only other nearby school.

As may be seen from Table 3-1, the average quarterly dose acquired at the indicator stations (inner ring) over the year was 0.3 mrem greater than that acquired at the control stations; this difference was not discernable, however, since it was less than the MDD of 1.7 mrem. In previous years the absolute value of the difference between the annual average quarterly dose acquired at these two station groups has varied from 0 to 1 mrem; the average dose was greater at the control stations for three of the seven years; the average difference was 0.4 mrem.

The quarterly doses acquired at outer ring stations ranged from 11.3 to 23.7 mrem with an average of 15.3 mrem for the year which is 0.4 mrem greater than that found for the inner ring. There was no discernable difference between the averages of the inner and outer rings since this difference was less than the MDD of 1.0 mrem. In past years the average quarterly dose for the inner ring stations had always been found to be greater than that for the outer ring stations by amount ranging from 0.2 to 1.0 mrem; the average difference has been 0.6 mrem over the past seven years (1980 through 1986) since installation of the two rings.

The quarterly doses in units of mrem acquired at the roadside park and at Toombs Central School were respectively:

Average	Minimum	Maximum
14.2	13.6	15.1
15.0	14.5	15.5

The doses acquired at the special interest stations are seen to be within the range of those acquired at the other stations and are about the same as those found for 1986.

Frequently, TLDs are lost due to theft and damaged due to vandalism. At monthly intervals, the TLD stations are checked for missing or damaged badges; replacement badges are provided as needed. When both badges are missing at the end of the quarter, there are no means by which to assess the dose at that location for the quarter. Both badges were missing at Station 102 at the end of the third quarter and at Station 111 at the end of both the third and fourth quarters. A total of 16 badges from 8 different stations was found to be missing during the year. In addition, one badge was lost in shipment. This is slightly worse than the previous year when a total of 15 badges were found to be missing from 7 different stations.

4.4 Milk

Milk samples from cows were obtained biweekly throughout the year at Station 304, the state prison dairy, and at Station 316, Thompson's dairy. Both of these locations are control stations. Goat milk samples were also obtained biweekly from March 9 through July 13 at Station 216, Clark's farm, which is an indicator station. All milk samples in previous years were obtained from cows.

The annual land use survey to identify the location of the nearest milk animal in each of the 16 meteorological sectors within a distance of 5 miles and the location of all milk animals within a distance 3 miles was conducted on January 20, 21, 26 and 27. A milk animal is a cow or goat that is producing milk for human consumption. The survey was conducted several months earlier than usual because there had been no indicator station since milking operations at Williamsons' farm ceased during the previous quarter. Although no milk animals were located, the owners of a goat herd, the Clarks, located in the NNW sector at 4.8 miles, related that they may commence milking their goats within a few months.

During the third quarter, the Clarks let all of their goats go dry because some of them had contacted sore eye. The Clarks expected that goat milk would be available again in six months or so. In an effort to find replacement samples, the county agents were contacted. None knew of any milk animals within 5 miles of Plant Hatch. A second land use survey was conducted on October 27, no milk animals were located.

No manmade radionuclides were found from the gamma isotopic analysis of the milk samples. In each year since 1978 when the gamma isotopic analysis of milk samples became a requirement, positive levels of Cs-137 were found in some samples. The frequency and intensity of these positive levels had been found to be decreasing in recent years.

There were no positive indications of I-131 in any of the milk samples collected throughout the entire year. Since 1978, positive levels were found only during 1980 and 1986. Positive levels were found in 1978 and in all previous years of operation. During preoperations all readings were less than 2 pCi/l which was the allowed LLD at that time.

All of the positive readings of Cs-137 and the significant readings of I-131 have been generally attributed to fallout from the nuclear weapons tests. However, the positive levels in 1986 were largely attributed to the Chernobyl incident.

4.5 Grass

The TS call for the gamma isotopic analysis of grass samples collected monthly at 3 locations. Two indicator stations (Nos. 106 and 112) and a single control station (No. 309) have been designated for these collections. Gamma isotopic analyses have been performed on grass samples since 1978. There was only one failure during the year to obtain an adequate sample at these locations. Due to the cold weather, adequate samples were not available in February at Station 106. During 1986 there were four failures.

The results for the regular collections which are presented in Table 3-1 are somewhat typical of those usually encountered. The only manmade radionuclide detected was Cs-137. The levels for the control station overshadow those for the indicator stations. Positive results were obtained from each sample collected at the control station, whereas positive results were obtained at only one of the indicator stations (No. 106) and from only about half of the samples collected there.

The mean for the indicator stations, 60 pCi/kg wet, is a bit lower than that found during the past five years, while the mean for the control station, 428 pCi/kg wet, is somewhat higher. From 1982 through 1986, the means have randomly varied between 61 and 149 pCi/kg wet for the indicator stations and between 99 and 388 pCi/kg wet for the control station. For 1987, the mean value for the control station is seen to be 368 pCi/kg wet greater than the mean for the indicator stations. This difference is discernable since the MDD was calculated to be 283 pCi/kg wet.

As a consequence to the land use survey conducted early in the year, the critical dose receptor due to gaseous releases was determined to be a child who consumes vegetables from Reynold's garden located in the SW sector at 2.2 miles. Although the dose commitment at this location was not calculated to be 20 percent greater than that at the locations from which samples are currently being obtained, leafy vegetables were also collected monthly at this garden from July through December.

The results for the Reynold's garden are not included in Table 3-1. Only Cs-137 was found and it was found in each sample. The positive levels which ranged from 12 to 137 pCi/kg wet and averaged 50 pCi/kg wet are seen to be similar but slightly lower than those found for Station 106.

4.6 River Water

Surface water is composited from the Altamaha River at an upstream location (No. 170) and at a downstream location (No. 172) using automatic sampling machines. Small quantities are collected at intervals not exceeding a few hours. River water collected by these machines is picked up monthly; quarterly composites are composed of the monthly collections.

A gamma isotopic analysis is made on each monthly collection. As usual, no manmade radionuclides were detected. The only manmade radionuclides ever detected (by gamma isotopic analysis) were as follows:

Year	Quarter	Station	Radionuclide	Level (pCi/l)
1975	4th	172	Ce-141	78.2
1986	2nd	170	La-140	18
1986	2nd	172	Cs-137	12

Last year's positive result is attributed to the Chernobyl incident.

Tritium analyses are performed on the quarterly composites. Positive results were obtained only for three of the samples. A level of 221 pCi/l was found at Station 170 for the first quarter. For the fourth quarter levels of 186 and 241 pCi/l were found at Stations 170 and 172, respectively. These levels are typical of those generally found. In past years, positive results had generally been obtained in a greater percentage of the samples.

On September 29, the annual survey of the Altamaha River was conducted downstream of the plant for at least 50 river miles to identify anyone who may use river water for drinking purposes. As in all previous surveys, no intakes for drinking water were observed. This was corroborated by information obtained on September 23 from the State of Georgia that no surface water permits on the Altamaha River downstream of HNP had been issued. If river water should become used for drinking, the TS requirements for its sampling and analysis will be implemented.

4.7 Fish

Gamma spectral analyses were performed on the edible portion of fish samples collected at the river stations on May 27 and November 17 - 18. Largemouth bass were collected at both stations each time. In May, red ear sunfish were also collected at both stations and white crappie were collected only at Station 172. In November, channel catfish were also collected at Station 170.

As shown in Table 3-1, Cs-134 and Cs-137 were, as usual, the only manmade radionuclides detected. While Cs-137 was found in each sample, Cs-134 was found in 5 of the 8 samples. These frequencies of occurrence are typical of those experienced during the past few years. The average level for each of these radionuclides was about 30 percent lower than that found over the previous four year period. The required LLDs are 100 and 200 pCi/kg wet for Cs-134 and Cs-137, respectively. The RL for each is 10 times its LLD. The only positive reading exceeding its specified LLD was the Cs-134 reading of 150 pCi/kg wet in the white crappie caught at the indicator station on May 27.

The average values at the indicator station are higher than those at the control station as has generally been the case for the past several years. The average values at the downstream station were 54 and 10 pCi/kg wet greater than those at the upstream station for Cs-134 and Cs-137, respectively. However, these differences are not discernable since they are less than the MDDs of 288 and 59 pCi/kg wet for Cs-134 and Cs-137, respectively.

4.8 Sediment

The annual collection of sediment took place on May 27 at the river stations. A gamma isotopic analysis was performed on each sample. As shown in Table 3-1, positive results were obtained only for Cs-137; this typically happens. The levels were 39 and 59 pCi/kg dry for locations 170 and 172, respectively.

The fission product Cs-137 has almost always been found in the sediment samples. The levels found this year are lower than those typically found during the past 5 years by a factor of about 5 or 6. The LLD for Cs-137 is 200 pCi/kg dry.

5.0 INTERLABORATORY COMPARISON PROGRAM

Section 3.16.3 of the TS requires that analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program that has been approved by the NRC. The Environmental Protection Agency's (EPA's) Environmental Radioactivity Laboratory Intercomparison Studies (Crosscheck) Program conducted by the Environmental Monitoring and Support Laboratory in Las Vegas, Nevada is such a program and it has been approved by the NRC. Analyses were performed only where the type analysis and sample in the EPA Crosscheck Program were the same as that delineated in Table 2-1. Reported herein are the results of participation in the EPA Crosscheck Program by the Central Laboratory.

Any results for which disagreement was established using the NRC's "Criteria for Comparing Analytical Measurements" as described in Attachment 1 to this section were investigated to determine the cause of the disagreement. Corrective actions were taken as warranted. The results of any such investigations and corrective actions are reported in this section.

Since all of the results reported herein are presented in the same tabular format, an explanation of the column headings is provided. "Date" means the collection date given by the EPA. "Known" refers to the EPA known value $\pm$ one standard deviation, s. "Result" is the average value measured by the laboratory $\pm$ experimental s. "Resolution" is determined by dividing the known value by its s value. "Ratio" equals the "result" (value determined by the laboratory) divided by the "known" (value determined by EPA). An explanation is provided in the text for any of the comparisons showing "Disagreement." It should be noted that whenever the EPA known value is zero or the laboratory-determined result is a less than (LT) value, or the calculated resolution value is less than 3, a comparison by the NRC criteria cannot be made.

The results of the gross beta and Cs-137 analyses of air filters are given in Table 5-1. Listed in Table 5-2 are the results of the I-131 and gamma analyses of milk samples. Table 5-3 presents the results of the gamma and tritium analyses of water.

Disagreement was not established with any of the comparisons. However, the results of the gamma isotopic analysis of the October 9 water sample for Ru-106 were 40, 48 and LT 46 pCi/l. By using only the positive results, agreement was established. The size of the samples to be counted is being increased from 0.45 to one liter; this will improve the counting statistics.

A result outside of 2s suggests a bias in its measurement. Whenever this occurs, the Central Laboratory is required by procedure to investigate and follow-up with corrective actions, as needed.

TABLE 5-1

CROSSCHECK PROGRAM RESULTS FOR AIR FILTERS
(pCi/filter)

Date	Known	Result	Resolution	Ratio
		Gross Beta		
4/10/87	43 ± 5	43.0 ± 0.0	8.6	1.00
8/28/87	30 ± 5	28.0 ± 1.0	6.0	0.93
		Cs-137		
4/10/87	8 ± 5	12.0 ± 1.7	1.6	1.50
8/28/87	10 ± 5	9.7 ± 2.1	2.0	0.97

TABLE 5-2

CROSSCHECK PROGRAM RESULTS FOR MILK SAMPLES
(pCi/l)

Date	Known	Result	Resolution	Ratio
		I-131		
2/27/87	9.0 ± 0.9	8.7 ± 1.2	10.0	0.96
6/26/87	59.0 ± 6.0	67.3 ± 5.7	9.8	1.14
		Cs-137		
6/26/87	74.0 ± 5.0	78.0 ± 5.9	14.8	1.05

TABLE 5-3

CROSSCHECK PROGRAM RESULTS FOR WATER SAMPLES
(pCi/l)

Date	Known	Result	Resolution	Ratio
		Cr-51		
6/05/87	41.0 ± 5.0	48.0 ± 27.9	8.2	1.17
10/09/87	70.0 ± 5.0	66.7 ± 26.1	14.0	0.95
		Co-60		
2/06/87	50.0 ± 5.0	58.0 ± 4.6	10.0	1.16
6/05/87	64.0 ± 5.0	63.0 ± 5.3	12.8	0.98
10/09/87	15.0 ± 5.0	13.7 ± 2.3	3.0	0.91
		Zn-65		
2/06/87	91.0 ± 5.0	95.7 ± 5.9	18.2	1.05
6/05/87	10.0 ± 5.0	10.7 ± 3.21	2.0	1.07
10/09/87	46.0 ± 5.0	53.0 ± 13.5	9.2	1.15
		Ru-106		
2/06/87	100.0 ± 5.0	130.0 ± 40.0	20.0	1.30
6/05/87	75.0 ± 5.0	75.7 ± 7.4	15.0	1.00
10/09/87	61.0 ± 5.0	44.0 ± 5.6*	12.2	0.72
		Cs-134		
2/06/87	59.0 ± 5.0	57.0 ± 2.0	11.8	0.97
6/05/87	40.0 ± 5.0	38.0 ± 1.0	8.0	0.95
10/09/87	25.0 ± 5.0	25.7 ± 4.0	5.0	1.03
		Cs-137		
2/06/87	87.0 ± 5.0	86.7 ± 5.7	17.4	1.00
6/05/87	80.0 ± 5.0	79.3 ± 7.1	16.0	0.99
10/09/87	51.0 ± 5.0	49.3 ± 6.7	10.2	0.97
		H-3		
2/13/87	4209.0 ± 421.0	4137.0 ± 30.6	10.0	0.98
6/12/87	2895.0 ± 357.0	2677.0 ± 60.3	8.1	0.92
10/16/87	4492.0 ± 449.0	4253.0 ± 80.2	10.0	0.95

* Result is based upon two positive values.

ATTACHMENT 1

Criteria for Comparing Analytical Measurements

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the Reference Laboratory's value to its associated one sigma uncertainty. As this comparison, referred to as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement should be considered acceptable as the resolution decreases. The values in the ratio criteria may be rounded to fewer significant figures to maintain statistical consistency with the number of significant figures reported by the Reference Laboratory, unless such rounding will result in a narrowed category of acceptance. The acceptance category reported will be the narrowest into which the ratio fits for the resolution being used.

RESOLUTION	RATIO = LICENSEE VALUE/REFERENCE VALUE		
	Agreement	Possible Agreement "A"	Possible Agreement "B"
LT 3	No Comparison	No Comparison	No Comparison
GE* 3 and LT 4	0.4 - 2.5	0.3 - 3.0	No Comparison
GE 4 and LT 8	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
GE 8 and LT 16	0.6 - 1.67	0.5 - 2.0	0.4 - 2.5
GE 16 and LT 51	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
GE 51 and LT 200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.67
GE 200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

* GE means greater than or equal to

"A" criteria are applied to the following analyses:

Gamma spectrometry where principal gamma energy used for identification is greater than 250 kev.

Tritium analyses of liquid samples.

"B" criteria are applied to the following analyses:

Gamma spectrometry where principal gamma energy used for identification is less than 250 kev.

Sr-89 and Sr-90 determination.

Gross beta where samples are counted on the same date using the same reference nuclide.

6.0 CONCLUSIONS

This report has shown the licensee's conformance with Section 3/4.16 of the TS during the year. It has shown that all data were carefully examined. A summary and a discussion of the results of the laboratory analyses for each type sample collected have been presented.

No measurable radiological impact upon the environment as a consequence of plant discharges to the atmosphere or to the river was established.

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April 19, 1988

U. S. Nuclear Regulatory Commission
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PLANT HATCH - UNITS 1, 2
NRC DOCKETS 50-321, 50-366
OPERATING LICENSES DPR-57, NPF-5
ANNUAL RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE REPORT

Gentlemen:

Enclosed is the Plant Hatch Units 1 and 2 Annual Radiological Environmental Surveillance Report for the calendar year 1987. This report is submitted in accordance with the requirements of Technical Specifications Sections 6.9.1.6 and 6.9.1.7.

If you have any questions in this regard, please contact this office at any time.

Sincerely,

L. T. Gucwa

REB/lc

Enclosure: Plant Hatch Annual Radiological Environmental Surveillance Report for Calendar Year 1987

c: (see next page)

Add: NRR/DEST/ADE 4r Encl
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Georgia Power

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