VEGP OLSER
AMENDMENT 5

Insertion Instructions

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p. 2.1-11	Replace
p. 2.1-3	Replace
t. 2.1-12	Replace
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p. 2.2-1	Replace
p. 2.2-11	Replace
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p. 8.2-3	Replace
p. 12.1-1	Replace
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t. 12.1-2	Replace
t. 12.1-4	Replace
NPDES Permit Attachment (15 pages)	Add
p. Q290.8-1 (behind tab May 31, 1984)	Replace
p. Q290.8-3	Replace
t. E290.8-1 (Sheet 2 of 2)	Replace
t. E290.8-2	Add
t. E290.8-3	Add

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2.1.2.4 Jurisdictional Population

Five counties are bisected by the 10-mile radius of the VEGP. All of the plant site is situated in Burke County, Georgia. However, Burke County's jurisdiction primarily includes the sectors from the west-northwest to the southeast. The town of Girard is 7.5 miles south-southeast. Richmond County, Georgia, lies 5 miles west-northwest and northwest from the plant site. 1

Three miles north of the site boundary is Aiken County, South Carolina. Barnwell County, South Carolina, lies 1/2 mile to the northeast and east-northeast. A small portion of the area within the 10-mile radius includes Allendale County, South Carolina, 8 miles east of the plant site. Tables 2.1-43 and 2.1-44 exhibit jurisdictional population and location, respectively. 1

2.1.2.5 Methodology for Population Estimates and Projections

Appendix 2A of the FSAR provides part of the information required by the draft guidelines for the OLSER. The remainder of the information can be found in paragraph 6.1.4.2.

2.1.3 USE OF ADJACENT LANDS AND WATERS

The VEGP site is located on the southwest side of the Savannah River about 23 river miles upstream from the intersection of the Savannah River and U.S. Highway 301. The property is located in the eastern sector of Burke County, Georgia, across the Savannah River from Barnwell County, South Carolina. This location is approximately 15 air miles east-northeast of Waynesboro, Georgia, and 26 air miles south-southeast of Augusta, Georgia. The VEGP site, which is wholly owned by Georgia Power Company (GPC), will occupy approximately 3169.1 acres as follows:

Facility	Acres		
Site acreage not related to construction	1777.9		1
Plant Wilson	37.7		
Outside fence	569.6	(cleared area)	5
Inside fence	579.4		
West gate	10.1		
Transmission lines	148.5	(onsite)	5
Roads	69.4		
Railroad	18.8	(onsite)	
Pond (south)	8.5		

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Facility	Acres
Pond (west)	10.1
Visitor's center	1.1
Total	3169.1

The layout of these items within the site is given in figure 2.1-2.

Due to the remoteness of the VEGP site property from heavily populated areas, there are few human activities within the 5-mile radius of the plant site. A survey by the Central Savannah Area Planning and Development Commission[1] shows no public or private schools, hospitals, commercial areas, industrial plants, settlements, parks, recreational areas, or valued historic, scenic, or cultural areas within the Georgia portion of the 5-mile radius from VEGP. There will be a Georgia Power Company employees recreation area located approximately 2 miles southwest from the plant site. Refer to paragraphs 2.1.2.3 and 8.1.2.4 for more specific information. The South Carolina portion of the area described by this 5-mile radius falls wholly within the Savannah River Plant site, which is a highly restricted area, thus excluding all public and private activities save those associated with the plant. Two Savannah River Plant industrial sites are located within the 5-mile radius as given on figure 2.1-5, i.e., the heavy water production facility and the CMX-TNX facility. Figure 2.1-6 shows the site boundary, water bodies, and transportation lines within 5 miles of the site.

The greatest single land use present and projected within the 5-mile radius area is silvicultural. The remaining lands are either swamps or agricultural areas. The current population within the 5-mile radius is approximately 1100. The residences in this radius are essentially temporary ones serving VEGP construction workers. They consist of mobile home, camper, and duplex units. There are no permanent residential areas as such, though isolated residences are located in the 5-mile radius. Those near the plant site are discussed in paragraphs 2.1.3.1 and 2.1.3.2.

Lands adjacent to the GPC property boundary are generally large tracts, many of which are used as timberlands. The property lines of those adjacent and abutting properties are shown in figure 2.1-7.

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harvested crops such as corn, grain sorghum, and peanuts or on winter forage crops, primarily rye, and to a lesser extent, barley or wheat. Hay, primarily from coastal Bermuda grass, is used as a supplementary feed to foraged feed, primarily in the winter months. Silage, primarily corn and grass, is also used as a supplementary feed but to a lesser extent.

2.1.3.4 Recreational Fishing

Marine fishing data are not applicable because the proposed reactor site is not within 50 miles of the Atlantic Coast. The site is situated on the Savannah River (river mile 151) potentially impacting both commercial and recreational fishing. Data on recreational fishing success in the Savannah River from the river mile 0 to mile 187.2 have been obtained from creel and roving surveys conducted by the Georgia Department of Natural Resources (DNR). Table 2.1-48 presents the annual estimate of total number, average weight, and kg/ha by species from river mile 0 to mile 21.6 for the period December 29, 1979 to December 26, 1980. The total area covered by this survey was approximately 2535.2 ha. The recreational harvest for this section of the Savannah River was estimated to be 6.4 kg/ha. Table 2.1-49 shows the annual estimate of total number, average weight, and kg/ha by species from river mile 21.6 to mile 187.2 for the period December 29, 1979 to December 26, 1980. The total area covered by this survey was about 4122.2 ha. The recreational harvest for this section of the Savannah River was estimated to be 25.15 kg/ha.

2.1.3.5 Commercial Fishing

Commercial fishing data for the entire Savannah River is not available at this time from the Georgia DNR. Table 2.1-50 presents 5 years of data on weight and cash value of commercial shad from the lower Savannah River. The 5-year mean weight of shad was 37,183.6 kg with a mean value of $64,153.

2.1.3.6 Hunting

Deer hunting does occur within the 50-mile radius. Both hunting pressure and hunting success are very low, however. The State Game and Fish Commission's estimated annual harvest of deer ranges from 6280 to 18,840 deer. Estimated annual number of licensed hunters is 2500 to 5000. Other major species hunted include quail, rabbit, dove, turkey, woodcock, squirrel, duck, fox, and raccoon. No data are available on the success rate for hunting of these species on a regional or local level.

2.1.3.7 Public Accessibility

The remote, rural nature of the VEGP site and property has ensured minimal disruption to local land uses. All cooling water conveyance structures are contained on GPC property, and the point where these structures, both intake and outfall, join the Savannah River is not frequented by recreational users such as fishermen. (Recreational hunting and fishing activities are discussed in previous sections.) A single railroad spur has been constructed from the main line at Waynesboro to bring construction materials to the site and will be used for supplies in the future. The route for this spur did not interfere with any existing land uses. One road, i.e., River Road, has been diverted to skirt the GPC property. Old River Road, prior to GPC's activity, was a soil surfaced road. New River Road, which borders the GPC property, is paved. Thus, even the minimal increase to the distance traveled to avoid GPC property is compensated for by the higher quality of the roadway. No additional offsite access or other activities which could interfere with existing or projected land uses are contemplated at this time.

2.1.3.8 Water Usage and Characteristics

2.1.3.8.1 Possible Contamination Areas

2.1.3.8.1.1 Surface Water. The VEGP site is bordered on the east side by the Savannah River and on the south side by Beaverdam Creek. The discharge structure for the plant is directed into the Savannah River at about river mile 151. All overland flows would drain into either the Savannah River or Beaverdam Creek, which also discharges into the Savannah River immediately. The area of possible surface water contamination is, therefore, limited to the Savannah River downstream of the plant discharge (figure 2.1-9).

2.1.3.8.1.2 Groundwater. Additional groundwater information from that presented in the CPSER subsections 2.5.4 and 5.5.3 is summarized in FSAR subsection 2.4.12 and includes more recent water level data. A description of the geohydrological properties of the VEGP site including the potential for contamination of aquifers is found in subsection 2.4.2. Groundwater flow paths are illustrated for both the water table aquifer (unconfined) and the deeper Cretaceous and Tertiary groundwater systems (confined) in figures 2.1-10 and 2.1-11. Also, the response to Nuclear Regulatory Commission question E470.4 addresses potential contamination of offsite groundwater wells. 5

5

2.1.3.8.2 Usage of Possibly Contaminated Water Supplies

The Savannah River system below the VEGP site is very sparsely developed and, therefore, has few users. Population centers utilizing the Savannah River are not encountered until the ocean outfall of the river is approached in the area of Savannah/Chatham County (figure 2.1-9). In this area, eight withdrawals have been identified of which two serve at least some domestic users. One other withdrawal was identified in the area, i.e., Continental Forest, Inc.; it was determined that this withdrawal was from an upstream tributary to the Savannah River and, therefore, is not exposed to possible contamination.

The two population areas which are served by withdrawals from the Savannah River are the Beaufort/Jasper County water intake which currently serves approximately 50,000 domestic users and the water intake for the Cherokee Hill Water Treatment Plant which serves an effective population of 20,000 users. The Beaufort/Jasper County intake currently withdraws 5.18 million gal/day and is located at approximate river mile 39. It is projected, based on the Office of Business Economics-Economic Research Service's population projections, that by the year 2020, the domestic withdrawal rate will be approximately 5.47 million gal/day. Cherokee Hill Water Treatment Plant's domestic withdrawal rate is currently approximately 45.07 million gal/day and is expected to increase to 59.9 million gal/day by the year 2020. It is located downstream of the Beaufort/Jasper County intake at about river mile 29.

All of the remaining withdrawals are for industrial purposes, primarily cooling water. The industrial process water used is primarily for paper processing. There are no process waters associated with foodstuffs. There are no identified groundwater users such as riverbank wells which could conceivably be contaminated by VEGP discharge. A survey conducted by GPC found that there was no irrigation water withdrawal from the Savannah River near the plant site.

Table 2.1-51 lists the identified water users which could be contaminated by VEGP discharges, including the user name, type of water use, distance from the station in river miles and radial miles, current and projected withdrawal rates, and estimated return rates. Projections were made based on population for domestic users and the type of industrial use for other users. The various power company usages are not expected to increase over the projection period. The other industrial users are assumed to increase withdrawal rates at an average of 2 percent per year. Return rates were calculated on the assumption that domestic, industrial process, and cooling waters were 80, 90, and 95 percent of withdrawal rates, respectively. Use of the Savannah River does not vary seasonally, nor are there significant storage ponds or flow augmentation activities. 1

2.1.3.9 Socioeconomic Conditions

The socioeconomic sources [2, 3] identified in this subsection for Burke and Richmond Counties serve to update information presented in the CPSER section 2.2.

Burke County has a rural/agricultural economic base with some manufacturing. Major industrial activity in the county includes the manufacturing of draperies, clothing, lumber, fabricated metal products, and electric machinery. Table 2.1-52 shows the largest employment sectors for the county. Burke County ranks as one of the largest counties east of the Mississippi River and is sparsely populated. Currently, there is no county-wide zoning in force. The Burke County public school system is consolidated county-wide with nine facilities. The Burke County cities of Waynesboro, Midville, and Sardis are served by public water and sewage systems. Fire protection in Burke County is provided by volunteers in the cities of Waynesboro, Sardis, Midville, Girard, and Alexander. The sheriff's department provides services to the entire county, supplemented by municipal police forces of Waynesboro, Midville, and Sardis. 1

The economy of Richmond County is much more diversified than Burke County's, largely due to the influence of the Augusta metropolitan area. The county's economy is based on finance,

TABLE 2.1-12

POPULATION BY SEGMENT FOR NORTHEAST SECTOR
(60 to 500 MILES)

Mile (Ring)	Year 1987	2007	2028
60	19,161	28,348	33,198
70	18,829	26,624	39,780
85	208,870	249,714	293,681
100	61,479	73,501	86,432
150	178,281	202,386	288,464
200	269,053	335,909	413,141
350	1,952,630	2,424,538	3,012,690
500	3,186,605	3,637,416	4,308,568
Total	5,894,908	6,978,436	8,475,954

5

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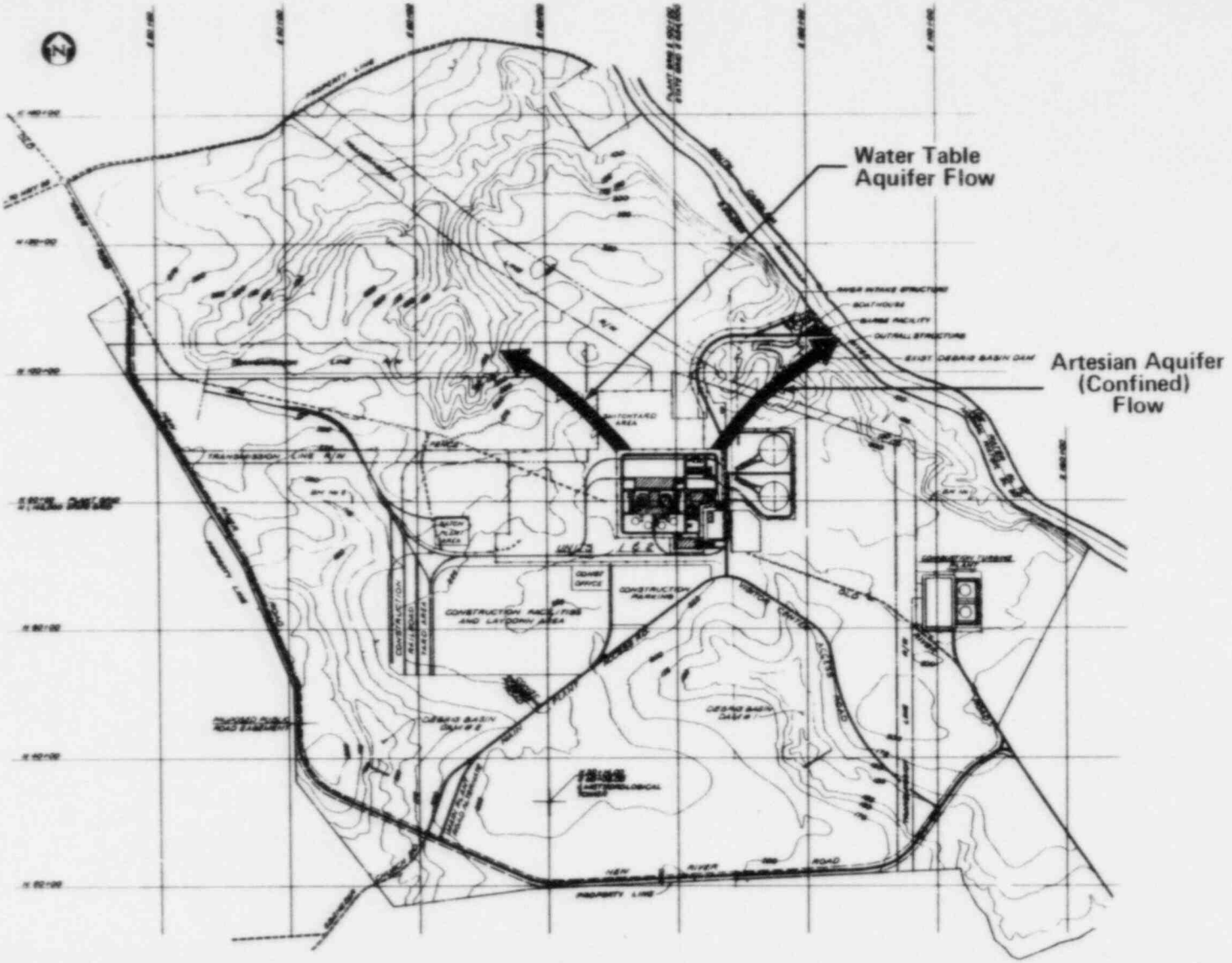

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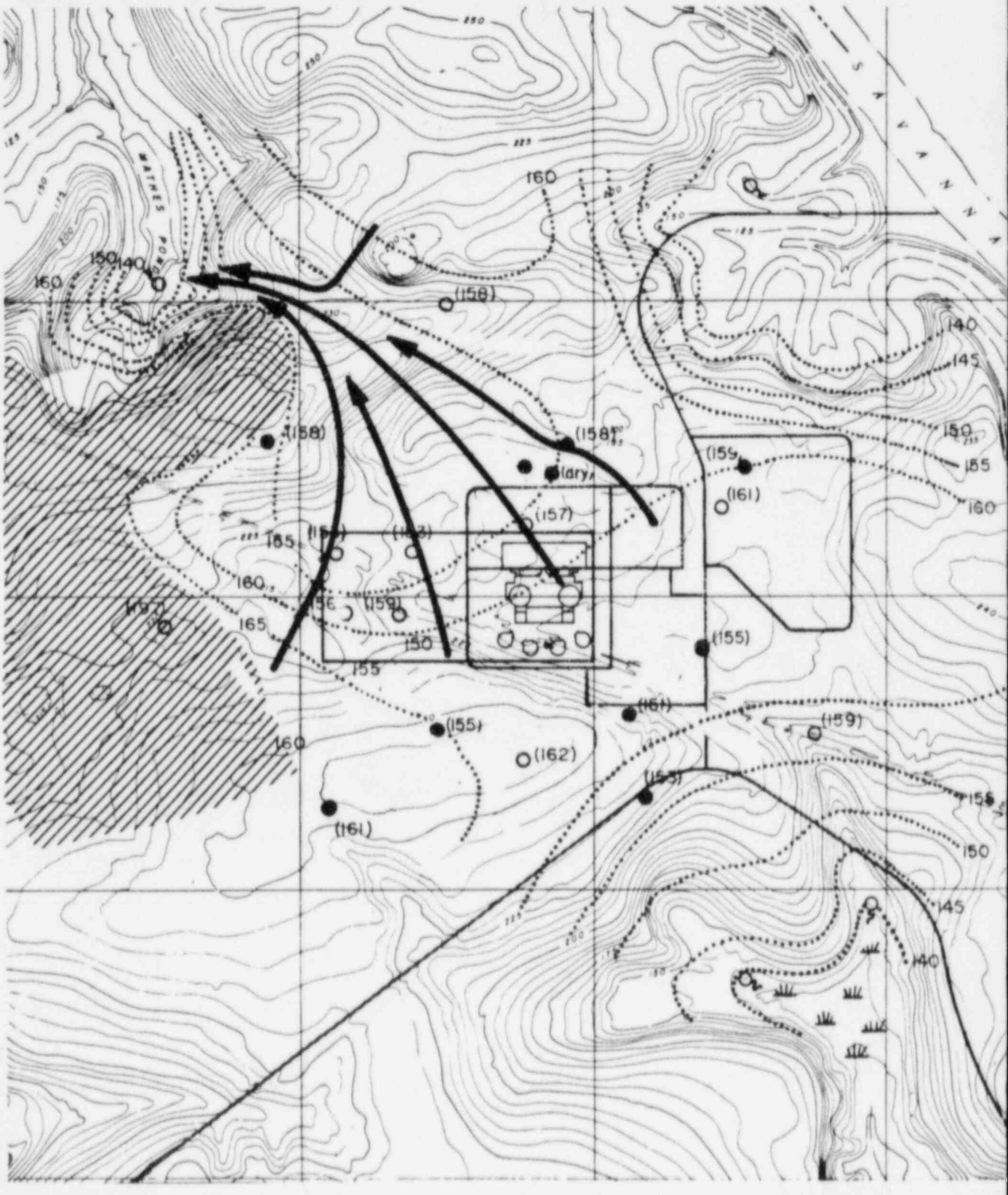
Georgia Power

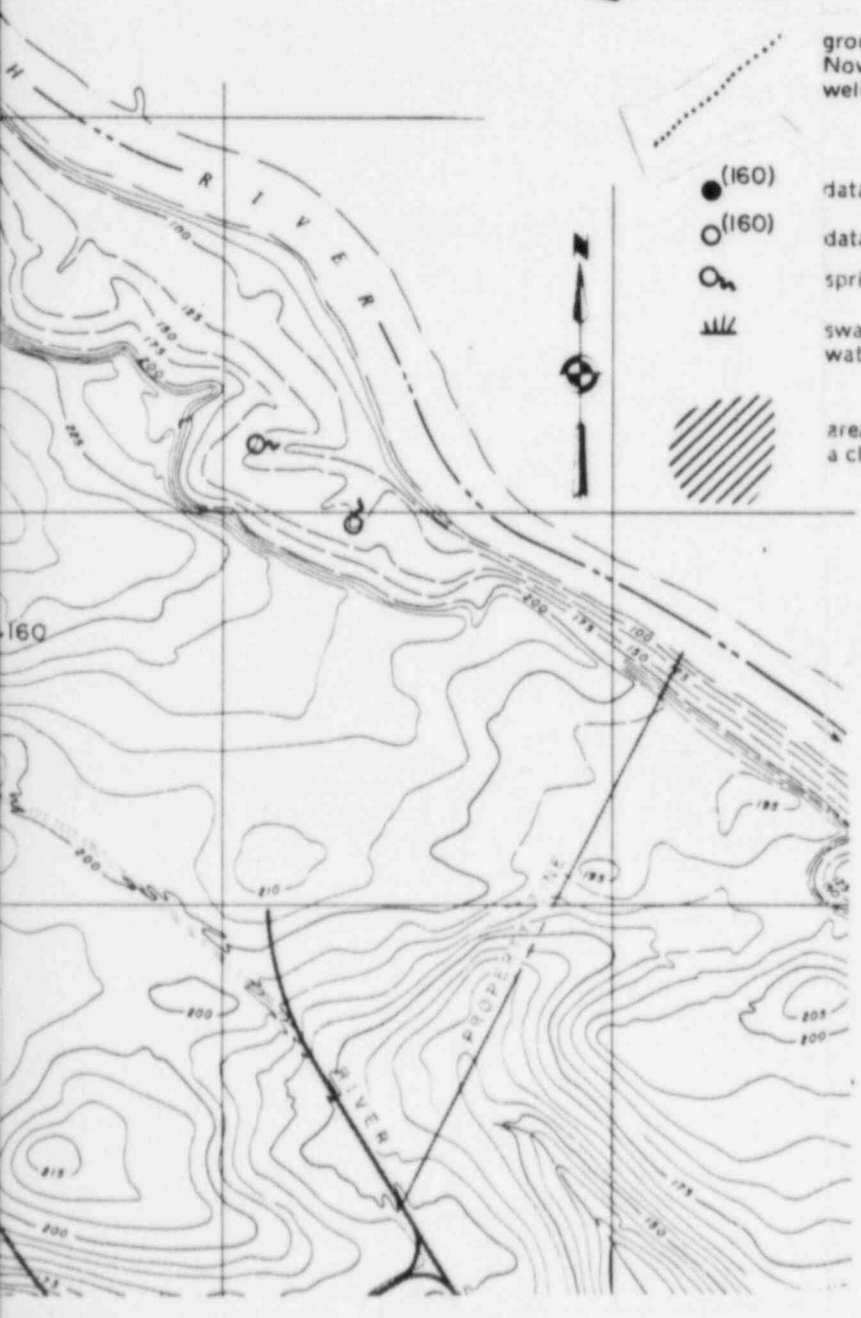
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

FLOW DIRECTIONS IN ONSITE
AQUIFER SYSTEMS

FIGURE 2.1-10

433-9


MATHES POND
160
150
140
(158)
(158)
(158)
(dry)
(157)
(161)
155
160
185
165
150
155
(155)
(161)
(159)
(155)
160
(162)
(155)
(161)
155
150
145
140



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VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

FLOW PATH AND CONTOURS OF WATER TABLE AQUIFER, NOVEMBER 1971

FIGURE 2.1-11

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2.2 ECOLOGY

This section describes the flora and fauna in the vicinity of the VEGP, their habitats, and their distribution. This baseline data updates information presented in section 2.7 of the Construction Permit Stage Environmental Report (CPSER) on the aquatic and terrestrial ecology of the site. The ecological environment in the nearby vicinity has not changed substantially from the environmental description presented in the CPSER and that described in the Final Environmental Statement (FES). Copies of the actual studies and raw data will be provided to the Nuclear Regulatory Commission upon request. Subsection 2.2.3 discusses the rare, endangered, or threatened species which possibly could occur on or near the site. A detailed discussion of methodologies used in conducting these programs is presented in section 6.1.

2.2.1 TERRESTRIAL ECOLOGY

2.2.1.1 Terrestrial Ecology Summary

Baseline studies to characterize the terrestrial flora and fauna on the VEGP site were conducted from 1974 to 1981.

Aerial photography and vegetation transects were used to describe the floral communities on the site. Sandhill-upland hardwood-pine is the dominant vegetation type on the site. Small stands of natural regenerated pine and pine plantations are interspersed within the sandhill-upland hardwood-pine communities. Hardwood stands occur in the stream and flood plain areas and along the bluff adjacent to the Savannah River flood plain. The vegetation inventory identified 109 herbaceous and shrub species and 48 tree species.

Interspersed within the wooded areas are fields, ponds, and cleared areas forming a patchwork of plant communities on the site. The number of different plant communities and the interspersion has resulted in a wide diversity of plants and animals, as well as creating a vast area of habitat margin or "edge" necessary for wildlife.

The surveys describing the fauna of the plant site identified 126 species of birds, 49 species of reptiles and amphibians, and 11 species of small mammals. Deer, squirrels, and rabbits occur in moderate to high populations. Furbearer (otter, beaver, bobcat, fox, raccoon, and opossum) signs are common over the plant site.

Three hundred and forty-three taxa of terrestrial invertebrates

were collected and identified. Coleoptera (beetles), Diptera (flies), Hymenoptera (bees and wasps), and Araneae (spiders) comprised the largest portion of the invertebrates collected.

Reports on the data collected with discussion of results for the studies describing the terrestrial ecology of the VEGP site are on file at Georgia Power Company (GPC). There are no domestic fauna (e.g., cows or goats) at the site or the nearby vicinity.

2.2.1.2 Vegetation Map and Description of the Site

A study to update the 1972 vegetation map (see CPSER section 2.7.1) and description of the VEGP site began in November 1980 and ended in May 1981 (see section 6.1.4.3.1). The purpose of the study was to evaluate the effects of construction on the vegetative communities. Figure 2.2-1 shows the vegetation communities and cleared areas of the site.

Approximately 46 percent of the original site has been cleared for construction. As of November 1984, an additional 60 acres of sandhil-upland hardwood pine community have been cleared. The sandhill-upland hardwood-pine community comprises approximately 43 percent of the remaining vegetation types. The dominant overstory species in the community are longleaf pine (Pinus palustris), post oak (Quercus stellata), and turkey oak (Quercus laevis). Other communities found on the site include branch hardwood, sandhill-upland hardwood-planted slash pine, cove hardwood (an additional 2 acres have been cleared since the 1980-1981 vegetation study), slash pine plantation, bluff hardwood, bottomland hardwood-river swamp, sandhill-longleaf pine, sandhill-cleared, and fields. 5

2.2.1.3 Terrestrial Invertebrates

A study to collect baseline data on the terrestrial invertebrate populations on the VEGP site was conducted in January, April, August, and November 1981 (see section 6.1.4.3.2). A total of 343 taxa were collected at four sampling plots on the site.

The Coleoptera, Diptera, Hymenoptera, and Araneae accounted for the greatest number of taxa. This was an expected result due to the known sizes of these taxa, their wide distribution, and the selectivity of some of the sampling methods. Other taxa may have been underrepresented due to sampling location and sample method selectivity.

Forty-six taxa occurred on all of the sampling plots on all of the collection dates. Ninety-one taxa occurred on all of the plots at some time during the survey period. These data indicate a diverse invertebrate fauna throughout the VEGP site.

The largest number of taxa were collected in April and August; the least number of taxa were collected in January. Of the four

by several species but in relatively low numbers compared to the diatoms. This observation is in agreement with other studies done on the Savannah River phytoplankton population by the Academy of Natural Sciences of Philadelphia.

2.2.2.5.2 Zooplankton

A study of the zooplankton community of the Savannah River near the VEGP site began in January 1981 and ended in September 1981 (see section 6.1.1.2.4). The purpose of this study was to gather baseline data on species composition, density, and diversity of the zooplankton community.

A total of 32 taxa were collected in the Savannah River between river mile 150.6 and river mile 151.2. The number of taxa collected for each major taxonomic group were: Protozoa, 7; Cnidaria, 1; Rotifera, 12; Copepoda, 3; Ostracoda, 1; Cladocera, 1; other Crustacea, 1; and miscellaneous taxa, 7. Because most identifications were made only to major taxonomic levels and many soft-bodied forms were destroyed by the formalin preservative used, the actual species variability of the zooplankton populations were underrepresented.

Members of the phyla Protozoa comprised approximately 61 percent of the total number of zooplankton samples taken in 1981. Rotifera represented about 18 percent; Crustacea, 10 percent; and other miscellaneous phyla, 10 percent of the total samples taken. Keratella spp. was one of the most abundant rotifers in the studies from 1959 to 1962 conducted by the Academy of Natural Sciences of Philadelphia and in the 1981 study. Relatively low densities of rotifers, copepods, and crustacean nauplii were also observed in both studies.

Densities of zooplankton were relatively low in the Savannah River near the VEGP. Other studies[9, 10, 11] conducted on the Savannah River revealed low zooplankton densities. The number of protozoan species varied greatly from that found in other studies and is probably due to differences in sampling design, methods, and level of identification. 1

2.2.3 RARE AND ENDANGERED SPECIES

Vertebrate species which may be found in the vicinity of the VEGP and which are listed on the Federal Endangered Species List[1] and Georgia's Protected Species List[2] are the shortnose sturgeon (Acipenser brevirostrum), American alligator (Alligator mississippiensis), mountain lion (Felis concolor cougar), ivory-billed woodpecker Campephilus principalis), red-cockaded woodpecker (Picoides

borealis), peregrine falcon (Falco peregrinus), wood stork (Mycteria americana), and the southern bald eagle (Haliaeetus leucocephalus leucocephalus). An evaluation of the occurrence of the wood stork, bald eagle, and red-cockaded woodpecker at the VEGP site and along the associated transmission lines was submitted to the staff (by D. O. Foster's letter to H. R. Denton dated September 14, 1984). 5

The shortnose sturgeon was not reported as occurring in the Savannah River by Dahlberg and Scott[3] or McFarlane, et al.[4] Heidt and Gilbert[5] reported its occurrence in the Savannah River, and more recent reports from South Carolina biologists[6] indicate its occurrence as far upstream as river mile 134. The specimens are reported from Millett and Tillman, South Carolina. In 1979, 1980, and 1981, specimens collected numbered 10, 7, and 12, respectively. Studies by GPC have failed to verify the presence of either the adults or larvae of the shortnose sturgeon in the vicinity of the VEGP. Specific sampling techniques for adult shortnose sturgeon were not used and may be the reason for their absence.

Heidt and Gilbert[5] stated that the shortnose sturgeon was reported to be rare and thought to have disappeared from much of its range in the United States. It appears to be relatively common in many large rivers along the eastern coast. Studies in large rivers of the eastern United States would probably reveal additional shortnose sturgeon populations. The Georgia Protected Species List recommends the life history and habitat requirement of the shortnose sturgeon be researched and critical habitats be determined. Such information is not yet available for the State of Georgia.

The American alligator has been sighted on the Savannah River and in sediment retention basins 1 and 2 located on the plant site. The habitats preferred by the American alligator are swamps, lakes, sloughs, or sluggish streams. The status of the American alligator was noted in FES-CP subsection 2.7.1. 5

The mountain lion has not been sighted nor have tracks been found on the plant site. The species has been reported from Columbia County, located north of Burke County, but has not been reported from Burke County. Farming and logging operations have probably led to the decline of the species, which prefers vast tracts of undisturbed land. Since much of the area surrounding the plant site has been disturbed by farming and logging operations, it is doubtful that the species occurs in the vicinity of the plant site.

The ivory-billed woodpecker and red-cockaded woodpecker are very habitat-specific species. The ivory-billed woodpecker requires extensive acreages of mature cypress swamp and bottomland

hardwoods. This species has not been observed in Georgia in over 30 years and is probably now extinct. The red-cockaded

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2.4 HYDROLOGY

Since the submission of the VEGP Construction Permit Stage Environmental Report (CPSER) and the publication of the Nuclear Regulatory Commission's Final Environmental Statement (FES), additional flow and water quality data for the Savannah River and groundwater have become available. The following is a brief description of these additional studies and factors which have changed since the CPSER and FES.

2.4.1 SURFACE WATER ENVIRONS

Since the completion of the FES, an additional upstream reservoir, Richard B. Russell, located between Clarke hill and Hartwell reservoirs has been completed. The construction of this reservoir is not expected to change the low or average flow characteristics at the VEGP site.

The City of Augusta, Georgia has proposed to construct a 12-MW hydroelectric facility on the existing canal which parallels the Savannah River in the vicinity of Augusta. This hydroelectric facility will only divert a portion of the river flow through the turbines and return it to the river. This activity will be above the existing navigation lock and dam which controls water levels in the vicinity of Augusta. This proposal will have no impact on water levels or flows in the vicinity of VEGP. 5

Based on data from the United States Geologic Survey gaging station at Augusta, Georgia (approximately 50 river miles upstream from the VEGP site), the annual average flow of the Savannah River is 10,300 ft^3/s. Due to upstream flow control by the U.S. Corp of Engineer dams, the minimum flow, guaranteed to preserve navigability, is 5,800 ft^3/s with 6,300 ft^3/s achieved 70 percent of the time.

There are four facility structures in the flood plain associated with VEGP: the intake structure with canal; the barge unloading facility; the site runoff flume; and site discharge pipe. These facilities have been permitted by the Corps of Engineers pursuant to section 10 of the River and Harbors Act and section 404 of the Clean Water Act. As part of that process (33 CFR 320.4 (1)), the Corps of Engineers considered Executive order 11988 relative to flood plain management and the effect that these facilities would have on upstream and downstream users. (See response to question E240.7.) 5

Detailed information on surface water is found in section 2.4 of the Final Safety Analysis Report (FSAR). Section 2.5 of the

CPSER and section 2.5 of the FES contain further information on surface water.

Additional surface water quality studies have been performed by Georgia Power Company, the U.S. Geological Survey, and others. Results of these studies have been analyzed and compared with information utilized to prepare the FES. These studies show no significant change in the characteristics of the surface water quality at the VEGP site from that used in the preparation of the FES. Georgia Power Company has conducted specific studies

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regarding silt loading in the Savannah River in the vicinity of the intake structure. This information has been utilized in the design of the VEGP intake structure.

2.4.2 GROUNDWATER

Details of the regional and site groundwater characteristics are discussed in FSAR subsection 2.4.12. Readers are referred to that document for descriptions of aquifer characteristics, hydraulic properties, stratigraphic features which control groundwater migration, and details of past and projected future use of the groundwater resource.

In the paragraphs which follow, the groundwater aquifers at the VEGP are briefly described with emphasis placed on the potential for contamination to migrate offsite and affect groundwater quality in adjacent areas.

2.4.2.1 Cretaceous and Tertiary Groundwater Systems

The Cretaceous groundwater system is represented in the VEGP area by the Tuscaloosa Formation. This unit is approximately 700 ft thick near the VEGP and appears to be of equal or greater thickness in South Carolina. It consists primarily of crossbedded sands and gravels with subordinate beds of silt, clay, and kaolin. It is a highly transmissive aquifer system. 4

Recharge to the Cretaceous aquifer is primarily from infiltration of rainfall where the formation is exposed several miles north of VEGP. In the same general area, the Tertiary groundwater system is also exposed and off-laps the Cretaceous system. In this area, the Cretaceous and Tertiary systems are in hydraulic contact and the groundwater is under water table conditions. After the water infiltrates the sediments, it migrates downdip in a south-by-southeast direction. Downdip from the recharge area, groundwater in the Cretaceous sediments becomes confined beneath the relatively impermeable clays and silts of the Huber and Ellenton Formations (Paleocene). At VEGP the Huber and Ellenton Formations are semipermeable and permit hydraulic contact between the Cretaceous aquifer and overlying Tertiary aquifer. As will be seen, these aquifers are both confined by the stratigraphically higher Blue Bluff member of the Lisbon Formation. 5 5

At the VEGP site, the Tertiary groundwater system is represented by two members of the Lisbon Formation. The lower member of the Lisbon Formation consists of fluvial sands and sandy clays for which formal stratigraphic nomenclature has not yet been established. 5

3.3.3 CONSUMPTIVE USE

The VEGP will consume an average of 840 gal/min of groundwater and 30,000 gal/min of Savannah River water. Maximum consumptive use is 2300 gal/min of groundwater and 30,000 gal/min of river water. The majority of the plant water consumption is due to evaporation from the natural draft cooling towers. At the maximum use rate, the river water consumption is 0.6 percent of the 10,300 ft^3/s average Savannah River flow and 1.2 percent of the 5800 ft^3/s minimum flow guaranteed from upstream control structures. The above flow rates are based on a two-unit operation. 5 1

TABLE 3.4-1 (SHEET 2 OF 2)

Drift rate	
guaranteed (percent)	0.03
expected (percent)	0.008
Circulating Water Pump (2 per tower)	
Flowrate (gal/min)	242,300
Head (ft)	95

5

1

TABLE 3.4-2

GPC WATER CHEMISTRY CRITERIA FOR
COOLING TOWER OPERATION

Stability index	7.0 - 8.0
Cycles of concentration	2.0 - 6.0
pH	7.0 - 8.5
Total manganese (ppm as Mn)	<0.2
Corrosion (mil/year)	<10
Free available chlorine (ppm Cl_2)	0.2 - 1.0 (periodic) 5

concentration. This will be followed with a rinse of demineralized water.

2. Rust and mill scale will be removed from the system by circulating a heated organic acid solution for several hours.

3. Following the cleaning, the system will be flushed with rinses consisting of demineralized water and/or passivating chemicals.

Estimated total water volume used in one complete cleaning would be approximately 9,000,000 gal per unit. Wastes from this flushing process will be directed to the waste water retention basin, construction sediment retention basin, or the startup ponds for suspended solids removal before discharge to the Savannah River. The startup ponds consist of one unlined pond with a capacity of 5×10^6 gal for short term storage and one lined (0.100-in. high-density polyethylene) pond with a capacity of 3×10^6 gal for long term storage. The waste water retention basin is described in section 3.6.3. The majority of the water flushings from the fire protection system, potable water system, and utility water system will be directed to site storm drains. From the storm drains, the flushings will discharge to one of the three construction sediment retention basins for suspended solids removal. A small quantity of flush water will be collected in building drains which discharge to the waste water retention basin. Other station systems that are water flushed will discharge to either the waste water retention basin or the unlined startup pond for suspended solids removal. All chemical cleaning flushings will be discharge to the lined startup pond for treatment prior to discharge. The waste water from the startup ponds and waste water retention basin is discharged to the blowdown sump. Assuming that water flushing is sufficient, the startup waste is subject to EPA effluent limitations and standards for low volume wastes. 5 2 3

If chemical cleaning is required, treatment in the startup ponds will conform to EPA effluent limitations for metal cleaning wastes as discussed in subsection 5.1.1. The estimated quantities of chemicals used for chemical cleaning is shown in table 3.6-3.

Periodic nonradioactive operational equipment cleaning wastes will also be discharged to the waste water retention basin and/or startup ponds. The amount of cleaning waste involved will not be greater than that used during preoperational cleaning. 2

3.6.2.4 Water Treatment Plant

The water treatment plant is essentially the same as discussed in CPSER subsection 3.7.3. However, there is only one water treatment plant due to the decrease in the plant size from four to two units.

3.6.2.5 Liquid Radioactive Wastes

Systems for processing liquid radioactive wastes are described in subsection 3.5.2. Final discharge of effluents from the liquid radioactive waste processing system will meet 10 CFR 20 requirements for release into the Savannah River and EPA effluent limitations for low volume waste as discussed in subsection 5.1.1.

3.6.2.6 Turbine Building and Miscellaneous Building and Area Drains

The turbine building miscellaneous building and area drains are discussed in FSAR subsection 9.3.3. Oily wastes are treated by an oily waste separator and meet the EPA effluent limitations for low volume waste oil discharge as discussed in subsection 5.1.1.

3.6.3 LIQUID DISCHARGE SUMMARY

As shown in figure 3.3-1, the low volume waste streams are collected in the waste water retention basin. The basin is a corrosion-proof, epoxy-lined basin that provides aeration and retention time for the wastes. The basin consists of two compartments, one side being used to handle normal waste streams and the other compartment providing holdup capacity for waste requiring treatment. Each compartment is sized for the waste generated for both units. Any treatment of the waste is done manually as needed based on the results of periodic samples. The solids removed from the waste water retention basin is discussed in subsection 3.6.4.

Liquid wastes from the waste water retention basins, the blowdowns from the nuclear service cooling water towers and natural draft towers, and any dilution flow necessary to meet 10 CFR 20 limits are combined in the blowdown sump. The liquid radwaste is injected into the discharge pipe downstream of the blowdown sump.

The characteristics of the waste streams and of the combined effluent discharge to the Savannah River are shown in table

3.9 TRANSMISSION FACILITIES

The environmental effects of the operation and maintenance of the transmission facilities are addressed in section 5.5. This section addresses changes in the transmission system since the Construction Permit Stage Environmental Report (CPSER) and the Construction Permit Stage Final Environmental Statement (FES).

Figure 3.9-1 illustrates the transmission system proposed in the CPSER and evaluated in the FES. This system included six corridors containing eight 500-kV lines and three 230-kV lines. This system would have impacted approximately 12,660 acres.

Figure 3.9-2 indicates the currently proposed transmission system. This system is based on current planning studies evaluating substation and interconnection needs for the Georgia intergrated transmission network. Changes from the CPSER are due to a reduction from a four-unit plant to a two-unit plant as well as changes to construction schedules of substations and lines. The system described in figure 3.9-2 supersedes past system descriptions in the CPSER and intervening changes such as those described in Mr. D. E. Dutton's letter to D. G. Eisenhut of February 1, 1982.

Two 230-kV lines will go from VEGP to Goshen. These lines will share a common right-of-way approximately 19 miles in length with the existing 230-kV line which goes from Plant Wilson to Goshen.

A short single 230-kV line will go from VEGP to South Carolina Electric and Gas (SCEG). The route will involve approximately 3.8 miles of line on the Georgia side of the Savannah River and approximately 18.5 miles on the Savannah River Plant. The line will occupy approximately 36 acres of wetlands primarily in 1000- to 2000-ft stretches associated with Four Mile, Branch, and Steel Creeks. Most of these wetland areas can be spanned by the transmission lines by placing towers outside these areas. SCEG will be responsible for constructing the line. SCEG will be required to obtain Environmental Compatability and Public Convenience and Necessity from the state of South Carolina pursuant to Utility Facility Siting and Environmental Protection Act (Title 58, Chapter 33, Code of Laws of South Carolina). All activities in South Carolina associated with the VEGP-SCEG line will be performed in conformance with the requirements of this law. The application for this certificate process has been initiated by SCEG. A copy of the application will be provided to the staff on or about June 1, 1985.

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A 500-kV line will go from VEGP to Plant Scherer. This line will be approximately 152 miles long. This line is routed via the existing Wadley Substation but will not be initially interconnected at that point. This line is also routed via the Wallace Dam area, the site of a future substation.

A 500-kV line will go from VEGP to the Thalmann Substation. This line is routed by a proposed substation at Effingham (McIntosh) but will not interconnected at that point. The VEGP - Thalmann line will be approximately 159 miles in length.

It is projected that the entire network illustrated on figure 3.9-2 will affect approximately 6,500 acres. This is a reduction in the environmental impact from that originally evaluated at the Construction Permit Stage of approximately 12,600 acres. 5

Table 3.9-1 provides details on the basic electrical design parameters including design voltage, line capacity, conductor type and configuration, spacing between phases, and minimum conductor clearances to ground. Table 3.9-2 indicates the lengths, widths, and area of rights-of-way. Table 3.9-3 indicates the land use categories impacted by the transmission lines. The categories correspond to those given in the CPSER and (FES). 2

The basic structural design parameters for the 500-kV and 230-kV structures are the same as those described in section 5.4.1 of the CPSER. In addition, the general methods of construction are also the same as those provided in the CPSER. Figure 3.9-3 illustrates the SCEG 230-kV transmission line structure.

Insofar as feasible and practical, route selection has been guided by the Federal Power Commission publication, "Electric Power Transmission and the Environment" and the Department of Interior/Department of Agriculture publication entitled "Environmental Criteria for Electric Transmission Systems." Due consideration has been given to the avoidance of possible conflicts with any known natural or manmade areas where adverse effects of the environment could result. GPC coordinates with the appropriate agencies within the State of Georgia for determination of whether any structures or site of historical or archaeological significance will be disturbed and any required mitigating returns. These actions are consistent with the requirements of the VEGP Construction Permit condition 3E(1) and the commitments summarized in section 4.5 of the (FES).

TABLE 3.9-1

PHYSICAL CHARACTERISTICS OF VEGP TRANSMISSION LINES

		VEGP-Goshen (White) 230-kV Line	VEGP-Goshen (Black) 230-kV Line	VEGP-Thalmann 500-kV Line	VEGP-Plant Scherer 500-kV Line	VEGP-SCEG 230-kV Line (Georgia Side)	VEGP-SCEG 230-kV Line (South Caroline Side)
1.	Structure type	Guyed H-frame	Guyed H-frame	Four-legged rigid base	Four-legged rigid base	Guyed H-frame	Guyed H-frame
2.	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel	Galvanized steel	Wood and galvanized steel
3.	Nominal height	80 ft - 100 ft	80 ft - 100 ft	80 ft - 100 ft	80 ft - 100 ft	80 ft - 100 ft	80 ft - 100 ft
4.	Line length (miles)	18.8	18.8	159	152	3.8	18.5
5.	Number of lines	1 at 230 kV	1 at 230 kV	1 at 500 kV	1 at 500 kV	1 at 230 kV	1 at 230 kV
6.	Nominal span	1300 ft	1300 ft	1300 ft	1300 ft	1300 ft	800 ft
7.	Number of structures/ miles	4 - 4.5	4 - 4.5	4 - 4.5	4 - 4.5	4 - 4.5	6-6.5
8.	Conductor type/size	Two bundles 795 kcmil ACSR	Two bundles 795 kcmil ASCR	Three bundled 1113 kcmil ASCR	Three bundled 1113 kcmil ASCR	Two bundles 1351.5 kcmil ACSR	Two bundled 1272 kcmil ASCR
9.	Phase/phase clearance	23 ft	23 ft	28 ft	28 ft	23 ft	18 ft
10.	Conductor ground clearance at maximum operating condition	27 ft	27 ft	33 ft	33 ft	27 ft	30 ft

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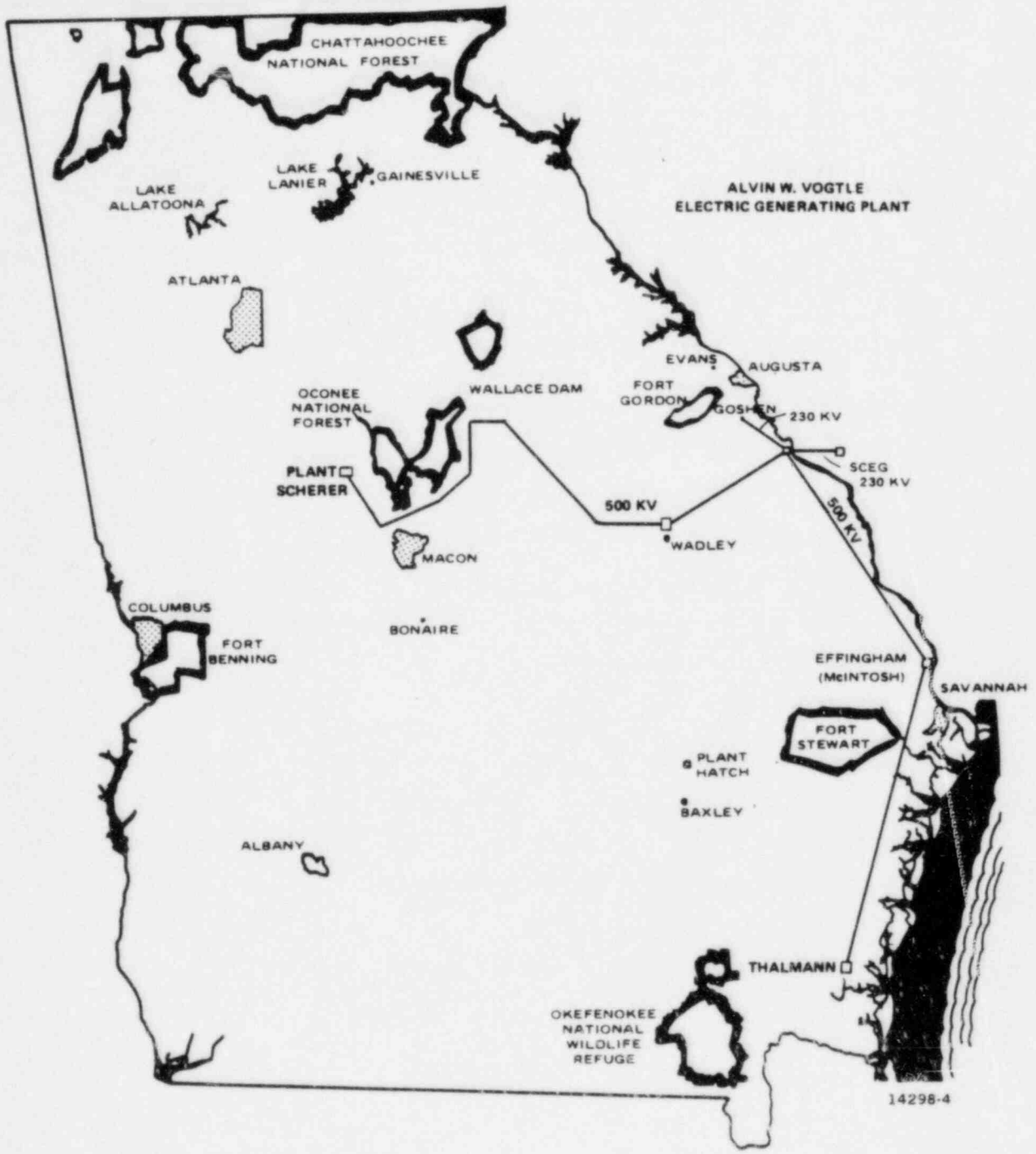
VEGP-OLSER-3

TABLE 3.9-2

PHYSICAL CHARACTERISTICS OF VEGP TRANSMISSION LINES

Name of Line/Section	Lengths of Different Widths of R/W (Miles) 275 ft	150 ft	137.5 ft	125 ft	100 ft	Total Length of Parallel lines (Miles)
Plant Vogtle-Wadley-Wallace Dam-Plant Scherer 500-kV transmission line						
• Plant Vogtle-Wadley section*	--	24.6	17.8	--	--	17.8
• Wadley-Wallace Dam section	--	42.4	13.9	--	--	13.9
• Wallace Dam-Plant Scherer section	--	49.2	3.5	--	0.9	4.4
• Total	--	116.2	35.2	--	0.9	36.1
Plant Vogtle-Effingham-Thalmann 500-kV transmission line						
• Plant Vogtle-Effingham section	--	68.8	--	--	--	0.3
• Effingham-Thalmann section	--	83.6	--	6.2	--	45.1
• Total	--	152.4	--	6.2	--	45.4
Plant Vogtle-Goshen No.1 , No. 2, and No. 3 230-kV transmission line	18.80	--	--	--	--	18.8
Plant Vogtle-South Carolina Electric & Gas (SCEG)	--	--	--	--	--	--



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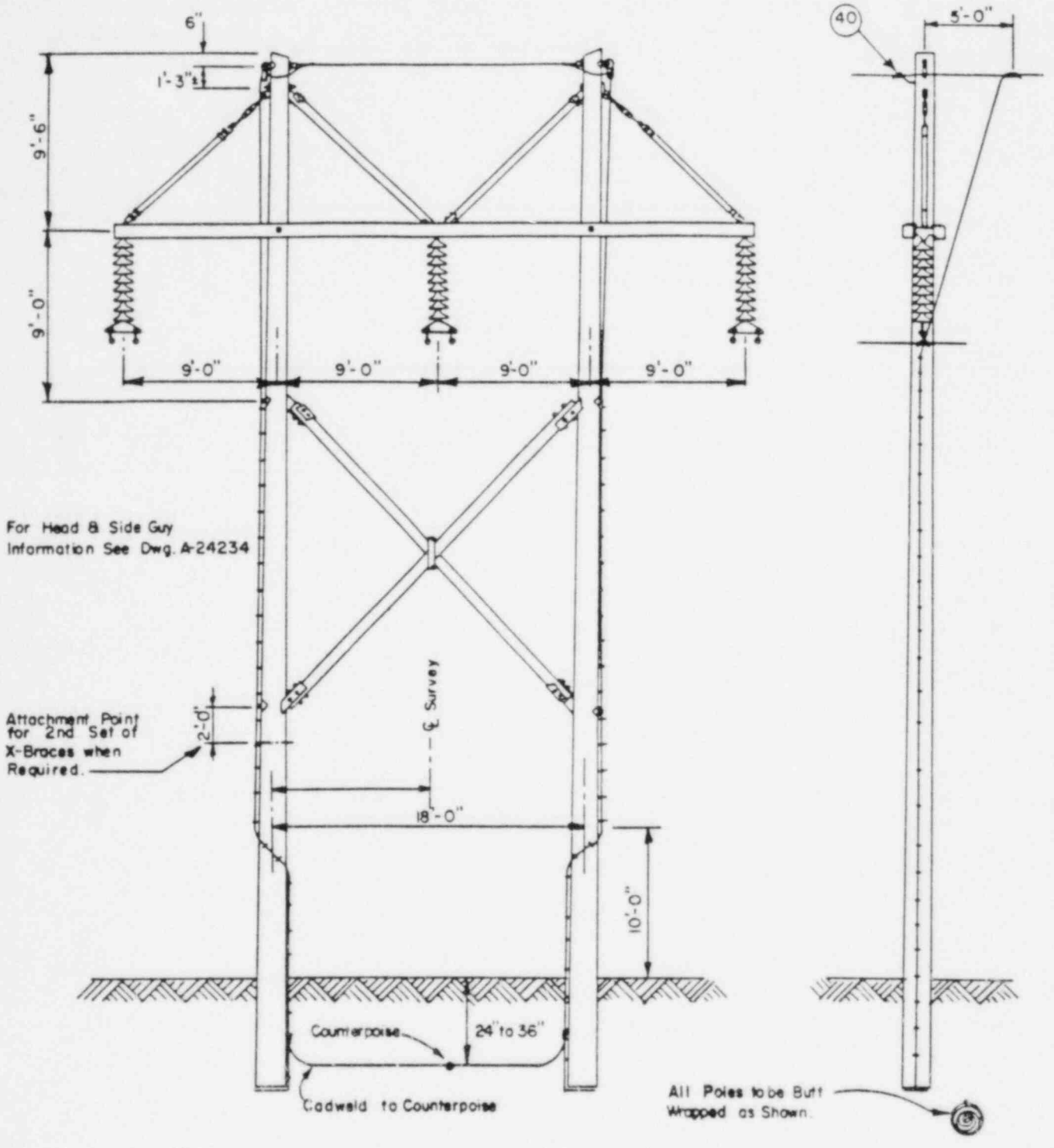
Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

TRANSMISSION LINE ROUTING

FIGURE 3.9-2

433-9



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Georgia Power VOGTLE ELECTRIC GENERATING PLANT UNIT 1 AND UNIT 2	230kv TRANSMISSION LINE STANDARD
	FIGURE 3.9-3

433-9

NUS-4662

AN EVALUATION OF COOLING TOWER DRIFT DEPOSITION AT THE VOGTLE ELECTRIC GENERATING PLANT

for

Southern Company Services, Inc.

January 29, 1985

Morton I. Goldman, Sc.D.

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AN EVALUATION OF COOLING TOWER DRIFT DEPOSITION AT THE VOGTLE ELECTRIC GENERATING PLANT

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I. INTRODUCTION

On October 26, 1984 NUS was requested to review the amounts of minerals from cooling tower drift estimated to be deposited in the vicinity of the Vogtle Electric Generating Plant (VEGP). A drift deposition assessment had been submitted earlier by the Applicant based on presumptions of the similarity between the behavior of drift from the cooling towers at the VEGP and from those at several other power plants. The conclusion was reached that the VEGP towers were not likely to produce significant drift mineral deposition densities. To demonstrate the validity of that conclusion, a decision was made to model the performance of the VEGP towers to predict site specific drift mineral deposition. This report presents results of that modeling.

II. FOG DRIFT DEPOSITION MODEL

The drift mineral deposition patterns to be expected from the operation of the VEGP were predicted using the NUS FOG computer code. This code, most recently documented in the ER-OL for the Palo Verde Nuclear Generating Station[1] calculates the release, plume rise, transport and deposition of drift droplets from natural and mechanical draft cooling towers and other heat dissipation systems.

The drift deposition routines in FOG consist of the following three calculational procedures: (1) the sequential release of the entrained drift droplets from the effluent plume, (2) the subsequent horizontal transport of the drift droplets as they fall to the ground, and (3) the calculation of the airborne concentrations and deposition rates of drift minerals at pre-specified downwind distances for each of the 16 wind directions.

It is assumed in the FOG model that the excess water vapor, the temperature excess, the vertical velocity, and the concentration of drift droplets follow a Gaussian distribution normal to the plume axis. The plume is assumed to extend two standard deviations (i.e., $2\sigma_y$ and $2\sigma_z$) away from the plume axis. The release of the entrained droplets at any point within the plume depends on the relative magnitudes of the terminal fall velocity of the droplets and the vertical velocity of the air in the plume. At each downwind distance under consideration, these two velocities are compared for the various size categories of droplets in the plume, and a fraction of the droplets is released. This process is repeated until all droplets are released from the plume. When the plume reaches its maximum height, the vertical velocity throughout the plume is zero. Any droplets remaining in the plume at the level-off point are then released. Droplets released from the plume then fall, first through the plume air, and then through the ambient air beneath the plume.

The drift is carried downwind by the ambient wind until it is deposited on the ground. The rate of fall of the drift droplets is proportional to their terminal velocity, which in turn is dependent on the droplet size. The droplet size can change by evaporative processes, which depend on the physical and transport properties of the liquid droplets and the

surrounding air. For relative humidities below 50%, complete evaporation of the drift droplets to dry particles is possible. A stepwise procedure is employed in FOG to compute the trajectory of the droplets by considering the above effects.

Deposition rates of drift minerals as wet droplets and dry particles are calculated for each of the sequential meteorological records included in a one or more year meteorological data set, with wind speeds increased with height according to a power law relationship. These calculated deposition rates are then summarized to obtain the mineral deposition (in terms of lb/acre-year) over the entire grid.

The FOG code was recently evaluated and validated by an independent consultant, Dr. William Dunn of the University of Illinois, "as one of the better-performing" of the computer models evaluated on behalf of the NRC.(2)

III. FOG MODEL INPUT DATA

As with most contemporary computer models, the FOG code requires a great degree of detail with respect to the meteorological parameters of the site, the design and performance characteristics of the towers, the size distribution of the droplets emitted as drift, and their chemical composition. Hour-by-hour meteorological records for two periods (from April 4, 1977 to April 4, 1978, and from April 1, 1980 to March 31, 1981) taken from the site meteorological tower were used for the analyses. The latter year is that used for the Applicant's comparative drift analyses, and the earlier year of record is one felt by the Applicant's meteorological consultant to be representative of average site meteorology.(3) Annual wind roses for these two data years are presented in Figure 1.

Since the tower effluent plume rises considerably higher than the elevation of the site tower, the reasonableness of the site data as a basis for calculation was checked using wind data measured by the Savannah River Laboratory[4] at higher elevations on a 1000 foot TV tower across the Savannah River from the VEGP. These data are presented as annual wind roses in Figure 2. It can be noted that aside from expected increases of wind speed with elevation, and the slight change in wind direction with height, these data agree well with those taken from the VEGP meteorological tower.

The majority of the cooling tower input information used came from the VEGP-OLSER, Section 3.4, supplemented with more detailed information on tower design details provided to the Applicant by Research-Cottrell, the tower vendor. A tabulation of the pertinent design and operating parameters used as input to the FOG model are shown in Table 1.

One of the more significant parameters not available specifically for the VEGP towers is the mass distribution by droplet size of the drift emitted from the top of the tower during operation. Values reported for natural draft towers[5-10] were examined with the objective of selecting mass-size distribution spectra to bound the likely range of drift droplet sizes, and the consequent deposition patterns. The spectra examined are presented in Figure 3 as a probability distribution of mass versus droplet diameter. Of these distributions, those curves labelled 1 through 5 and HC represent measured data; the remaining curves either represent design objectives or assumptions, or are not specifically identified as measured spectra in the references cited.

It can be noted in Figure 3 that most of the curves are relatively closely grouped, with mass median (50th percentile)

diameters ranging from about 80 to 150 microns. It is the larger drift droplets (i.e., those in excess of a few hundred microns in diameter) which tend to produce the most significant deposition because of their greater fall velocities and mass. The size distribution labelled "6" in Figure 3, with a mass median diameter in excess of 200 microns, was selected as a "conservative" spectrum almost certain to produce an upper bound deposition pattern. Although the mass median diameter of the distribution labelled "4" attributed to the Pennsylvania State University (PSU) measurements at the Keystone station is even greater, this distribution was measured by aircraft sampling in the plume rather than at the tower exit and was rejected as too deviant from the remainder of the spectra.

The distribution labelled "NUS", with a mass median diameter of 100 microns, is used by NUS as the "default" spectrum for evaluations in which the data appropriate to the particular natural draft tower are not available. It is a hypothetical distribution, one representative of most of those reported and therefore likely to be similar to droplet sizes (and resulting distribution patterns) observed from operating towers. In the absence of a droplet mass-size distribution specifically determined for the VEGP towers, the NUS spectrum was used to provide the "realistic" values for this evaluation. Each of these spectra was distributed into 16 size classes, or bins, for use as input to the FOG code as presented in Tables 2 and 3 for the conservative and realistic distributions, respectively.

IV. FOG MODEL RESULTS

As indicated above, two runs of the FOG code were made for each year of meteorological data, one with the conservative

and the other with the realistic droplet size spectrum. The isopleths of total mineral deposition (both in droplets and as dry particles) in pounds per acre per year are presented in Figures 4 and 5 for the representative data year and the conservative and realistic droplet spectra, respectively. Figures 6 and 7 present corresponding results for the later year.

Several conclusions can be drawn from the results shown in these figures:

1. Of the two input parameters varied, the meteorological data year and the drift droplet spectrum, the latter is by far the more significant, producing about an order of magnitude change in mineral deposition. This is generally consistent with observations by others.(2,5)

2. The conservative drift droplet size spectrum produces a maximum mineral deposition of about 1.7 pounds per acre-year (0.16 kg/ha-mo) to the east of the cooling towers at the boundary of the plant site during the representative year of record. The less typical year changed the shape of the deposition patterns somewhat and reduced the maximum to about 1 pound per acre-year (0.09 kg/ha-mo).

3. The realistic drift droplet spectrum produces an estimate of the maximum mineral deposition of about 0.1 pounds per acre-year (0.009 kg/ha-mo) at the plant site boundary east of the cooling towers during the representative year of record. This is a factor of 17 less than that resulting from the use of the conservative droplet spectrum. The less typical year

yielded an estimate for maximum deposition at the site boundary of less than 0.1 pounds per acre-year, again located to the east of the towers.

4. Even the most conservative of the four runs shows a maximum total mineral deposition rate off the plant site which is less than two pounds per acre-year (0.18 kg/ha-mo) of which NaCl is less than one-fourth, well below any value expected to result in adverse effects. For example, the US NRC states[11]: "Deposition of salt drift (NaCl) at rates of 1 to 2 kg/ha-mo is generally not damaging to plants."

V. CONCLUSIONS

It is concluded that the operation of two units of the Vogtle Electric Generating Plant in accordance with expected design and performance parameters will not result in a detectable addition to the natural environment in respect to deposition. This conclusion confirms the earlier analysis by the Applicant using an extrapolation of the predicted performance of other plants with natural draft cooling towers, an analysis much more conservative than the site-specific drift deposition analysis reported herein. The best estimate of the deposition of solids from the drift of two cooling towers at the downwind site boundary is a value of less than one pound per acre-year.

VI. ACKNOWLEDGMENTS

Contributions to this review were made by S. R. Tammara (FOG runs), B. L. Orndorff (library research and VEGP meteorological data reduction), and R. W. Brode (SRP TV Tower data reduction).

VII. REFERENCES

1. Palo Verde Nuclear Generating Station ER-OL, Section 6.1.3.3.3.3.

2. Dunn, W.E., "Evaluation of NUS/FOG Computer Model for Predicting Cooling Tower Drift Deposition Rates", July 15, 1983.

3. Personal Communication from Mark Abrams, Pickard, Lowe and Garrick, Inc., December 1984.

4. US DOE-Savannah River Laboratory supplied data tape; see also Hoel, D., "Climatology of the Savannah River Plant Site", DP-1679, June 1984.

5. Chen, N.C.J., and Hanna, S.R., "Drift Modeling and Monitoring Comparisons", Atmospheric Environment, Vol.12, pp 1725-1734, 1978.

6. DeVine, J.C., "The Forked River Program: A Case Study in Salt Water Cooling", GPU Service Corporation, Parsippany, NJ, February 1974.

7. Personal Communication from Mark Abrams, Pickard, Lowe and Garrick, Inc., December 1984.

8. Susquehanna SES ER-OL, Figure 5.1.4, May 1978.

9. Beaver Valley Power Station Unit 2 ER-OLS, Appendix 3B.

10. Grand Gulf Nuclear Station ER, Table 5.1.11, Amendment 5, February 1981.

11. Environmental Standard Review Plans for the Environmental Review of Construction Permit Applications for Nuclear Power Plants, NUREG-0555, Section 5.3.3.2, US NRC 1979.

TABLE 1

VOGTLE ELECTRIC GENERATING PLANT
COOLING TOWER DESIGN AND OPERATING PARAMETERS

Parameter	Value per Tower	
Number of towers	2 (1 per unit)	(a)
Height, feet	550	(b)
Exit diameter, feet	303	(b)
Heat dissipated, BTU/hr	8×10^9	(a)
Range, °F	33	(a)
Circulating water flow, gpm	484,600	(a)
Expected drift rate, %	0.008	(c)
Avg. blowdown TDS conc, mg/l	240	(d)
Avg. concentration factor	4	(d)

(a) Vogtle Electric Generating Plant - OLSER, Table 3.4-1

(b) Vendor design information

(c) Letter, H.D. Burnum, Southern Co. Services, Inc. to M.Shuman, Research-Cottrell, Dec. 14, 1984.

(d) Vogtle Electric Generating Plant - OLSER, Table 3.6-2

TABLE 2

"CONSERVATIVE" DRIFT DROPLET DISTRIBUTION (a)

Bin No.	Diameter Range, microns	Representative Diameter, microns	Mass Fraction %	Cumulative Mass Fraction, %
1	<50	30	5	5
2	50 - 80	65	6	11
3	80 - 120	100	9	20
4	120 - 140	130	6	26
5	140 - 160	150	7	33
6	160 - 180	170	6	39
7	180 - 200	190	8	47
8	200 - 220	210	8	55
9	220 - 240	230	6	61
10	240 - 260	250	7	68
11	260 - 290	275	6	74
12	290 - 320	305	7	81
13	320 - 360	340	6	87
14	360 - 400	380	5	92
15	400 - 450	425	4	96
16	>450	500	4	100

Mass Median Diameter = 208μ

(a) See Figure 3, Curve "6"

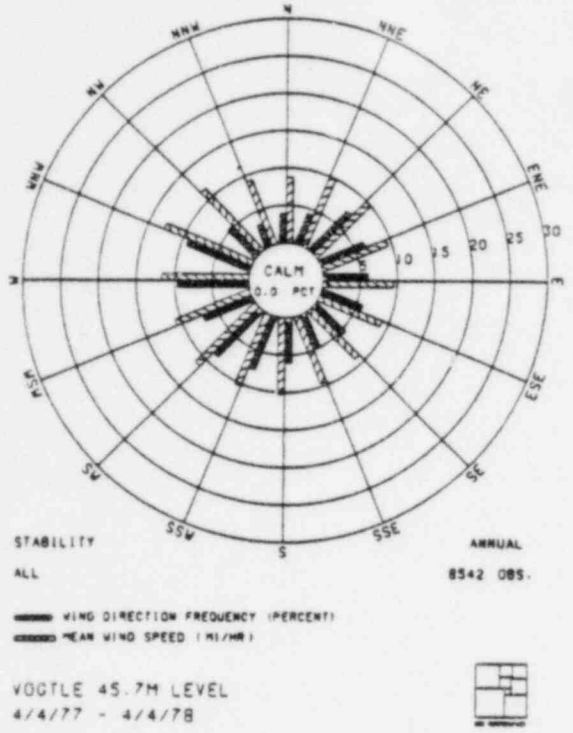
TABLE 3

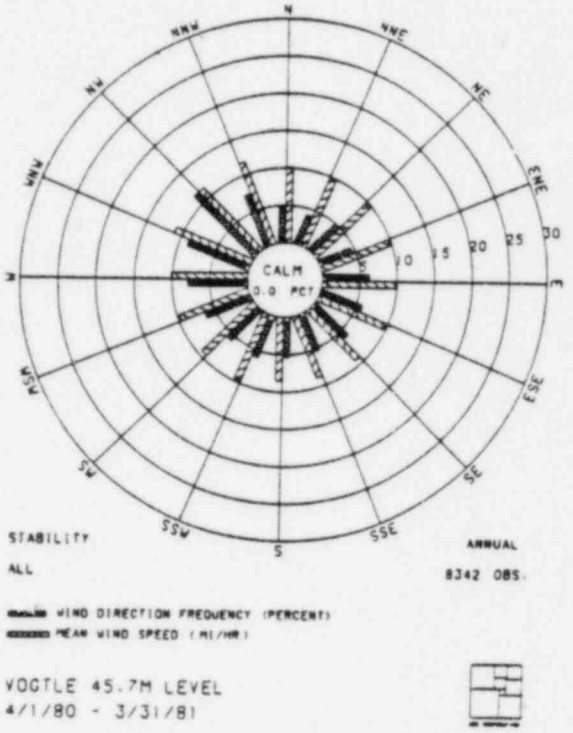
"REALISTIC" DRIFT DROPLET DISTRIBUTION (a)

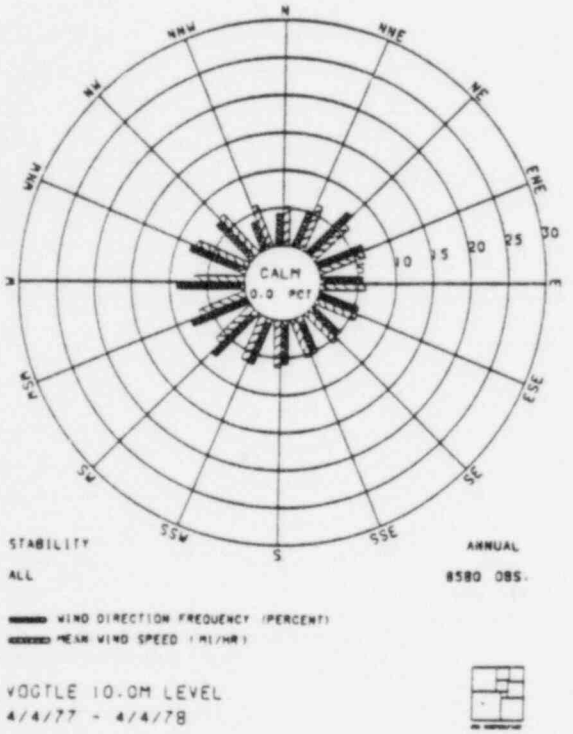
Bin No.	Diameter Range, microns	Representative Diameter, microns	Mass Fraction, %	Cumulative Mass Fraction, %
1	<30	20	2	2
2	30 - 40	35	4	6
3	40 - 50	45	6	12
4	50 - 60	55	7.5	19.5
5	60 - 70	65	8.5	28
6	70 - 80	75	8	36
7	80 - 90	85	8	44
8	90 - 100	95	7	51
9	100 - 110	105	7	58
10	110 - 120	115	6	64
11	120 - 135	127.5	7	71
12	135 - 150	142.5	6	77
13	150 - 180	165	8.5	85.5
14	180 - 220	200	6.5	92
15	220 - 300	260	5.4	97.4
16	>300	350	2.6	100

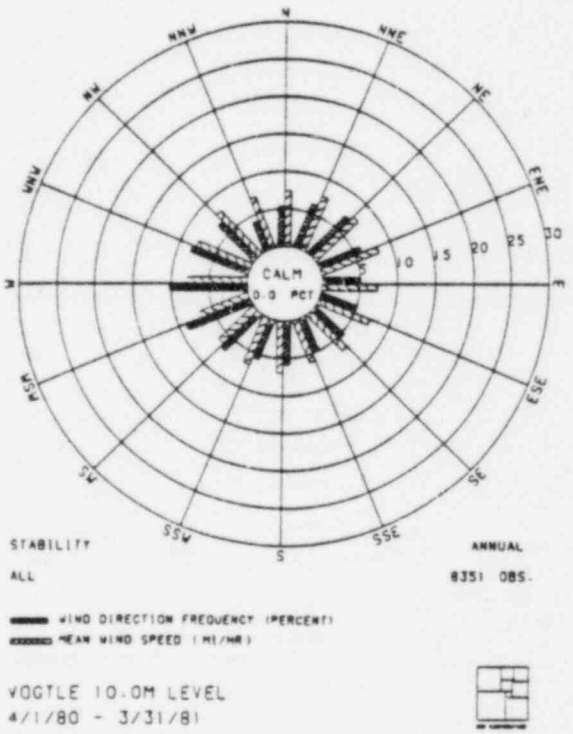
Mass Median Diameter = 98μ

(a) See Figure 3, Curve "NUS"





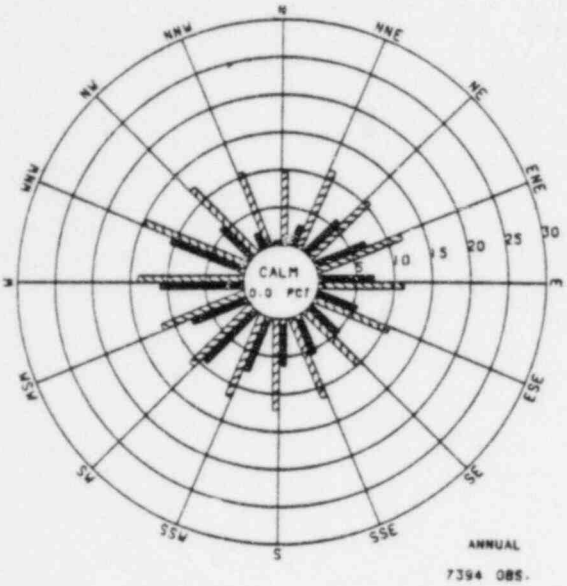




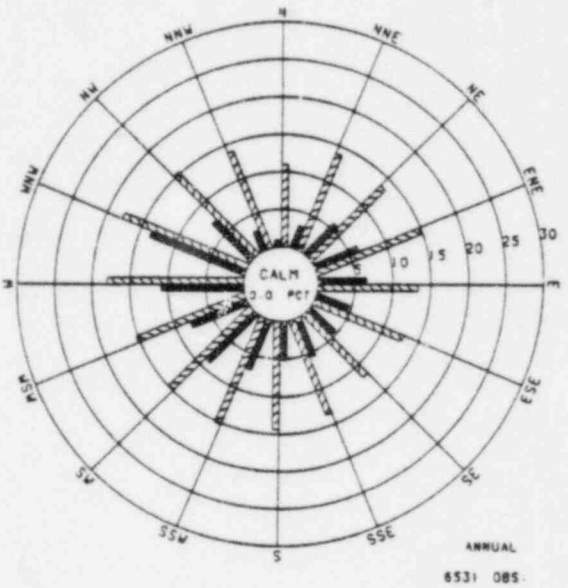
1977-78

1980-81

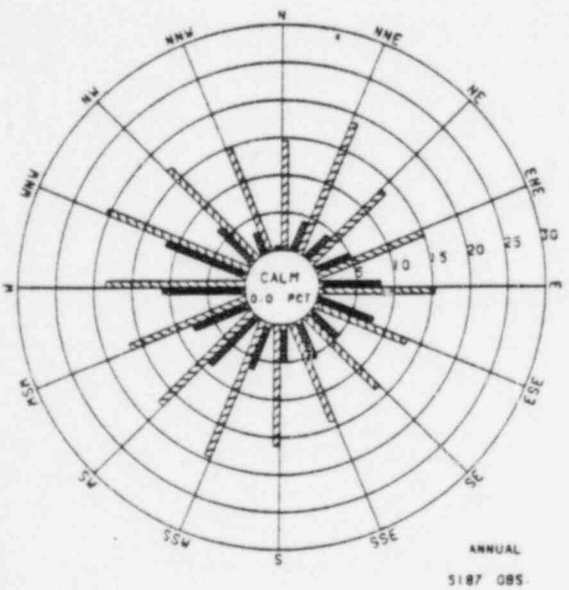
Figure 1.
ANNUAL WIND ROSES
VOGTLE ELECTRIC GENERATING PLANT



91-M LEVEL



182-M LEVEL



304-M LEVEL

Figure 2.
ANNUAL WIND ROSES
WJBF-TV TOWER
SAVANNAH RIVER LABORATORY DATA
4/4/77 - 4/4/78

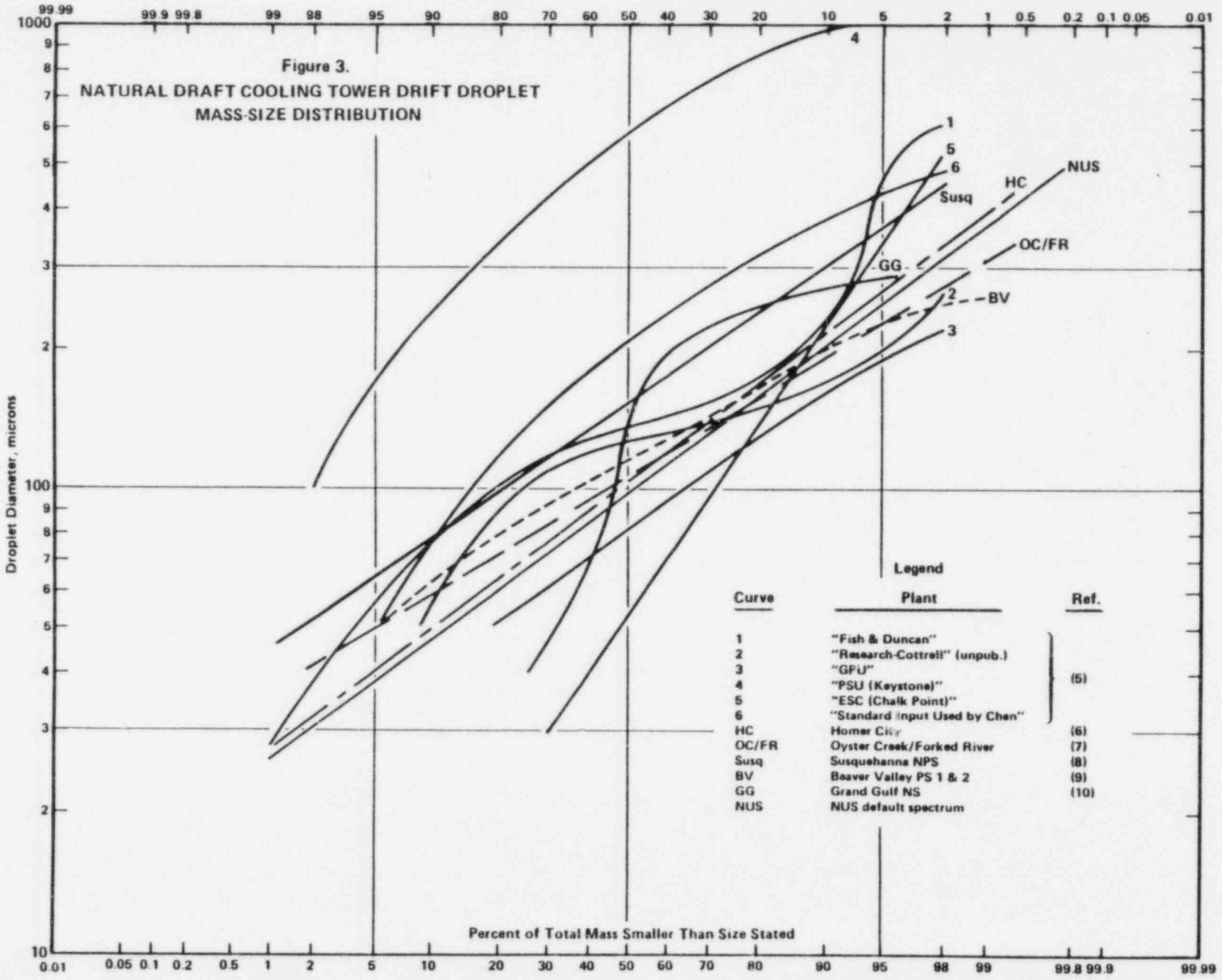
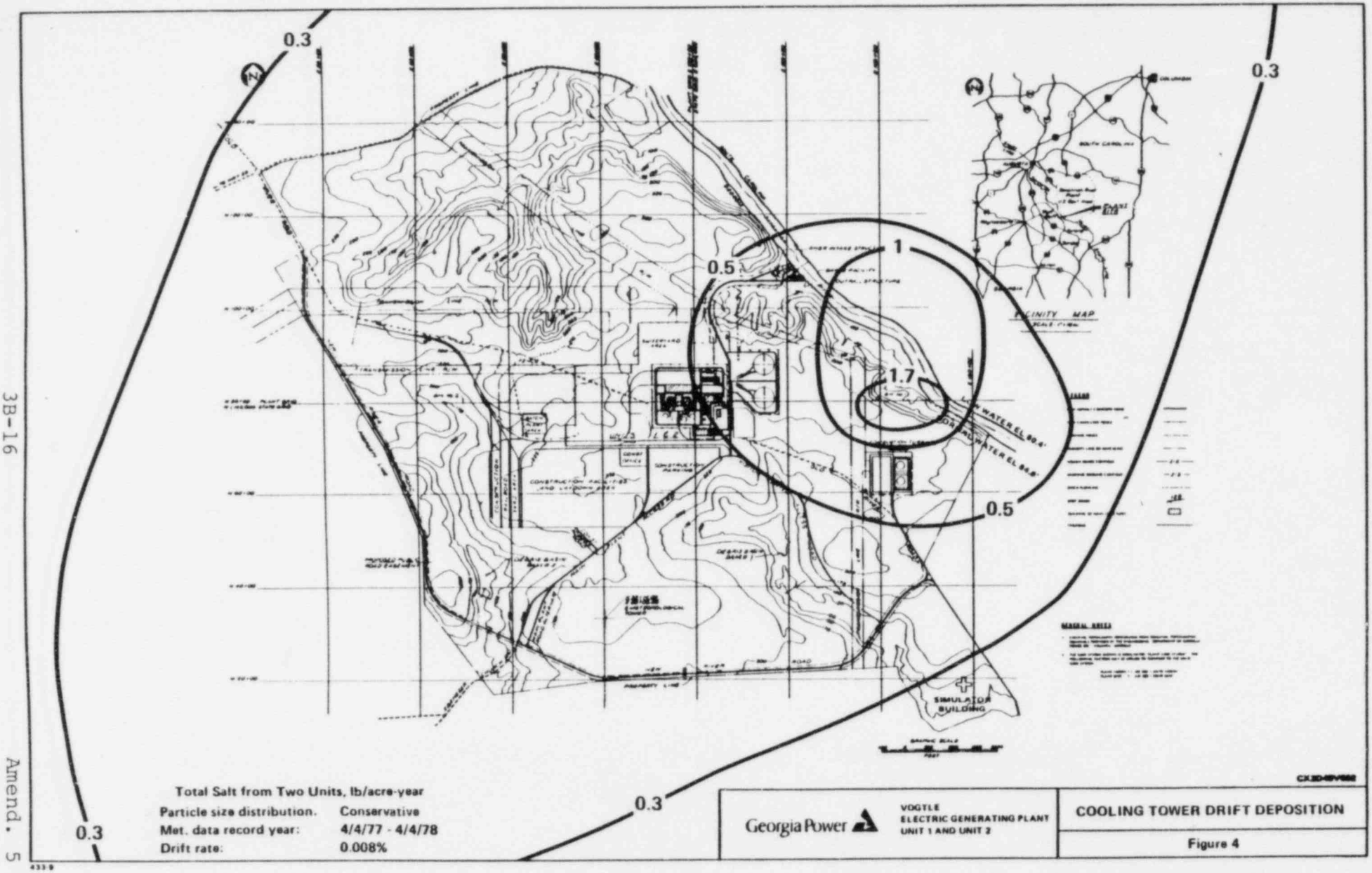
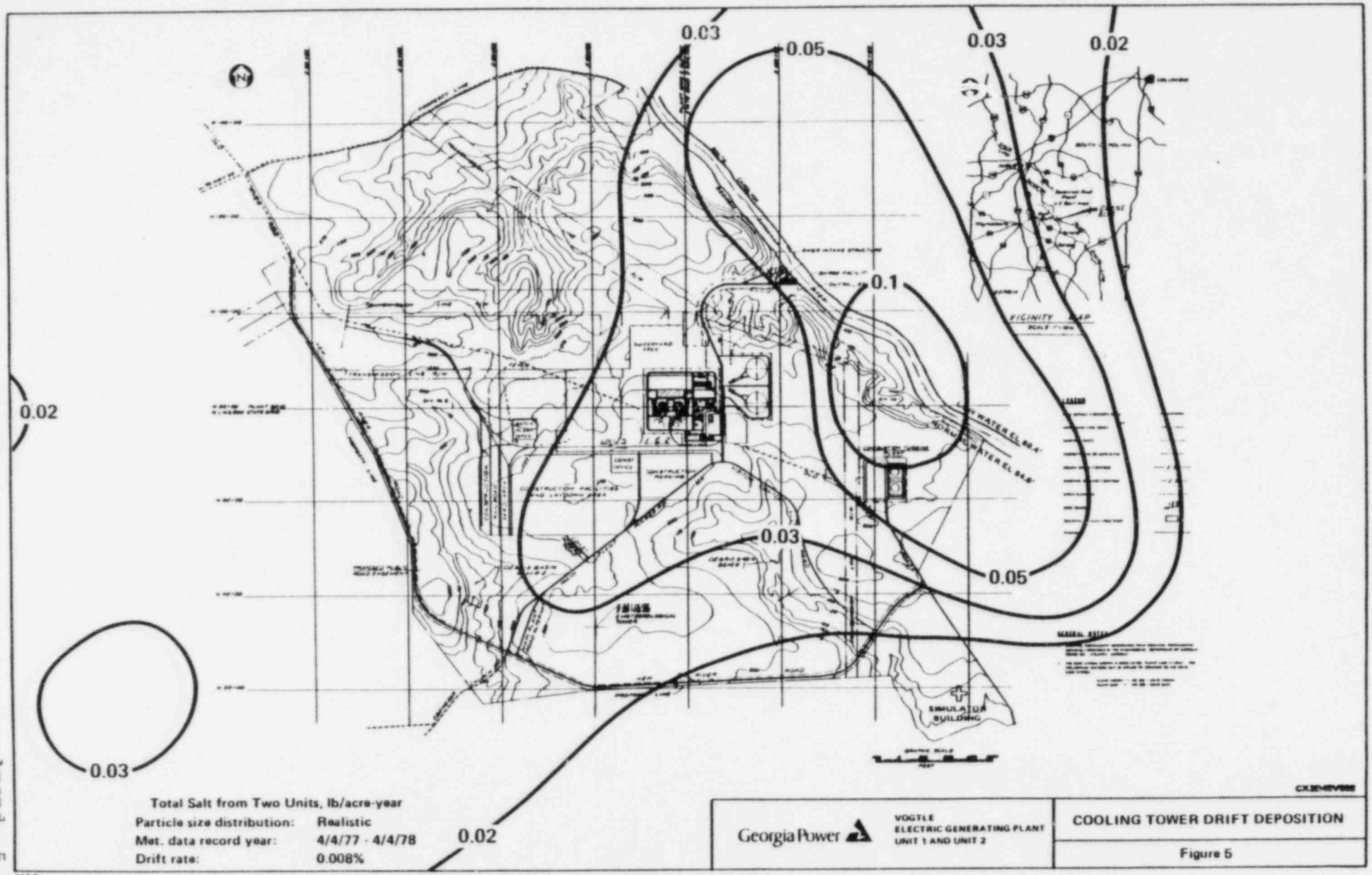
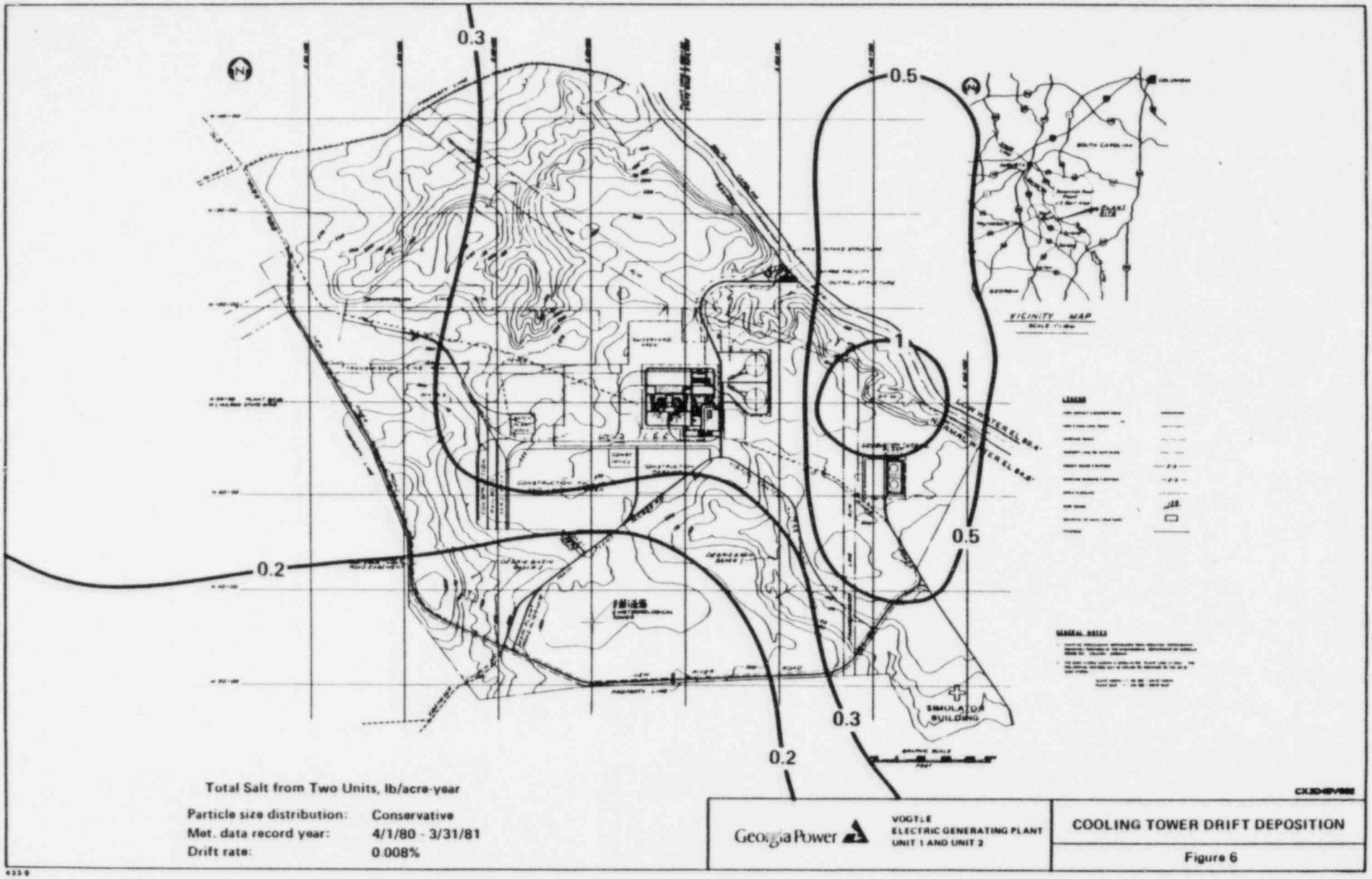
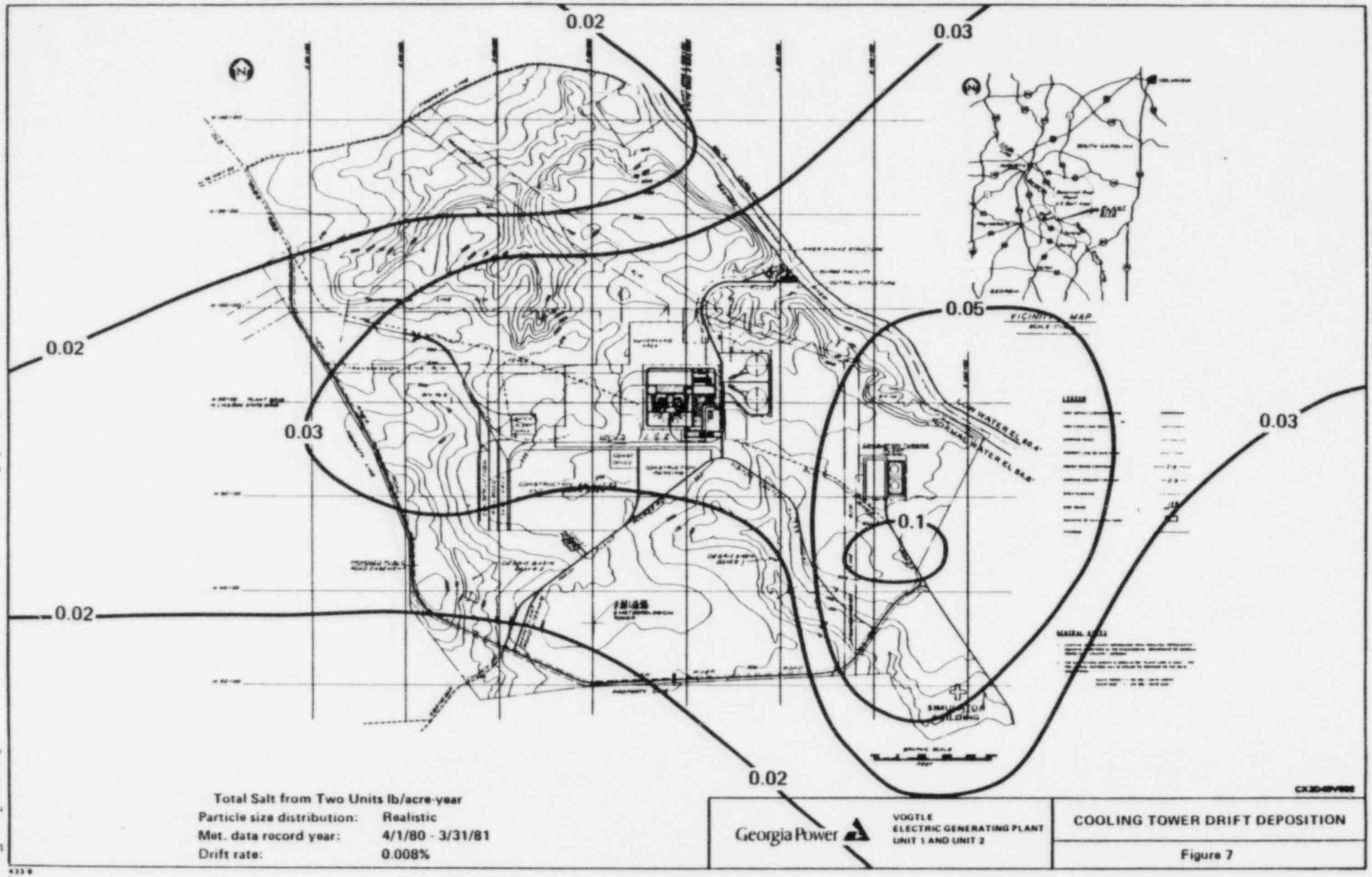


Figure 3.
NATURAL DRAFT COOLING TOWER DRIFT DROPLET
MASS-SIZE DISTRIBUTION
Droplet Diameter, microns
Percent of Total Mass Smaller Than Size Stated
99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
1000 9 8 7 6 5 4 3 2 100 9 8 7 6 5 4 3 2 10
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
4
1
5
6
Susq
HC
NUS
OC/FR
GG
2
BV
3
Legend
Curve
Plant
Ref.
1 "Fish & Duncan"
2 "Research-Cottrell" (unpub.)
3 "GFU"
4 "PSU (Keystone)"
5 "ESC (Chalk Point)"
6 "Standard Input Used by Chen"
(5)
HC Homer City (6)
OC/FR Oyster Creek/Forked River (7)
Susq Susquehanna NPS (8)
BV Beaver Valley PS 1 & 2 (9)
GG Grand Gulf NS (10)
NUS NUS default spectrum


0.3
0.5
1
1.7
0.3
0.5
0.3
VICINITY MAP
SIMULATOR BUILDING
Total Salt from Two Units, lb/acre-year
Particle size distribution. Conservative
Met. data record year: 4/4/77 - 4/4/78
Drift rate: 0.008%
Georgia Power
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2
COOLING TOWER DRIFT DEPOSITION
Figure 4


0.03
0.05
0.03
0.02
0.1
0.02
0.03
0.05
0.03
0.02
VICINITY MAP
SIMULATOR BUILDING
Total Salt from Two Units, lb/acre-year
Particle size distribution: Realistic
Met. data record year: 4/4/77 - 4/4/78
Drift rate: 0.008%
Georgia Power
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2
COOLING TOWER DRIFT DEPOSITION
Figure 5


0.3
0.5
1
0.5
0.2
0.3
0.2
VICINITY MAP
SIMULATOR BUILDING
Total Salt from Two Units, lb/acre-year
Particle size distribution: Conservative
Met. data record year: 4/1/80 - 3/31/81
Drift rate: 0.008%
Georgia Power
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2
COOLING TOWER DRIFT DEPOSITION
Figure 6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0.03
0.02
0.03
0.05
0.03
0.1
0.02
0.02
Total Salt from Two Units lb/acre-year
Particle size distribution: Realistic
Met. data record year: 4/1/80 - 3/31/81
Drift rate: 0.008%
Georgia Power
VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2
COOLING TOWER DRIFT DEPOSITION
Figure 7

TABLE 5.2-5

ESTIMATED INDIVIDUAL DOSES FROM LIQUID EFFLUENTS
AS LOW AS REASONABLY ACHIEVABLE[a] [b] [c]

Individual and Pathway	Usage (kg/year; h/year)	Dilution Factor	Time (h)	Shorewidth Factor	DOSE (mrem/year) Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Adult												
Fish	21.0	10.0	24.0	0.2		6.01E-01	1.07E+00	7.91E-01	1.50E-01	3.61E-01	1.21E-01	1.29E-01
Drinking	730.0	10.0	12.0	0.2		1.14E-02	1.97E-01	1.92E-01	5.37E-01	1.85E-01	1.78E-01	1.91E-01
Shoreline	12.0	10.0	0.0	0.2	3.06E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03	2.61E-03
				Total	3.06E-03	6.15E-01	1.27E+00	9.85E-01	6.89E-01	5.49E-01	3.02E-01	3.22E-01
Teenager												
Fish	16.0	10.0	24.0	0.2		6.33E-01	1.09E+00	4.53E-01	1.40E-01	3.67E-01	1.41E-01	9.21E-02
Drinking	510.0	10.0	12.0	0.2		1.11E-01	1.44E-01	1.33E-01	4.34E-01	1.32E-01	1.27E-01	1.34E-01
Shoreline	67.0	10.0	0.0	0.2	1.71E-02	1.46E-02	1.46E-02	1.46E-02	1.46E-02	1.46E-02	1.46E-02	1.46E-02
				Total	1.71E-02	6.59E-01	1.25E+00	6.01E-01	5.89E-01	5.14E-01	2.82E.01	2.41E-01
Child												
Fish	6.9	10.0	24.0			7.85E-01	9.54E-01	1.80E-01	1.45E-01	3.10E-01	1.11E-01	3.47E-02
Drinking	510.0	10.0	12.0			3.18E-02	2.77E-01	2.49E-01	9.93E-01	2.54E-01	2.42E-01	2.46E-01
Shoreline	14.0	10.0	0.0		3.58E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03
				Total	3.58E-03	8.19E-01	1.23E+00	4.32E-01	1.14E+00	5.67E-01	3.56E-01	2.84E-01
Infant												
Fish	0.0	10.0	24.0	0.2		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drinking	330.0	10.0	12.0	0.2		3.39E-02	2.82E-01	2.42E-01	1.42E+00	2.51E-01	2.39E-01	2.39E-01
Shoreline	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				Total	0.0	3.39E-02	2.82E-01	2.42E-01	1.42E+00	2.51E-01	2.39E-01	2.39E-01

a. Individual doses calculated using the LADTAP II code. All data is on a per unit basis.

b. Appendix I Design Objectives for Liquid Effluents: total body dose = 3 mrem/year per unit from all pathways; dose to any organ = 10 mrem/year per unit from all pathways. Docket RM-50-2 Annex to Appendix I Design Objectives: total body dose = 5 mrem/year per site from all pathways; dose to any organ = 5 mrem/year per site from all pathways; nontritium releases = 5 Ci/year per unit (FSAR table 11.2.3-1).

c. Although the dose due to the drinking water pathway has been included in this evaluation; currently no river water is used for potable water within 100 river miles of the site.

5.7 RESOURCES COMMITTED

The operation of the VEGP will involve the commitment and use of various natural resources and will result in certain irretrievable and irreversible commitments of natural resources. Because of the reduction from four units to two units at VEGP, the committed resources will be substantially reduced from those summarized in the Final Environmental Statement and chapter 10 of the Construction Permit Stage Environmental Report (CPSER). Air, water, and land commitments are retrievable upon cessation of plant operation. At the end of the useful life of this plant, the buildings could be removed and the grounds returned to essentially their original condition; however, it is most likely that the concrete structures would remain (subsection 5.8).

The irretrievable resources committed at the VEGP would be the uranium used in the form of nuclear fuel and the materials used for construction of the plant. Of these resources committed, only the nuclear fuel is unique, because the commitment and use of air, water, land, and construction materials would be similar for a fossil plant.

A number of the following acreage figures have changed since publication of the CPSER. These changes are due to various reasons, such as reduction in the number of units and design changes. The following resources are committed for the operation of the VEGP:

A. Land

1. Site - The VEGP site consists of 3169 acres of land. A list of plant facilities and acreages is found in subsection 2.1.3. The plant facilities will occupy approximately 717 acres of the site, thus changing their use from agricultural and timber production to electrical generation. The remaining 2452 acres will either be managed in accordance with acceptable land management techniques or be landscaped, fertilized, and reseeded after construction is completed. At the end of the useful life of the plant, the land can be returned to agricultural or other uses with the necessary expenditures of money and human effort. 1

2. Transmission lines - The offsite transmission line rights of way will consist of approximately 6500 acres which will be removed from the growing of timber, however, this land can be returned to its former state if desired. 2 5 3

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Amend. 2 4/84
Amend. 3 5/84
Amend. 5 3/85

3. Access railroad - The offsite access railroad spur will consist of approximately 386 acres which will be removed from the growing of timber and agricultural products; however, this land can be returned to its former state if desired.

4. The total area of the plant site, the transmission line rights of way, and the access railroad spur is approximately 10,000 acres, which is about 0.20 percent of the land within a 50-mile radius of the site. The acreage used is very similar to the land within the 50-mile radius. No unique or unusual areas will be consumed by the land use.

B. Water

Savannah River water converted to water vapor by operation of the VEGP cooling towers represents a minor loss to the Savannah River (at maximum consumptive use: approximately 1.2 percent of 5800 ft^3/s at low flow and 0.6 percent of 10,300 ft^3/s at average flow). This water vapor will be returned in the form of precipitation due to natural phenomena. Groundwater used for makeup, drinking, etc., will be obtained from wells at a maximum rate of approximately 2300 gal/min and average rate of approximately 840 gal/min. The VEGP water consumptive use is discussed in subsection 3.3.3.

C. Uranium

The reactors are fueled with uranium dioxide pellets enriched in the fissionable isotope U-235. The initial fuel load for each core consists of 193 fuel assemblies divided into regions with average enrichments of 2.1, 2.6, and 3.1 weight percent U-235. Each enrichment region represents approximately one-third of the initial core. Fuel requirements for operation of the reactors depend upon fuel management practices. However, a typical annual cycle would require replacement of approximately one-third of each core annually. Assuming 75 percent capacity, the plant would require an annual commitment per reactor of approximately 440,000 lb of U_3O_8 (natural uranium), assuming no reprocessing of spent fuel. Over the plant's 40-year life, this represents a commitment of approximately 17,600 tons of U_3O_8 or approximately 0.5 percent of the total estimated uranium resources in the United States in the forward-cost category of $100 per lb of U_3O_8 or less.

D. Construction Materials

Construction materials in the form of steel, concrete, timber products, etc., cannot be practically retrieved and are thus consumed.

E. Wildlife Habitats

The area that will be removed from biological productivity and used for buildings, roads, parking, and other facilities will total 717 acres or 23 percent of the site's total 3169 acres. Approximately 1777.9 acres (56 percent) will be managed in accordance with approved land management practices (see D. O. Foster letter to E. G. Adensam, January 9 1984). Approximately 600 acres of pine and mixed pine land on the site will be burned under control conditions during the months of January or February 1984 and periodically throughout the life of the plant. The controlled burn activities will enhance the productivity of the areas burned. Burning activities of these types are accepted land management practices. These activities are conducted during the winter months in order to minimize the damage to trees and to take advantage of the wet sublayer. 1

The portions of the site to be burned are prepared by developing fire breaks around them. These fire breaks were developed by the Georgia State Forestry Commission. Furthermore, the burn activities will be supervised by representatives of the Forestry Commission and Georgia Power Company. Only portions of the site will be burned at any one time and this activity will be coordinated with expected traffic. The burning activities will be conducted during periods of low but steady wind.

The areas to be burned are far removed from plant facilities. Plant supervision will be notified before any burn activity is initiated. The plant fire brigade will also be notified; however, the burning activity will not require their participation.

Of the 1391.2 acres that were originally disturbed by construction, 569.6 acres will be fertilized and reseeded and 148.5 acres will be involved in onsite transmission lines and 18.6 acres will remain as ponds. Existing habitat including transmission corridors may be enhanced due to increased edge effect created by planting and landscaping following the construction 5

phase. The acreage used for offsite transmission lines will also create an edge effect and thus enhance wildlife habitat. The terrestrial habitat within at least a 5-mile radius of the site is very similar to that found on the plant site; therefore, a very small percentage of habitat will be lost from the total area. There should be no significant impact to the aquatic habitat, because the cooling towers will be used to minimize thermal effects and chemical releases will meet effluent guideline limitations as discussed in section 5.1.

The operation of the VEGP will affect the environment in terms of the irretrievable and irreversible commitment of natural resources to the extent indicated above. However, the extent to which the use of the environment is curtailed is not considered serious and is warranted due to the benefits of the electrical power produced. Chapter 11 presents the overall cost-benefit analysis for the VEGP.

TABLE 6.1-1 (SHEET 4 OF 4)

Sample Medium and Location	Frequency	Analysis
Groundwater	Quarterly	Gamma isotopic and tritium analyses
Regional confined aquifer		
51 - Makeup well number 1 (0.4 miles N)		
63 - Construction well number 1 (0.4 miles SW)		
Local unconfined aquifer		
61 - Spring water from upper end of Mallards Pond (0.8 miles NW)		
62 - Spring water from bluff near river mi 150 (1.1 miles E)		

5

5

a. Particulate sample filters should be analyzed for gross beta 24 h or more after sampling to allow for radon and thoron daughter decay. If gross beta activity is greater than ten times the mean of control sample for any medium, gamma isotopic analysis should be performed on that individual sample.

b. Also considered a control station.

TABLE 6.4-9

SUMMARY OF TRITIUM CONCENTRATION AND OTHER RADIONUCLIDES DETECTED IN GROUNDWATER SAMPLES OBTAINED AUGUST 1982

Location		Tritium[a]	Gamma Spectroscopic Analysis Radionuclide
Station No.	Location	(pCi/l)	Concentration (pCi/l)
51	Makeup Well #1	240 + 21	None
61	Mallard's Pond	1280 + 40	None
62	Bluff at river mile 150	3810 + 70	None

a. Tritium activity was not corrected for decay.

Power Company and Burke County are cooperating on a road improvement program, the cost of which should be at least partially offset by increased tax revenues to the county. There are no identifiable temporary external costs due to the plant's operation.

8.2.2.2 Long Term External Costs

The VEGP site is centered in wooded lands scattered with fields used for agriculture. The terrain is very flat. The clearing of the site for the VEGP required the removal of several hundred acres of trees and brush. No significant harm was done to existing landscape, rock formations, lakes, rivers, etc.

At the time of purchase, approximately 721 acres of the site were croplands, pastures, and fields. Except for two small ponds, the rest of the 3169-acre site was in timber. Construction of the plant facilities requires approximately 1453 acres of the site for the main power block and cooling towers, construction facilities and stockpile, the river intake facility, construction debris basins, meteorology tower and access road, and roadways. After construction of the plant is completed, the 519.6 acres used for construction activities will be landscaped. The use of 717 acres for general plant facilities (buildings, roads, parking lots, and other facilities) will continue throughout the life of the plant and will not be available for other purposes. The remaining acreage will be managed in accordance with accepted land management techniques. The use of 717 acres for operation of the plant will not result in a significant reduction of regional products due to displacement. 5 1

The operation of VEGP will not result in significant impairment of recreational values. The primary recreational values in the area include hunting and fishing. The plant site has been posted, and access to the site for hunting and fishing will be restricted. However, boat traffic on the Savannah River will not be affected. Use of adjacent lands and waters for tourism, recreation, and commercial fishing are discussed in subsection 2.1.3. There will be no significant loss of income from these activities as a result of normal operation of VEGP. As discussed in subsection 5.1.3, entrainment and impingement at the VEGP intake structure is not expected to result in a significant adverse impact on fish populations of the Savannah River.

As discussed in section 2.6, there are no significant historical or cultural areas on the VEGP site. There are no national landmarks in the nearby vicinities. Since area transportation

will not be affected by plant operation, VEGP will not restrict access to areas of scenic, historic, or cultural interest.

Areas in the vicinity of VEGP are rich in both prehistoric and historic cultural resources. Since none of the properties are near the site, they will not be adversely affected by plant operation.

Natural draft and nuclear service (mechanical draft) cooling towers will be used at VEGP. The operation of these towers is not expected to cause increased frequency of ground fog, reduced visibility, icing, or any other adverse meteorological conditions (see section 5.1). Effects of increased noise levels resulting from the operation of the VEGP are discussed in section 5.6.

A study prepared for Georgia Power Company by Battelle Columbus Division estimated the impacts of the VEGP on essential community services in surrounding areas.[1] Population estimates in that report project that approximately 80 percent of the in-moving workers associated with the operation of VEGP will reside in Richmond County, an urban and urbanizing area that will be able to accept the relatively small numbers of in-movers without significant costs.

12.0 ENVIRONMENTAL APPROVALS AND CONSULTATIONS

12.1 SUMMARY

This chapter provides a summary of those licenses, permits, and approvals required by federal, state, local, and regional authorities for station and transmission system construction and operation. This chapter also contains a listing of the state environmental agencies, regional representatives, and local authorities which were contacted concerning the station location and construction. The status of obtaining all required approvals is indicated.

12.1.1 STATUS OF STATION ENVIRONMENTAL APPROVALS AND CONSULTATIONS

The information concerning status of the station's environmental approvals and consultations is listed in tables 12.1-1, 12.1-2, and 12.1-3. Table 12.1-1 lists permits, certifications, and approvals dealing with water quality during the construction and operation of the facility. Air quality permits required to construct and operate the facility are listed in table 12.1-2. Table 12.1-3 lists the general permits, notifications, and plans required to construct and operate the facility.

12.1.2 STATUS OF TRANSMISSION SYSTEM ENVIRONMENTAL APPROVALS AND CONSULTATIONS

The information concerning status of the transmission system environmental approvals and consultations is listed in table 12.1.4. Application for these permits are made as transmission system routes are finalized. In addition, the Georgia Department of Natural Resources State Historic Preservation Officer as well as the Nuclear Regulatory Commission is supplied with a consultant's report and Cultural Resource Management CRCMS Plans delineating historical and archaeological properties for each segment of the VEGP transmission system as they become available. The CRM plans outline Georgia Power Company's (GPC) procedures for identifying and assessing the significance of cultural resources within the transmission corridor. The plan also outlined mitigative actions to be taken by GPC should the cultural resource inventory identify any significant sites. 5

12.1.3 CONSULTATIONS WITH STATE, LOCAL, AND REGIONAL PLANNING AUTHORITIES

Georgia Power Company (GPC) has consulted with the following groups concerning the VEGP. (See Construction Permit Stage Environmental Report (CPSER), chapter 12.)

- U.S. Department of Interior, Fish and Wildlife Service. 5
- Corps of Engineers.
- Department of Energy Savannah River Plant. 1
- Barnwell Nuclear Fuel Plant.
- Central Savannah River Area Planning and Development Commission.
- Georgia Historical Commission (now the State Historic Preservation Officer).
- Georgia Environmental Protection Division.
- Georgia Radiological Health Service (responsibilities now assumed by the Georgia Department of Natural Resources and Department of Human Resources).

The VEGP CPSER lists the Georgia and South Carolina environmental agencies contacted plus partial lists of local and regional representatives contacted (pages 12.2 through 12.13).

GPC has consulted with various local officials, agencies, and citizens' advisory committees concerning the socioeconomic impacts of the operation of the VEGP. These are outlined in development studies(1 2) commissioned by GPC to estimate the impact of the VEGP on essential community services of Burke and Richmond Counties.

The Final Environmental Statement-Construction Permit (FESCP) contains a complete listing of federal, state, and local agencies and individuals asked to comment on the draft environmental statement (pages v through vi). Appendix L of the FES contains copies of the comments received. 5

TABLE 12.1-1

WATER QUALITY PERMITS,
CERTIFICATIONS, AND APPROVALS

Authorization Required	Issuing Agency	Status	Comments
Sewage treatment plant approval	Georgia EPD	Issued 4/1/77	
Waste water treatment system approval	Georgia EPD	Issued 12/3/80	
NPDES permit for power generation facilities	Georgia EPD	Issued 9/10/84	
Groundwater use permit	Georgia EPD	Issued 6/28/78	
Permit to withdraw surface water from Savannah River	Georgia EPD	Issued 9/5/80	
Permit to operate a public water system	Georgia EPD	Issued 3/26/82	
Intake structure water quality certification	Georgia EPD	Issued 5/15/79	
Intake structure Department of the Army permit	Corps of Engineers	Issued 2/6/81	
Discharge pipe water quality certification	Georgia EPD	Issued 1/15/82	
Discharge pipe Department of the Army permit	Corps of Engineers	Issued 3/26/82	

1 5

TABLE 12.1-2

AIR QUALITY PERMITS

Authorization Required	Issuing Agency	Status	Comments
Permit to construct startup boilers	Georgia EPD	Issued 2/17/81	
Permit to operate startup boilers	Georgia EPD		The application to be filed within 30 days after commencement of normal operations.
Permit to operate concrete batch plants 1 and 2	Georgia EPD	Issued 7/1/80	
Permit to construct and operate waste volume reduction system	Georgia EPD		Waste volume reduction system exempted from permitting requirements on 11/4/83. 5

Table 12.1-4

TRANSMISSION SYSTEM
ENVIRONMENTAL APPROVALS AND CONSULATIONS

Authorization Required	Issuing Agency	Status	Comments
Permit for aerial crossing over navigable waters	Corps of Engineers		Permits for VEGP-Thalmann line were issued on 10/29/82, 11/5/82, and 2/26/85.
Utility encroachment permit for aerial crossing over federal interstate highways	Georgia Department of Transportation (DOT)	Pending	
Utility encroachment permit for aerial crossing over state highways	Georgia DOT		Permits for the VEGP-Wadley line were issued on 4/12/83. Other permits pending.
Utility encroachment permit for aerial crossing over county or local highways	County Highway Departments		Permits for the VEGP-Wadley line were issued on 4/18/83. Other permits pending.
Permit for aerial crossing over railroad lines	Railroad superintendent		Permits for the Louisville and Wadley railroad were issued on 12/9/77. Permits for the VEGP-Effingham-Thalmann line were issued over the Southern Railway Company on 6/15/84; over the Seaboard System Railroad Company on 5/23/84 and 6/4/84; over the Central of Georgia Railway Co. on 6/15/84.
Notification of aerial crossing over pipelines	General Manager of individual	Pending	Permit for the VEGP-Effingham-Thalman line were issued over the Atlanta Gas Light Company on 8/14/82; over the Southern Natural Gas Company on 8/13/82.

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Amend. 5 3/85

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5

VEGP-OLSER-3

VEGP-OLSER

Department of Natural Resources

ENVIRONMENTAL PROTECTION DIVISION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334

XXXXXXXXXXXXXXXX
Commissioner

J. LEONARD LEDBETTER
Division Director

September 10, 1984

Mr. T. E. Byerley
Manager of Environmental Affairs
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

RECEIVED
SEP 12 1984
ENV. AFFAIRS

Re: NPDES Permit No. GA 0026786
Vogtle Electric Generating Plant

Gentlemen:

Pursuant to the Georgia Water Quality Control Act, as amended, the Federal Water Pollution Control Act, as amended, and the Rules and Regulations promulgated thereunder, we have today issued the attached National Pollutant Discharge Elimination System (NPDES) permit for the specified wastewater treatment facility.

Please be advised that on and after the effective date indicated in the attached NPDES permit, the permittee must comply with all the terms, conditions and limitations of this permit.

Sincerely,

J. Leonard Ledbetter

J. Leonard Ledbetter
Director

JLL:bk
Enclosure

AN AFFIRMATIVE ACTION/EQUAL EMPLOYMENT OPPORTUNITY EMPLOYER

PERMIT NO. GA 0026786

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
P. O. Box 4545
Atlanta, Georgia 30302

is authorized to discharge from a facility located at

Vogtle Electric Generating Plant
Waynesboro, Burke County, Georgia

to receiving waters Savannah 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 September 10, 1984.

This permit and the authorization to discharge shall expire at midnight, August 31, 1989.

Signed this 10th **day of** September, 1984.

E. Leonard Ledbetter
Director,
Environmental Protection Division

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning effective date and lasting through August 31, 1989, the permittee is authorized to discharge from outfall(s) serial number(s) 001_A- Cooling Tower Blowdown (001_{A1} and 001_{A2})

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day)		Discharge Limitations Other Units (Specify)		Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type	Monitoring Requirements Sample Location
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.			
Flow-m^3Day (MGD)	-	-	-	-	*2	*2	*2
Free Available Chlorine*5	-	-	0.2 mg/l	0.5 mg/l	1/Week	Multiple Grabs*3	*1
Total Residual Chlorine*5	-	-	-	-	1/Week	Multiple Grabs*3	*1
Time of TRC Discharge	-	-	-	120 minutes/ day per unit	1/Week	Multiple Grabs	*1
Total Chromium	-	-	-	0.2 mg/l	1/Quarter	Grab	*4
Total Zinc	-	-	-	1.0 mg/l	1/Quarter	Grab	*4

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 at final discharge.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Monitored immediately following dechlorination system.
*2 See Part III, Special Requirements, Item 7.
*3 See Part III, Special Requirements, Item 4.
*4 Monitored prior to mixing with other waste streams.
*5 Effluent limitations for FAC and TRC refer to the average and maximum concentrations during any individual chlorine release period.

The permittee shall certify yearly that no priority pollutant other than chromium or zinc is above detectable limits in this discharge. This certification may be based on manufacturer's certifications or engineering calculations.

STATE OF GEORGIA
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EPD 2.21-2-I

During the period beginning effective date and lasting through August 31, 1989,
the permittee is authorized to discharge from outfall(s) serial number(s) 001_B - Low Volume Waste (Wastewater Retention Basin)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements		
	kg/day (lbs/day)		Other Units (Specify) (mg/l)				
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location *1
Flow-m^3Day (MGD)	-	-	-	-	*2	*2	*2
Total Suspended Solids	-	-	30	100	2/Month	Grab	Discharge Line
Oil & Grease	-	-	15	20	2/Month	Grab	Discharge Line

VEGP-OLSER

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 at final discharge.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Prior to mixing with cooling tower blowdown.
*2 See Part III, Special Requirements, item 7.

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EPD 2.21-2-1

STATE OF GEORGIA
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ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through August 31, 1989,
the permittee is authorized to discharge from outfall(s) serial number(s) 001_{B5} - Sewage Treatment Plant

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements		
	kg/day (lbs/day)		Other Units (Specify) (mg/l)				
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location *1
Flow-m^3Day (MGD)	-	-	-	-	*2	*2	*2
BOD_5	-	-	30	45	Quarterly	Grab	Discharge Line

VEGP-OLSER

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 at final discharge.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

*1 Prior to mixing with any other waste stream.
*2 See Part III, Special Requirements, item 7.

VEGP-OLSER

EPD 2.21-2-I

STATE OF GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

During the period beginning effective date and lasting through August 31, 1989,
the permittee is authorized to discharge from outfall(s) serial number(s) 001_{B7} - Low Volume Waste (Liquid Radwaste System)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements		
	kg/day (lbs/day)		Other Units (Specify) (mg/l)				
	Daily Avg.	Daily Max.	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location *1
Flow-m^3Day (MGD)	-	-	-	-	*2	*2	*2
Total Suspended Solids	-	-	30	100	2/Month	Grab	Discharge Line
Oil & Grease	-	-	15	20	2/Month	Grab	Discharge Line

VEGP-OLSER

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 other waste streams.
*2 See Part III, Special Requirements, item 7.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

N/A

2. 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 3 months shall be summarized for each month and reported on an Operation Monitoring Report (Form WQ 1.45), postmarked no later than the 21st.day of the month following the completed reporting period. The first report is due on December 21, 1984.
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 - Industrial Wastewater Program
270 Washington Street, S.W.
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 Operation Monitoring Report Form (WQ 1.45). 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

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 avialable 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, revoked or reissued 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;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge; or

d. To comply with any applicable effluent limitation issued pursuant to the order the United States District Court for the District of Columbia issued on June 8, 1976, in Natural Resources Defense Council, Inc. et.al. v. Russell E. Train, 8 ERC 2120 (D.D.C. 1976), if the effluent limitation so issued:

(1) is different in conditions or more stringent than any effluent limitation in the permit; or

(2) controls any pollutant not limited in the permit.

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 for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition. A draft permit will be provided for review and comments prior to issuance.

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.

13. Best Available Technology Economically Achievable

Notwithstanding Part II, B-4 above, if an applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 301(b)2 of the Federal Act for a pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with such effluent standard or prohibition. A draft permit will be provided for review and comments prior to issuance.

14. The permittee will implement best management practices to control the discharge of hazardous and/or toxic materials from ancillary manufacturing activities. Such activities include, but are not limited to, materials storage areas; in-plant transfer, process and material handling areas; loading and unloading operations; plant site runoff; and sludge and waste disposal areas.

PART III

A. PREVIOUS PERMITS

1. 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.

B. SPECIAL REQUIREMENTS

1. There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

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. 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 to 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

Each discharge shall be sampled by composite consisting of three or more grab samples, one of which will be collected immediately after the start of discharge, one immediately prior to termination of discharge, and one or more between these two. Results shall be reported monthly by the 21st day of the following calendar month.

4. Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day as monitored immediately following the dechlorination facilities.

5. 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 except that the limitations for free available chlorine and total residual chlorine discharges from cooling tower blowdown shall apply following the dechlorination system as noted in Item 4 above.

6. The Director may modify any effluent limitation upon request of the permittee if such limitation is covered by an approved variance or by an amendment to the Federal Water Pollution Control Act.

7. The permittee shall determine the flow of the various waste streams and submit this determination to the Director once every two years.

Question E290.8

For the Plant Vogtle and other plants whose cooling tower drift parameters were compared in your Response E451.17 (February 1984), please provide the following information:

- Type of cooling tower.
- Height of cooling tower.
- Cooling tower drift rate (both quaranteed and expected).
- Rate of circulating water flow.
- Concentration of total dissolved solids in makeup.
- Concentration factor.
- Size distribution of drift droplets.
- Concentration of total dissolved solids in cooling tower blowdown.
- Evaporation rate.
- The locations and magnitudes of maximum drift deposition on and off the site.
- The plant capacity factor, if this was used in the drift deposition calculations.
- Other parameters used in predicting drift deposition rates.

Response

The VEGP cooling tower drift parameters were compared with four other plants with similar salt drift parameters as given in table E290.8-1. This table is based on data from references 1 through 17. The estimated onsite peak deposition rate at VEGP was calculated based on the ratio of the VEGP emission rate and wind rose frequency to those from the four other plants. (See table E290.8-2.)

Because Susquehanna, Beaver Valley unit 2, and VEGP cooling tower drift parameters are similar, the extensive data on salt drift deposition patterns available from Susquehanna and Beaver Valley Unit 2 were used for predicting the offsite peak salt deposition rate at VEGP. (See table E290.8-3.)

The response to question E451.17 provides further discussion of VEGP salt deposition estimates. Note that the response to question E451.17 submitted in Amendment 1 has been changed to reflect revised salt deposition rates. The revised onsite and offsite maximum predicted deposition rate for VEGP is 17 lb/acre/yr from 31 lb/acre/yr and 15 lb/acre/yr from 21 lb/acre yr, respectively. The attached list of references is also applicable.

1. U. S. Atomic Energy Commission, "Final Environmental Statement Related to the Proposed Alvin W. Vogtle Nuclear Plant Units 1, 2, 3 and 4," March 1974.

2. Georgia Power Company, Alvin W. Vogtle Nuclear Plant - Environmental Report, Unit 1 and 2, Volumes 1 and 2, August 1972.

3. Georgia Power Company, Vogtle Electric Generating Plant Unit 1 and Unit 2 Applicants Environmental Report Operating License Stage Volume 1, August 1983.

4. Georgia Power Company, Vogtle Electric Generating Plant Unit 1 and Unit 2, Final Safety Analysis Report, Volume 2, July 1983.

5. Pennsylvania Power & Light Company, Susquehenna Steam Electric Station Units 1 and 2, Environmental Report - Operating License Stage, Volumes 1-3, May 1978.

6. U. S. Atomic Energy Commission, "Final Environmental Statement Related to the Beaver Valley Power Station, Unit 1," July 1973.

7. Duquesne Light Company, et al., Beaver Valley Power Station Unit 2, Environmental Report - Operating License Stage, July 1983.

8. Duquesne Light Company, et al., Beaver Valley Power Station Unit 1, Final Safety Analysis Report, Volume 1, October 1972.

9. Duquesne Light Company, et al., Beaver Valley Power Station Unit 1, Environmental Report - Operating License Stage, September 1971.

10. U. S. Atomic Energy Commission, "Final Environmental Statement Related to the Construction of Shearon Harris Nuclear Power Plant Units 1, 2, 3 and 4," May 1973.

11. U. S. Atomic Energy Commission, "Revised Final Environmental tatement Related to the Construction of Shearon Harris Nuclear Power Plant Units 1, 2, 3, and 4," March 1974.

12. Carolina Power and Light Company, Shearon Harris Nuclear Power Plant, Units 1, 2, 3, and 4, Environmental Report, September 1971.

13. Carolina Power and Light Company, Shearon Harris Nuclear Power Plant, Units 1, 2, 3, and 4, Preliminary Safety Analysis Report, September 1971.

14. Mississippi Power and Light Company and Middle South Energy, Inc., Final Environmental Report - Grand Gulf Nuclear Station Units 1 and 2, Volumes 1-3, June 1978.

15. Duquesne Light Company, et. al., Beaver Valley Power Station Unit 2, Environmental Report Operating License Stage, May 1983.

16. Carolina Power and Light Company, Shearon Harris Nuclear Power Plant Unit 1, 2, 3, and 4, Environmental Report Operating License Stage, December 1981.

17. Duquesne Light Company, et al, Beaver Valley Power Station Unit 2, Final Safety Analysis Report, Section 2.3, May 1983.

TABLE E290.8-1 (SHEET 2 OF 2)

Plant/ Type of Cooling Tower		Vogtle/ Natural Draft	Susquehenna/ Natural Draft	Beaver Valley/ Natural Draft Unit 1	Beaver Valley/ Natural Draft Unit 2	Shearon Harris/ Natural Draft	Grand Gulf/ Natural Draft
Max offsite drift deposition	Rate	15 lb/acre/yr	3 lb/acre/yr	NA	9.9 lb/acre/yr[g]	NA	5.02 lb/acre/yr
	Distance from cooling tower	1.0 miles[i]	0.6 miles	NA	0.9 miles	NA	0.6 miles
	Wind sector deposited in	SE	SSW	NA	E	NA	E
Meteorological conditions, annual avg	Humidity	72%	70%	69%[e]	73.5%[f]	71%	76%
	Temperature	63.4°F	49°F	50.3°F	49.1°F	60°F	65.5°F
	Wind speed in predominant direction	6.6 miles/hr[b]	8.7 miles/hr	5.6[b] miles/hr	6.6[b] miles/hr	8.7 miles/hr	6.4 miles/hr[c]
	Frequency of dominant wind	12%	14.5%	15.6%	10.5%	10.6%	9.0%
	Dominant Pasquil stability class	E	D	E	D	E-F	D-E

a. Design maximum values were used in salt drift modeling.

b. Average wind speed in the dominant wind direction is not available, local average wind speed is applied. The actual wind speed is expected to be higher.

c. Wind speed has been adjusted from 33 ft to 150 ft by the following equation: $V/V_1 = (Z/Z_1)^P$, with V_1 = wind speed at a given level, Z_1 = reference height, and P = 0.45.

d. Although droplet size distribution for Unit 1 cooling tower was not provided in the environmental reports, it is expected to be similar to that for Unit 2.

e. Based on the data collected onsite between September 5, 1969 to September 5, 1970.

f. Based on the data collected onsite between January 1, 1976 to December 31, 1980.

g. Deposition rate represents the contribution from both units.

h. The drift loss used in drift deposition modeling as indicated in the references.

i. The peak deposition will occur within 0.3 to 0.9 miles of the cooling tower.

j. Deposition rate represents the contribution from four units.

TABLE E290.8-2

PEAK ONSITE DRIFT DEPOSITION USING REALISTIC ASSUMPTIONS

Parameter	VEGP	Susquehenna	Beaver Valley		Shearon Harris	Grand Gulf
			Unit 1	Unit 2		
Circulating water flow rate (gpm)	484,600	478,000	480,400	507,400	482,000	572,000
Drift rate (%)	0.008 (expected)	0.002 (expected)	0.005 (expected)	0.013 (guaranteed)	0.002 (expected)	0.008 (guaranteed)
Total dissolved Solids (mg/ℓ)	240 (avg)	1640 (max)	368 (avg)	365 (avg)	539 (avg)	1880 (max)
Emission rate[a] per tower (lb/d)	111	186	105	286	62	1022
Frequency of dominant wind (%)	12	14.5	15.6	10.5	10.6	9.0
Peak drift deposition per unit (lb/a/yr)	0.4-8.1[b]	1.5	8	2.1 (Unit 2)[d][c] 7.8 (Unit 1)	4	2.5[c]

a. Emission rate = (Circulating water flow rate) × (Drift rate) × (Total dissolved solids) × (Unit conversion factor) per tower.

b. Peak deposition rate at VEGP = (Peak deposition rate at other plant) × (Emission rate at VEGP/Emission rate at other plant) × (Frequency of dominant wind at VEGP/Frequency of dominant wind at other plant).

c. Maximum offsite value was used.

d. Calculated using information from Unit 2's environmental report - operating license stage.

TABLE E290.8-3

VEGP ESTIMATED OFFSITE PEAK DEPOSITION RATE

Parameter	Direction[a] Southeast	Northeast	East
Site boundary distance from cooling tower (miles)	1.0	0.6	0.6
Wind-rose frequency (%)	12	6	8.3
Estimated offsite total plant peak deposition rate (lb/a/yr) for:			
Susquehenna Deposition Pattern[b]	8.1 at 1.2 miles from cooling towers	8.1[d] at 0.6 miles from cooling towers	11.2[d] at 0.6 miles from cooling towers
Beaver Valley Unit 2 Deposition Pattern[c]	14.7 at 1.0 miles from cooling towers	8.1[d] at 0.6 miles from cooling towers	11.2[d] at 0.6 miles from cooling towers

a. Southeast section is the predominant wind sector; northeast and east wind sectors are the minimum site boundary distances with respect to the cooling towers.

b. Using the Susquehenna deposition pattern with two peaks (the second peak at one-half the value of the first), the VEGP maximum deposition rate of 16.2 lb/a/year is assumed to occur at 0.6 miles and a deposition rate of 8.1 lb/a/year is assumed to occur at 1.2 miles in the predominant wind direction.

c. Using the Beaver Valley Unit 2 deposition pattern with one peak, the VEGP maximum deposition rate of 16.2 lb/a/year is assumed to occur at 0.9 miles in the predominant wind direction.

d. Peak deposition rates in the nonpredominant wind sector are estimated by the ratio of wind-rose frequency in the nonpredominant wind sector to the wind-rose in the predominant wind sector.