2.0 THE SITE AND ENVIRONMENTAL INTERFACES

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 SITE LOCATION AND DESCRIPTION

The following sections update information presented in the Construction Permit Stage Environmental Report (CPSER) sections 2.1 and 2.2.

2.1.1.1 Specification of Location

The 3169-acre site is located in the eastern sector of Burke County, Georgia, on the Savannah River at river mile 151, approximately 23 river miles upstream from the intersection of the Savannah River and U.S. Highway 301, as shown in figure 2.1-1.

The coordinates of the center of the containment for each of the two units are given below in both latitude and longitude and Universal Transverse Mercator (UTM) coordinates. Latitude and longitude are given to the nearest second and UTM coordinates are given to the nearest 100 meters.

Unit	Latitude and Longitude	UTM Coordinates
1	33°08'30" N 81°45'44" W	Zone 17S MG 3,666,900 m N 428,900 m E
2	33°08'30" N 81°45'48" W	Zone 17S MG 3,666,900 m N 428,800 m E

2.1.1.2 Site Area

Figure 2.1-2 shows property lines for the site. The site boundary lines, plant property lines, and exclusion area boundary lines are all the same. There are no industrial, recreational, or residential structures within the site area, other than the VEGP and Georgia Power Company's combustion turbine plant, visitor's center, and the Georgia Power Training Center.

Reactor Units 1 and 2 are approximately 3600 and 3900 ft, respectively, from the center of containment to the exclusion boundary at the nearest point (Savannah River in the northeast direction). 3

The location and orientation of the principal plant structures within the site area are shown in figure 2.1-3. Within the site boundary, there is no prime, unique, or statewide important agricultural land.

2.1.1.3 Boundaries for Establishing Effluent Release Limits

The property lines as shown in figure 2.1-2 are the boundaries for determining effluent release limits. Effluent releases will not exceed the limits of 10 CFR 20.106 at the boundary. The reference point used for determining the minimum distance to the exclusion boundary is the Unit 1 plant vent. The shortest distance between the Unit 1 plant vent and the exclusion area boundary is approximately 3600 ft and is located at the Savannah River in the northeast direction. 1 3

2.1.2 POPULATION DISTRIBUTION

2.1.2.1 Population within 10 Miles

Figure 2.1.3-1 of the VEGP Final Safety Analysis Report (FSAR) identifies places of significant population groupings such as cities and towns and shows their position within the grid constructed by drawing concentric rings at 1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-, 9-, and 10-mile radii with the VEGP site at the center point. The concentric circles are further divided by 16 compass points thus transforming the circles into 22 1/2° sectors. Each sector therefore is composed of individual segments formed by the concentric rings divided by the 16 compass points. Tables 2.1-1, 2.1-2, and 2.1-3 lists the 1980 population data on which the 5- to 500-mile population projections are based. The population within 5 miles of the VEGP site was surveyed door to door on June 17, 1980, and updated in March 1982. Tables 2.1.3-1 through 2.1.3-16 of the FSAR provide the projected population for the first year (1987), midpoint (2007), and end point (2028) of the VEGP operating life for each segment. Table 2.1-4 provides totals for each sector, and table 2.1-5 provides totals for each annular ring. The methodology for projecting and disaggregating the population is discussed in appendix 2A of the FSAR. 1

2.1.2.2 Population between 10 and 500 Miles

Figure 2.1.3-2 of the FSAR displays the grid pattern used in the population disaggregation between 10 and 50 miles. Figure 2.1-4 displays the grid pattern between 10 and 500 miles.

Concentric rings at 10-, 20-, 30-, 40-, 50-, 60-, 70-, 85-, 100-, 150-, 200-, 350-, and 500-mile radii were drawn with the VEGP site at the center. Sectors and segments were formed as discussed in 2.1.2.1. The population from 10 to 500 miles from the VEGP were projected for the first year, midpoint, and end point in the plant's operating life. Population totals, by sector, from 10 to 50 miles and 50 to 500 miles are presented in tables 2.1-6 and 2.1-7, respectively. Annular ring population totals from 10 to 50 miles and 50 to 500 miles are presented in tables 2.1-8 and 2.1-9, respectively. The data for population by segment from 10 to 50 miles and from 50 to 500 miles are presented in FSAR tables 2.1.3-1 through 2.1.3-16 and tables 2.1-10 through 2.1-25 of this section, respectively. The methodology used to develop the projection and the disaggregation is discussed in appendix 2A of the FSAR. 1

2.1.2.3 Transient Population

Data on transient population is provided in tables 2.1-26 through 2.1-42. Land uses which draw nonresidents to within 10 miles of the operating units include the VEGP itself (industrial use), Plant Wilson adjacent to the VEGP site (industrial use), the Savannah River Plant in South Carolina (industrial use), the Savannah River and adjacent areas (public recreational use), a Georgia Power recreational facility (private recreational use), and state highway 125 in South Carolina (transportation). Some variance on a daily basis between weekday and weekend day totals is anticipated as well as between daytime and night time numbers. These variations are detailed in breakdowns of the totals for each sector. Peak totals for weekday and weekday night time periods are also shown. The only activity expected to show seasonal variation on a consistent basis is the use of the recreation facility available to Georgia Power employees. Expected usage in summer versus winter is shown in table 2.1-36 and in the summary table 2.1-42. 1 3

Activity relating to VEGP will consist of employment for VEGP operation, Training Center functions, Visitor's Center functions, and employment for construction of Unit 2 (1987 only). Most VEGP permanent employees including Georgia Power Company and contractor nuclear operations personnel, engineering support personnel, and security personnel will work on a Monday through Friday 8 a.m. to 5 p.m. or 7 a.m. to 4 p.m. schedule. The Training Center will also operate primarily on a Monday through Friday daytime schedule. However, some nuclear operations and security personnel will be assigned to night or weekend shifts. Most permanent plant workers are expected to

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live outside the 10-mile radius in the Waynesboro and South Augusta areas.

The Visitor's Center will be open on weekdays and during the day on weekends. Most visitors are expected to come on a prescheduled basis with a school group or as part of a special interest group. Due to the remote location, few individuals or family groups are expected.

The construction work force which will be completing Unit 2 in 1987 is expected to be divided between weekday and weekend shifts. The majority of construction workers will be on a weekday 7 a.m. to 5:30 p.m. shift (Monday through Thursday). The smaller weekday night shift will operate from 5 p.m. to 3:30 a.m. (Monday through Thursday). The very small weekend day shift will operate from 7 a.m. to 6:30 p.m. on Friday, Saturday and Sunday. The weekend night shift will function from 7 p.m. to 6:30 a.m. on Friday, Saturday, and Sunday. Some construction workers will live within the 10-mile radius during the week, but most will return to their permanent residences outside the 50-mile radius on weekends. By 2007, only operational, engineering support, and security personnel will be employed. 3

Plant Wilson is an oil-powered electric generating plant operated by Georgia Power Company. Its small workforce is expected to operate only on a weekday schedule.

Savannah River Plant (SRP) operations in South Carolina have five facilities within the VEGP 10-mile radius. These include: 100-C reactor, 100-K reactor, 400-D facility, 100-L reactor, and the central shop. Most personnel at these facilities will work on a Monday through Friday weekday schedule. Projected employment at SRP facilities for 2007 and 2028 is best represented by the 1987 data according to SRP officials. A system is in place to warn and account for transient population in SRP's emergency planning zone. The majority of SRP employees live in the Aiken - Augusta corridor.

Additional activities within the area under SRP jurisdiction may occur in the following VEGP sectors: north (mile rings 2 through 10), north-northeast (mile rings 2 through 10), northeast (mile rings 1 through 10), east-northeast (mile rings 2 through 10), east (mile rings 2 through 10), east-southeast (mile rings 3 through 10), north-northwest (mile rings 5 through 8). These activities occur infrequently and at currently unpredictable locations on the SRP reservation. No numbers reflecting the people involved are included in tables 2.1-26 through 2.1-42, but are included here for reference. The

U.S. Forest Service monitors timber growth in the area and has approximately 20 employees who work on the site. Contractors are occasionally allowed to conduct logging operations. Approximately 25 to 50 contractor personnel would be involved at any one time. Ecology research teams from the University of Georgia operating out of the Savannah River Ecology Lab undertake projects at various locations on the SRP site. A maximum of 25 team members may be on site at any one time. Inspection teams from the South Carolina Department of Health and Environmental Control may have as many as five persons on site. SRP also allows deer hunting in limited sectors of the property from October to December on Wednesdays and Saturdays. Hunters may be on site as early as 4 a.m., but must be off-site by nightfall. The sectors to be hunted are identified at the beginning of each year. A maximum of 150 hunters is allowed on any day.

Recreational activities available to the public at all times within the VEGP 10-mile radius include fishing on the Savannah River and hunting. Fishing activities were surveyed in 1980 by the Georgia Department of Natural Resources at access points above and below the VEGP site. The access points within 10 radial miles of the plant, all of which are on private property, are: Shell Bluff, river mile 162; Hancock Landing, river mile 150; Griffin Landing, river mile 146; Brighams Landing, river mile 143; and DOE Landing, river mile 141. 3

Fishing activities on sample days for the year were observed only at Hancock and DOE Landings. A total of 21 persons were observed fishing on 6 separate days at these two points, about equally distributed between weekend and weekday. Extrapolation from the sample yields an estimate of 231 fisherman per year within 10 miles of the plant. Since the fishing pressure is approximately evenly distributed over the weekday, this translates into a somewhat greater than 50-percent probability that one or more fisherman would be found on a given day within 10 miles of the plant. Normal plant operations do not affect existing or projected fishing patterns.

Hunting activity on the Georgia side of the river is similarly low. There are no direct data on hunting activity within 10 miles of the site, but surveys conducted by the Georgia Department of Natural Resources indicate that hunting yields in Burke County are among the lowest in the state. There are high hunting license sales in nearby Richmond County (primarily for deer hunting), but the primary hunting areas are reported to be the counties to the northwest of Richmond. The probability of a hunter receiving a license in Richmond County and hunting in one of the counties to the northwest is three to four times greater than the probability of hunting in Burke County. Furthermore,

there are no permanent hunting lodges or camps within the 10-mile radius of the plant site.

The Crackerneck Unit of the Sumter National Forest, north-northwest (mile rings 6, 7, 8), has a small recreational facility on the South Carolina side of the river. The unit has a primitive campground and trails, but no water supply, toilets, or permanent facilities. Usage is primarily as a base for hunting and fishing with 1025 user days estimated per year. It is managed by two employees. Discussions are underway to bring the area under SRP jurisdiction.

Private recreational facilities are available to Georgia Power employees at a site in the southwest (mile ring 3). The facility will not be open to the general public. Year-round usage is expected, but lower attendance is anticipated during winter operating hours (October 16 through April 14) than during summer hours (April 15 through October 15). Since some campsites are available, a small number of persons may be on the site at night. Peak attendance is expected during organized company activities such as baseball tournaments or picnics.

Transient highway traffic within the 10-mile radius is limited to State Route 125 in South Carolina which passes through the Savannah River Plant. Through traffic is primarily related to Augusta and the Port of Charleston during the week and recreational usage of South Carolina coastal areas and Savannah on weekends. Access to the Savannah River Plant reservation is by time-stamped travel pass so that records of the average number of vehicles on weekdays and weekend days are available. Employees also use this route. Estimates were made to eliminate employees with work destinations within the 10-mile radius since they have been counted in the Savannah River Plant employee figures. Georgia State Route 23 is within the 10-mile radius. It is used almost exclusively by area residents and may be used by some plant employees. Virtually no transient traffic is expected. 3

Attendance at churches within the VEGP 10-mile radius is not expected to generate any transient population traffic. Although there are 24 churches within the 10-mile radius, they are small in size and serve residents of the immediate area only.

The only school within the 10-mile radius, Girard Elementary, is scheduled to be closed in 1986.

There are no beaches, federal highways, amusement parks, National Register historic districts or sites, regional shopping malls, or colleges and universities within the 10-mile radius. Paragraph 2.1.3.3 of the Final Safety Analysis Report describes transient population within the VEGP 50-mile radius.

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	519.6	(cleared area)
Inside fence	579.4	
West gate	10.1	
Transmission lines	136.5	(onsite)
Roads	69.4	
Railroad	18.8	(onsite)
Pond (south)	8.5	

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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2.1.3.1 Residences, Meat Animals, Milk-Producing Cows/Goats, and Vegetable Gardens within 5 Miles of the VEGP Site

The area surrounding the VEGP site is surveyed periodically for a radius of 5 miles to locate and identify the nearest residence, meat animal, milk-producing animal (goat or cow), and vegetable garden of 500 ft^2 or greater in each of the 16 sectors defined by a 22 1/2° arc around the radius. This data, along with the distance to the nearest site boundary, are found in table 5.2-1. Several observations can be made from these data. First, there were no milk-producing animals identified in any of the 16 sectors. Second, all those sectors which extend into the Savannah River Plant property do not contain items in any of the listed categories. The residence listed nearest the plant site (west-southwest sector) is a trailer park housing predominantly construction-related GPC or contractor employees. 1 1

2.1.3.2 Land Use within a 5-Mile Radius

The remoteness of the VEGP site ensures few human activities within the 5-mile radius. There are no zoning ordinances existing for this area, nor are there any local plans to restrict development to limit population encroachment. As previously stated, there are no dairies, wildlife preserves, or sanctuaries in the area. The only industrial activity is that associated with the Savannah River Plant facility as previously described. The rural, small farm nature of this area blurs the distinctions to be made between many of the standard land use classifications. Any land may be used alternately for crops, pastures, hunting, or recreation with residences scattered sparsely throughout. None of these uses occurs on a large scale. The clearest distinction to be made on land use is between open and wooded lands. Open lands are used as cropland, primarily since no livestock or dairy operations exist in the area. Estimated crop types and yields for the area are given in paragraph 2.1.3.3. The wooded, largely silvicultural areas would more likely be used as hunting areas, though no hunting lodges or camps exist in the area. The hunting yields for Burke County as a whole are among the lowest in the state, as discussed in paragraph 2.1.3.3 of the FSAR. Hunting activities are, therefore, very limited. Figure 2.1-8 displays those areas which are wooded and those areas which are open. The residences in the area have been inventoried and are shown in figure 2.1-6.

2.1.3.3 Agricultural Activity

The annual meat, milk, and truck farming production within a 50-mile radius from the proposed reactor is shown in table

2.1-45. The table shows the annual meat production by type (cattle and hogs), milk production, and truck farming at successively greater 10-mile intervals from the reactor. 1

Unless otherwise noted, the data in these tables are taken from 1979 crop year statistics published by the Georgia Crop Reporting Service and the South Carolina Crop and Livestock Reporting Service. These data compiled and presented for each segment in the tables have been disaggregated from county statistics as follows.

For each of the 16 sectors of the five 10-mile intervals, the sector was composed of parts of one or more counties. For each segment, the individual county portions falling in each segment were measured using a grid measurement system. Next, for each county portion of a segment, the percentage of farmland in the portion was determined. This was done using a Landsat satellite photograph of the area which categorizes land type into nine categories, including cleared farmland. Estimates of the amount of farmland in each county portion were obtained using a grid estimation technique. The amount of farmland in each county portion within a given segment was then expressed as a percentage of the total farmland in the county by dividing the farmland area in a given segment by the total farmland in that county. These percentages were then used to assign meat, milk, and truck crop production figures to the various counties. For example, segment SE-20 is composed of parts of two counties in Georgia, Burke and Screven. For that segment, 0.5 percent of the farmland in Burke County and 10.4 percent of the farmland in Screven County fall in this segment. Thus, for a given commodity such as truck crops, 0.5 percent of the total truck crops produced in Burke County and 10.4 percent of the total truck crops produced in Screven County are assigned to segment SE-20. The total production of truck crops for that segment, therefore, is 1015.3 kg, the value given in table 2.1-45.

Table 2.1-46 shows annual agricultural crop production for the 50-mile radius around the proposed reactor. The table shows total annual production quantity (kg) by crop type. Table 2.1-47 shows the average annual yield for each of these crops in the same area. These data are based on statistics for 1979 from the same sources as the meat, milk, and poultry data above. 1

The vast majority of the cattle operations in the 50-mile area around the plant site consists of brood cows and calves and stockherd calves. These cattle graze year round. In the summer months (March through October), they graze primarily on permanent pasture land planted in coastal Bermuda grass, fescue grass, or other native grasses. In the winter months (November through February), they graze primarily on field residues of

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). 1

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. Two distinct aquifers underly the VEGP site. Both have been studied and monitored by GPC extensively over the past 10 years. The shallow or unconfined groundwater aquifer is replenished by rainfall percolating through the porous overlaying sands. The presence of porous surface sands and the moderate topographic relief in the site area indicate that there is no significant storm runoff; hence, virtually all precipitation infiltrates the ground. Lateral recharge from

adjacent areas is insignificant because the plant area is situated on an interfluvial high; i.e., it is isolated by drainage channels which have down cut to or near the marl aquilude and act as interceptor drains to potential recharge sources moving laterally toward the interfluvial. Groundwater present in the sands beneath the VEGP site eventually drains to the Savannah River through springs along the bluff. Figure 2.1-10 shows the direction of flow and the probable discharge point of contaminants percolating into the artesian aquifer beneath the plant site.

The second aquifer lies beneath a relatively impermeable aquiclude and is unlikely to be contaminated by spillage on the plant site. Should this occur, however, the flow of this aquifer is also towards the Savannah River, as indicated in figure 2.1-10. Exploratory holes drilled adjacent to the river indicate the aquiclude has been breached by the river allowing groundwater from the underlying aquifer to discharge to the river. Migration through the groundwater table to areas across the river is, therefore, highly unlikely.

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. 1

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,

insurance, real estate, and services. Although smaller in area, Richmond County is more densely populated than Burke County. The city of Augusta has experienced considerable commercial, institutional, and residential land development. The Richmond County public school system is consolidated county-wide with 55 facilities. Most of the county's sewage and water service is provided by the city of Augusta. Fire protection in Richmond County is provided by four fire departments: the Richmond County Fire Department; the Augusta Fire department; and fire departments for the cities of Hephzibah and Oakridge. The Augusta Police Department provides service within the city limits of Augusta, with the rest of the county being serviced by the Richmond County Sheriff's Department.

REFERENCES

1. Central Savannah River Area Directory of Manufacturers, 1982-1983, Central Savannah River Planning and Development Commission.

2. Batelle Columbus Laboratories, Action Plan for Burke County, January 1983.

3. Batelle Columbus Laboratories, Assessment of Service Needs for Burke and Richmond Counties, January 1982.

TABLE 2.1-1

POPULATION BY ANNULAR RING
(1- TO 500-MILE RADIUS TOTALS)

Year	Ring	Population	
1980	1	0	
	2	495	
	3	278	
	4	112	
	5	200	
	6	208	
	7	317	
	8	318	
	9	291	1
	10	341	
	20	91,413	
	30	157,988	
	40	111,341	3
	50	145,920	
	60	93,822	
	70	118,933	
	85	628,400	
	100	537,771	
	150	3,704,002	
	200	5,005,576	
	350	15,074,845	3
	500	25,274,319	

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TABLE 2.1-2 (SHEET 1 OF 16)

1980 POPULATION BY SEGMENT FOR NORTH SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
20	5,281
30	8,450
40	11,088
50	9,926
60	4,202
70	7,745
85	23,968
100	32,932
150	345,941
200	413,199
350	1,381,733
500	3,160,609

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 2 OF 16)

1980 POPULATION BY SEGMENT FOR NORTH-NORTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
20	5,281
30	8,450
40	12,675
50	17,594
60	20,993
70	21,900
85	57,520
100	22,582
150	297,513
200	891,093
350	2,001,405
500	3,731,408

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 3 OF 16)

1980 POPULATION BY SEGMENT FOR NORTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
20	3,304
30	5,156
40	8,289
50	19,784
60	14,803
70	15,862
85	187,598
100	55,821
150	164,296
200	249,300
350	1,789,438
500	2,832,434

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 4 OF 16)

1980 POPULATION BY SEGMENT FOR EAST-NORTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
20	2,185
30	3,278
40	4,283
50	10,994
60	8,492
70	7,750
85	28,872
100	32,360
150	193,423
200	228,320
350	653,535
500	33,790

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 5 OF 16)

1980 POPULATION BY SEGMENT FOR EAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
20	1,865
30	2,460
40	3,702
50	4,352
60	5,409
70	9,445
85	33,861
100	43,836
150	274,594
200	5,512
350	0
500	0

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 6 OF 16)

1980 POPULATION BY SEGMENT FOR EAST-SOUTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	3
7	0
8	3
9	0
10	5
20	1,174
30	2,317
40	4,319
50	6,540
60	3,222
70	7,494
85	20,993
100	44,458
150	33,404
200	0
350	0
500	0

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 7 OF 16)

1980 POPULATION BY SEGMENT FOR SOUTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	3
5	27
6	30
7	34
8	6
9	17
10	26
20	1,282
30	2,079
40	4,009
50	6,587
60	3,068
70	4,533
85	29,197
100	25,993
150	0
200	0
350	0
500	0

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 8 OF 16)

1980 POPULATION BY SEGMENT FOR SOUTH-SOUTHEAST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	6
6	61
7	84
8	114
9	84
10	71
20	1,142
30	1,966
40	2,668
50	5,193
60	3,975
70	4,005
85	98,397
100	103,937
150	13,738
200	0
350	23,131
500	980,185

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Amend. 3 5/84

TABLE 2.1-2 (SHEET 9 OF 16)

1980 POPULATION BY SEGMENT FOR SOUTH SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	6
6	34
7	57
8	28
9	23
10	34
20	1,428
30	2,465
40	3,901
50	9,181
60	5,190
70	4,640
85	17,905
100	20,761
150	97,955
200	619,185
350	2,073,260
500	2,925,230

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 10 OF 16)

1980 POPULATION BY SEGMENT FOR SOUTH-SOUTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	3
3	3
4	3
5	3
6	14
7	6
8	23
9	28
10	54
20	1,304
30	2,299
40	3,486
50	5,961
60	3,380
70	5,209
85	21,152
100	17,161
150	86,483
200	126,225
350	207,275
500	0

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 11 OF 16)

1980 POPULATION BY SEGMENT FOR SOUTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	287
3	8
4	6
5	24
6	11
7	15
8	18
9	26
10	84
20	1,354
30	2,239
40	3,393
50	5,110
60	3,027
70	4,589
85	16,944
100	14,924
150	90,941
200	246,924
350	523,314
500	0

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 12 OF 16)

1980 POPULATION BY SEGMENT FOR WEST-SOUTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	3
4	0
5	14
6	43
7	40
8	48
9	11
10	0
20	1,354
30	2,220
40	4,610
50	5,651
60	3,356
70	3,913
85	14,466
100	14,796
150	228,552
200	300,826
350	830,601
500	1,400,938

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 13 OF 16)

1980 POPULATION BY SEGMENT FOR WEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	8
3	11
4	46
5	21
6	9
7	17
8	33
9	48
10	28
20	1,354
30	2,275
40	4,233
50	4,508
60	3,071
70	3,051
85	21,878
100	29,752
150	300,217
200	313,239
350	1,571,195
500	1,148,478

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 14 OF 16)

1980 POPULATION BY SEGMENT FOR WEST-NORTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	67
3	247
4	13
5	19
6	3
7	9
8	35
9	35
10	32
20	14,530
30	33,641
40	16,322
50	9,312
60	3,256
70	1,936
85	9,067
100	13,179
150	862,799
200	1,174,389
350	1,597,796
500	1,947,204

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 15 OF 16)

1980 POPULATION BY SEGMENT FOR NORTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	130
3	6
4	41
5	80
6	0
7	52
8	7
9	19
10	7
20	30,876
30	49,040
40	16,902
50	19,784
60	4,157
70	3,219
85	13,202
100	23,114
150	196,475
200	114,841
350	1,100,933
500	2,163,918

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-2 (SHEET 16 OF 16)

1980 POPULATION BY SEGMENT FOR NORTH-NORTHWEST SECTOR
(1- TO 500-MILES)

Mile Ring	Population
1	0
2	0
3	0
4	0
5	0
6	0
7	3
8	3
9	0
10	0
20	17,699
30	29,653
40	7,461
50	5,437
60	4,221
70	13,642
85	33,380
100	42,165
150	517,671
200	322,523
350	1,321,229
500	4,950,125

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Amend. 3 5/84

TABLE 2.1-3

1980 POPULATION BY SECTORS

Sector	1- To 50-Mile Radius Totals	60- to 500-Mile Radius Totals
N	34,745	5,370,329
NNE	44,000	7,044,414
NE	36,533	5,309,552
ENE	20,740	1,186,542
E	12,379	372,657
ESE	14,361	109,571
SE	14,100	62,791
SSE	11,389	1,227,368
S	17,157	5,764,126
SSW	13,187	466,885
SW	12,581	900,663
WSW	13,994	2,797,448
W	12,591	3,390,881
WNW	74,265	5,609,626
NW	116,944	3,619,859
NNW	60,256	7,204,956
	509,222	50,437,668

Amend. 1 2/84
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Amend. 3 5/84

TABLE 2.1-4

POPULATION BY SECTORS
(0- TO 10-MILE RADIUS TOTAL)

Sector	1987	2007	2028
N	0	0	0
NNE	0	0	0
NE	0	0	0
ENE	0	0	0
E	0	0	0
ESE	11	11	11
SE	148	193	266
SSE	439	505	583
S	188	223	262
SSW	142	171	213
SW	497	230	267
WSW	165	199	231
W	230	219	250
WNW	482	199	240
NW	361	135	173
NNW	6	11	15
Total	2669	2096	2511

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-5

POPULATION BY ANNULAR RINGS
(0- TO 10-MILE RADIUS TOTAL)

Year	1 Mile	2 Mile	3 Mile	4 Mile	5 Mile	6 Mile	7 Mile	8 Mile	9 Mile	10 Mile	Total	
1987	0	517	289	117	210	216	331	331	303	355	2669	1, 3
2007	0	40	62	59	174	246	382	376	350	407	2096	
2028	0	64	85	80	256	278	440	435	406	467	2511	3

TABLE 2.1-6

POPULATION BY SECTORS
(20 -TO 50-MILE RADIUS TOTAL)

Sector	1987	2007	2028
N	38,722	48,001	61,401
NNE	49,703	64,511	87,278
NE	41,082	52,267	68,749
ENE	23,262	29,397	38,340
E	13,487	16,250	19,999
ESE	15,700	18,678	22,898
SE	15,069	17,023	20,132
SSE	11,504	11,657	12,537
S	18,184	21,734	27,918
SSW	13,762	15,285	17,280
SW	12,706	14,563	16,879
WSW	14,397	16,118	18,410
W	12,832	14,338	16,398
WNW	81,723	101,651	127,713
NW	135,141	180,490	242,202
NNW	67,084	81,680	102,848
Total	564,358	703,643	900,982

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-7 1

POPULATION BY SECTORS
(60- TO 500-MILE RADIUS TOTALS)

Sector	1987	2007	2028
N	5,671,709	6,251,688	7,186,036
NNE	7,590,184	9,023,626	11,298,629
NE	5,894,908	6,978,436	8,475,954
ENE	1,407,945	1,639,751	1,961,758
E	421,947	504,862	595,451
ESE	119,454	142,853	168,148
SE	70,156	84,398	101,290
SSE	1,429,911	1,832,169	2,310,119
S	6,659,290	8,319,863	11,339,793
SSW	528,613	688,680	846,603
SW	1,005,873	1,301,048	1,603,280
WSW	3,020,206	3,467,895	4,005,450
W	3,617,604	4,066,767	4,610,261
WNW	6,095,327	7,149,625	8,286,981
NW	3,826,261	4,500,423	5,065,094
NNW	7,634,087	8,395,035	9,658,982
Total	54,993,475	64,345,119	77,513,829

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-8 1

POPULATION BY ANNULAR RINGS
(20- TO 50-MILE RADIUS TOTALS) 3

Year	Ring	Population	
1987	20-mile	99,973	
	30-mile	171,145	
	40-mile	127,787	3
	50-mile	165,453	
	Total	564,358	3
2007	20-mile	121,693	
	30-mile	207,351	3
	40-mile	161,846	
	50-mile	212,753	
	Total	703,643	3
2028	20-mile	150,609	
	30-mile	256,430	3
	40-mile	211,891	
	50-mile	282,052	
	Total	900,982	3

TABLE 2.1-9 1

POPULATION BY ANNULAR RINGS
(60- TO 500-MILE RADIUS TOTALS)

Year	Ring (mile)		Population	
1987	60		111,897	
	70		138,163	
	85		700,510	
	100		596,169	
	150		4,099,656	
	200		5,507,735	
	350		16,304,629	
	500		27,534,716	
		Total	54,993,475	1
2007	60		155,860	
	70		185,938	3
	85		854,169	
	100		718,461	
	150		4,916,648	
	200		6,886,707	
	350		19,508,633	
	500		31,120,703	
		Total	64,347,119	1
2028	60		220,699	
	70		263,781	
	85		1,026,664	
	100		862,005	
	150		5,897,096	
	200		8,421,794	
	350		23,601,244	
	500		37,220,546	
		Total	77,513,829	1

TABLE 2.1-10 1

POPULATION BY SEGMENT FOR NORTH SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	4,586	5,470	6,443
70	8,505	10,168	11,954
85	26,300	31,443	36,975
100	36,327	43,431	51,072
150	379,117	457,571	543,565
200	450,368	567,804	704,875
350	1,420,507	1,615,090	2,072,273
500	3,345,999	3,520,711	3,758,879
Total	5,671,709	6,251,688	7,186,036

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-11 1

POPULATION BY SEGMENT FOR NORTH-NORTHEAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028	
60	27,513	48,321	88,588	
70	28,499	49,500	89,974	
85	65,690	83,679	108,990	
100	24,883	29,749	34,983	
150	323,525	395,316	436,281	
200	964,623	1,215,714	1,509,154	
350	2,162,420	2,651,520	3,114,356	3
500	3,993,031	4,549,827	5,916,303	
Total	7,590,184	9,023,626	11,298,629	3

TABLE 2.1-12 1

POPULATION BY SEGMENT FOR NORTHEAST SECTOR
(60 to 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	19,161	28,348	33,198
70	18,829	28,348	33,198
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

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-13 1

POPULATION BY SEGMENT FOR EAST-NORTHEAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028	3
60	10,261	13,334	17,874	
70	9,112	11,572	15,004	
85	33,008	41,062	51,521	
100	35,752	42,984	51,046	
150	210,542	227,715	276,003	
200	247,589	301,181	360,765	3
350	825,211	955,939	1,132,487	
500	36,470	45,964	57,058	3
Total	1,407,945	1,639,751	1,961,758	

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Amend. 3 5/84

TABLE 2.1-14 1

POPULATION BY SEGMENT FOR EAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	6,374	7,715	9,637
70	10,578	12,678	15,108
85	37,937	45,447	54,042
100	50,334	60,360	71,379
150	310,737	371,504	436,867
200	5,987	7,158	8,418
350	NA	NA	NA
500	NA	NA	NA
Total	421,947	504,862	595,451

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TABLE 2.1-15 1

POPULATION BY SEGMENT FOR EAST-SOUTHEAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,629	4,383	5,313
70	8,306	9,930	11,676
85	23,177	27,708	32,582
100	48,340	57,790	67,962
150	36,002	43,042	50,615
200	NA	NA	NA
350	NA	NA	NA
500	NA	NA	NA
Total	119,454	142,853	168,148

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TABLE 2.1-16 1

POPULATION BY SEGMENT FOR SOUTHEAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,468	4,297	5,228
70	5,073	6,175	8,858
85	32,525	38,911	45,795
100	29,090	35,015	41,409
150	NA	NA	NA
200	NA	NA	NA
350	NA	NA	NA
500	NA	NA	NA
Total	70,156	84,398	101,290

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TABLE 2.1-17 1

POPULATION BY SEGMENT FOR SOUTH-SOUTHEAST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028	3
60	4,615	6,116	8,100	
70	4,845	6,338	8,141	
85	108,636	136,822	164,380	
100	114,807	137,670	173,377	
150	15,338	18,815	21,864	
200	NA	NA	NA	
350	26,960	35,785	45,553	
500	1,154,710	1,490,623	1,888,704	3
Total	1,429,911	1,832,169	2,310,119	

Amend. 1 2/84
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Amend. 3 5/84

TABLE 2.1-18 1

POPULATION BY SEGMENT FOR SOUTH SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028	3
60	5,751	7,612	10,667	
70	5,332	6,688	8,422	
85	20,471	24,836	30,205	3
100	23,204	28,491	34,237	
150	109,210	133,763	144,408	
200	710,435	940,630	1,195,328	
350	2,309,884	3,035,593	4,086,418	
500	3,475,003	4,142,250	5,830,108	
Total	6,659,290	8,319,963	11,339,793	3

TABLE 2.1-19 1

POPULATION BY SEGMENT FOR SOUTH-SOUTHWEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,656	4,256	4,939
70	5,796	7,102	8,533
85	23,624	29,006	34,859
100	19,143	23,505	28,247
150	101,530	119,865	144,047
200	133,683	178,574	210,718
350	241,181	326,372	415,260
500	NA	NA	NA
Total	528,613	688,680	846,603

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TABLE 2.1-20
POPULATION BY SEGMENT FOR SOUTHWEST SECTOR
(60 to 500 MILES)

Mile (Ring)	Year 1987	2007	2028
60	3,250	3,738	4,350
70	5,089	6,243	7,496
85	18,796	23,077	27,733
100	16,591	20,388	24,501
150	101,373	124,755	149,947
200	281,717	334,062	401,822
350	579,057	788,785	987,431
500	NA	NA	NA
Total	1,005,873	1,301,048	1,603,280

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Amend. 3 5/84

TABLE 2.1-21 1

POPULATION BY SEGMENT FOR WEST-SOUTHWEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,495	3,652	4,236
70	4,160	4,607	5,488
85	15,946	19,302	23,228
100	16,416	20,153	24,220
150	253,896	289,185	374,646
200	329,013	399,739	475,450
350	886,059	1,018,295	1,157,081
500	1,511,221	1,712,962	1,941,101
Total	3,020,206	3,467,895	4,005,450

3 3 3 3

TABLE 2.1-22 1

POPULATION BY SEGMENT FOR WEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,224	3,431	4,261
70	3,314	3,752	4,619
85	24,310	29,570	35,678
100	33,211	40,775	49,003
150	333,910	409,960	492,671
200	345,558	423,426	508,341
350	1,668,457	1,839,078	2,010,608
500	1,205,620	1,316,775	1,505,080
Total	3,617,604	4,066,767	4,610,261

3 3 3 3

TABLE 2.1-23 1

POPULATION BY SEGMENT FOR WEST-NORTHWEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	3,745	4,619	5,606
70	2,168	2,661	3,199
85	10,076	12,373	14,869
100	14,655	17,992	21,623
150	961,148	1,177,059	1,418,142
200	1,296,173	1,591,385	1,912,453
350	1,645,907	1,877,484	2,121,786
500	2,161,455	2,466,052	2,789,303
Total	6,095,327	7,149,625	8,286,981

3 3

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-24 1

POPULATION BY SEGMENT FOR NORTHWEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028	
60	4,694	5,613	6,710	3
70	3,550	4,158	4,839	
85	14,553	17,559	20,859	
100	25,520	31,163	37,256	
150	218,876	267,584	320,619	3
200	125,648	153,538	179,034	
350	1,177,173	1,375,578	1,564,044	
500	2,256,247	2,645,230	2,931,733	3
Total	3,826,261	4,500,423	5,065,094	

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-25 1

POPULATION BY SEGMENT FOR NORTH-NORTHWEST SECTOR
(60 TO 500 MILES) 3

Mile (Ring)	Year 1987	2007	2028
60	4,475	4,955	5,549
70	15,007	17,742	20,690
85	36,591	43,660	51,267
100	46,417	55,494	65,258
150	566,171	678,128	798,957
200	347,888	427,587	542,295
350	1,409,183	1,664,576	1,881,257
500	5,208,355	5,592,893	6,293,709
Total	7,634,087	8,395,035	9,658,982

3

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Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-26 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(NORTH SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	1	3	0	0	3	0
7	4	6	1	3	4	3
8	5	8	1	3	5	4
9	5	8	1	3	5	4
10	5	8	1	3	5	4
Sector Total	112	142	28	41	28	18

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	1	3	0	0	3	0
7	4	6	1	3	4	3
8	5	8	1	3	5	4
9	5	8	1	3	5	4
10	5	8	1	3	5	4
Sector Total	25	38	4	12	22	15

TABLE 2.1-26 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	1	3	0	0	3	0
7	4	6	1	3	4	3
8	5	8	1	3	5	4
9	5	8	1	3	5	4
10	5	8	1	3	5	4
Sector Total	25	38	4	12	22	15

TABLE 2.1-27 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(NORTH-NORTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	10	15	2	4	8	6
7	4	6	1	3	4	3
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	441	592	54	90	50	39

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	10	15	2	4	8	6
7	4	6	1	3	4	3
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	354	488	30	61	44	36

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-27 (SHEET 2 OF 2)

Year 2028

Mile (King)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	10	15	2	4	8	6
7	4	6	1	3	4	3
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	354	488	30	61	44	36

3

TABLE 2.1-28 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(NORTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	27	32	6	4
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	12	16	3	5	11	7
7	0	0	0	0	0	0
8	121	147	26	52	26	26
9	443	473	30	60	30	30
10	800	800	50	50	50	50
Sector Total	1468	1545	136	199	123	117

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	3	3	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	12	16	3	5	11	7
7	0	0	0	0	0	0
8	121	147	26	52	26	26
9	443	473	30	60	30	30
10	800	800	50	50	50	50
Sector Total	1381	1441	112	170	117	113

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-28 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	3	3	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	12	16	3	5	11	7
7	0	0	0	0	0	0
8	121	147	26	52	26	26
9	443	473	30	60	30	30
10	800	800	50	50	50	50
Sector Total	1381	1441	112	170	117	113

3

TABLE 2.1-29 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(EAST-NORTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	103	127	34	41	13	13
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	15	20	4	6	13	9
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	121	147	26	52	26	26
Sector Total	239	294	64	99	52	48

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	14	17	7	10	5	5
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	15	20	4	6	13	9
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	121	147	26	52	26	26
Sector Total	150	184	37	68	44	40

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-29 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	14	17	7	10	5	5
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	15	20	4	6	13	9
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	121	147	26	52	26	26
Sector Total	150	184	37	68	44	40

3

TABLE 2.1-30 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(EAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	1010	1089	176	217	132	161
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	10	15	2	3	8	6
9	7	9	2	3	6	3
10	7	9	2	3	6	3
Sector Total	1034	1122	182	226	152	173

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	672	730	110	145	105	135
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	10	15	2	3	8	6
9	7	9	2	3	6	3
10	7	9	2	3	6	3
Sector Total	696	763	116	154	125	147

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-30 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	672	730	110	145	105	135
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	10	15	2	3	8	6
9	7	9	2	3	6	3
10	7	9	2	3	6	3
Sector Total	696	763	116	154	125	147

3

TABLE 2.1-31 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(EAST-SOUTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	118	141	33	39	11	10
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	118	141	33	39	11	10

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	23	30	7	9	4	4
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	23	30	7	9	4	4

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-31 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	23	30	7	9	4	4
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	23	30	7	9	4	4

3

TABLE 2.1-32 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(SOUTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	122	259	26	31	26	4
2	41	48	6	11	6	6
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	163	307	32	42	32	10

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	35	155	2	2	20	0
2	52	60	7	14	7	7
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	87	215	9	16	27	7

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-32 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	35	155	2	2	20	0
2	52	60	7	14	7	7
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	87	215	9	16	27	7

3

TABLE 2.1-33 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(SOUTH-SOUTHEAST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

TABLE 2.1-33 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-34 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(SOUTH SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-34 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-35 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(SOUTH-SOUTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

TABLE 2.1-35 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-36 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(SOUTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	75	400	50	100	50	20
	(10)[a]	(400)[a]	(5)[a]	(20)[a]	(15)[a]	(2)[a]
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	167	509	74	129	56	23
	(102)[a]	(509)[a]	(29)[a]	(49)[a]	(21)[a]	(5)[a]

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	75	400	50	100	50	20
	(10)[a]	(400)[a]	(5)[a]	(20)[a]	(15)[a]	(2)[a]
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	80	405	50	100	50	20
	(15)[a]	(405)[a]	(5)[a]	(20)[a]	(15)[a]	(2)[a]

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-36 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	75 (10)[a]	400 (400)[a]	50 (5)[a]	100 (20)[a]	50 (15)[a]	20 (2)[a]
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	80 (15)[a]	405 (405)[a]	50 (5)[a]	100 (20)[a]	50 (15)[a]	20 (2)[a]

3

a. Number expected during winter operating hours at GPC recreation facility (October 16 to April 14).

TABLE 2.1-37 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(WEST-SOUTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

TABLE 2.1-37 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-38 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(WEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-38 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-39 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(WEST-NORTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-39 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-40 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(NORTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	92	109	24	29	6	3

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

TABLE 2.1-40 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	5	5	0	0	0	0

3

TABLE 2.1-41 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
(NORTH-NORTHWEST SECTOR - 0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	92	109	24	29	6	3
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	2	5	0	5	6	4
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	94	114	24	34	12	7

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	2	5	0	5	6	4
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	7	10	0	5	6	4

TABLE 2.1-41 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	5	5	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	2	5	0	5	6	4
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
Sector Total	7	10	0	5	6	4

3

TABLE 2.1-42 (SHEET 1 OF 2) 1

TRANSIENT POPULATION
ANNULAR RINGS AND ENCLOSED POPULATION
(0 TO 10 MILES)

Year 1987

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	2457	2924	560	679	254	225
2	41	48	6	11	6	6
3	75	400	50	100	50	20
	(10)[a]	(400)[ ]	(5)[a]	(20)[a]	(15)[a]	(2)[a]
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	23	34	5	9	22	13
7	25	37	6	17	27	19
8	136	170	29	58	39	36
9	455	490	33	66	41	37
10	933	964	79	108	87	83
Total	4480	5529	795	1102	558	466
Enclosed	(4415)[a]	(5529)[a]	(750)[a]	(1022)[a]	(523)[a]	(448)[a]

3

Year 2007

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	804	992	129	169	134	144
2	52	60	7	14	7	7
3	75	400	50	100	50	20
	(10)[a]	(400)[a]	(5)[a]	(20)[a]	(15)[a]	(2)[a]
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	23	34	5	9	22	13
7	25	37	6	17	27	19
8	136	170	29	58	39	36
9	455	490	33	66	41	37
10	933	964	79	108	87	83
Total	2838	3609	365	595	439	386
Enclosed	(2773)[a]	(3609)[a]	(320)[a]	(515)[a]	(404)[a]	(368)[a]

Amend. 1 2/84
Amend. 3 5/84

TABLE 2.1-42 (SHEET 2 OF 2)

Year 2028

Mile (Ring)	Weekday Average	Weekday Peak	Weekday Night Average	Weekday Night Peak	Weekend Day	Weekend Night
1	804	992	129	169	134	144
2	52	60	7	14	7	7
3	75 (10)[a]	400 (400)[a]	50 (5)[a]	100 (20)[a]	50 (15)[a]	20 (2)[a]
4	0	0	0	0	0	0
5	335	462	27	54	32	27
6	23	34	5	9	22	13
7	25	37	6	17	27	19
8	136	170	29	58	39	36
9	455	490	33	66	41	37
10	933	964	79	108	87	83
Total Enclosed	2838 (2773)[a]	3609 (3609)[a]	365 (320)[a]	595 (515)[a]	439 (404)[a]	386 (368)[a]

3

a. Number expected during winter operating hours of GPC recreation facility (October 16 to April 14).

TABLE 2.1-43 1

JURISDICTIONAL POPULATION

Jurisdiction	1980	1987	2007	2028
Burke County, GA	19,349	20,162	22,764	25,878
Richmond County, GA	181,629	196,402	241,269	300,303
Aiken County, SC	105,625	118,277	149,180	193,840
Allendale County, SC	10,700	11,470	13,043	15,105
Barnwell County, SC	19,868	22,200	27,821	35,947

3

NODE POINT	DESCRIPTION	MAXIMUM FLOW[a] (GAL/MIN)	AVERAGE FLOW (GAL/MIN)
12	MISCELLANEOUS LOW VOLUME WASTES (OILY WASTE SEPARATOR, STEAM GENERATOR BLOWDOWN, TURBINE BUILDING DRAIN SYSTEM, CONDENSATE AND FEEDWATER FLUSH, DEMINERALIZED WATER MAKEUP SYSTEM)	11,000[b]	230
13	SANITARY WASTE	30	10
14	SANITARY WASTE TREATMENT PLANT DISCHARGE TO WASTE WATER RETENTION BASIN	180	10
15	WASTE WATER RETENTION BASIN DISCHARGE PER UNIT [e]	1600	140
16	STARTUP FLUSHES AND CHEMICAL CLEANING WASTES TO STARTUP POND	10,600	0[c]
17	STARTUP POND DISCHARGE	140	0[c]
18	LIQUID RADWASTE TREATMENT SYSTEM DISCHARGE	70	5[d]
19	BLOWDOWN SUMP DISCHARGE	55,000	10,280
20	PLANT DISCHARGE TO THE RIVER	55,000	10,285
21	RIVER WATER DIVERTED THROUGH TRASH SCREENS	940	0

a. THESE FLOWS ARE NOT NECESSARILY CONCURRENT.

b. THIS FLOW IS BASED ON AN EXPECTED PREOPERATIONAL FLUSH DISCHARGE.

c. STARTUP FLUSHES AND CHEMICAL CLEANING DOES NOT REGULARLY OCCUR DURING NORMAL OPERATION.

d. INTERMITTENT FLOW EXPRESSED AS A CONTINUOUS AVERAGE.

e. UNDER NORMAL CONDITIONS.

Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT
UNIT 1 AND UNIT 2

PLANT WATER USE

FIGURE 3.3-1 (SHEET 3 OF 3)

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 a 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. 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. 1 2

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

3.6-2. The plant waste discharge conforms to the requirements discussed in subsection 5.1.1.

3.6.4 CHEMICAL AND BIOCIDE SOLID WASTES

The VEGP chemical and biocide solid wastes consist of settled solids from the waste water retention basins and the cooling tower basins and salt drift emissions from the cooling towers.

3.6.4.1 Settled Solids Removal

Each natural draft cooling tower has a solid deposition rate of approximately 2.5 lb/min into the basin. The basins have a desilting channel that leads to the 24-in. blowdown line which goes to the blowdown sump for discharge into the river. The towers are also equipped with access ramps so that silt and sludge buildup may be removed. This is expected to occur during normal plant outages. Cooling tower sludge will be disposed of in an approved upland disposal site.

Solids removed from the waste water retention basin will also be disposed of in an upland disposal site. Previous operating experience has revealed that these solids and cooling tower settled solids are not hazardous (see section 5.6.3) and can be disposed of in an approved upland disposal site. 1

3.6.4.2 Cooling Tower Salt Drift Emissions

Salt drift emissions from the natural draft cooling towers for a four-unit plant are discussed in CPSER subsection 5.3.2. The NRC staff concluded (FES paragraph 5.5.1.1) that the effects of deposition of cooling tower salt drift would be negligible. The decrease in plant size from four to two units further reduces these effects. Additional information on salt drift emissions is provided in response to questions E290.3, E451.17, and E290.8. 1 3

3.7 SANITARY AND OTHER WASTE DISCHARGES

3.7.1 SANITARY WASTE

The sewage treatment plant treats waste water generated during both construction and plant operation. The treatment concept is the same as described in Construction Permit Stage Environmental Report (CPSER) section 3.7, but specific aspects of the processes (e.g., flow, retention time, and chlorine residual) have changed since that time as shown in table 3.7-1. During normal operation, the maximum sanitary flow from the plant is estimated to be 33,500 gal/day. This flow is based on an average annual population of 664 persons using an average of 35 gal per capita per day during plant operation. 3

The effluent from the sewage treatment plant is combined with other station effluents (section 3.6) prior to discharge to the Savannah River. The characteristics of the combined station effluent is described in table 3.6-2. The sanitary waste effluent will comply with the Environmental Protection Agency effluent guideline limitations as discussed in subsection 5.1.1.

Approximately 4000 gal of sludge per year are produced by the sewage treatment plant. Sludge is collected and transported by truck to an approved disposal area. 3

3.7.2 AUXILIARY BOILER EMISSIONS TO AIR

The VEGP has an auxiliary boiler which supplies auxiliary steam to various plant systems when main steam is not available. The oil-fired boiler is rated for 190,000 lb/h steam with an operating pressure of 200 psig. The boiler will be operated in accordance with the State of Georgia permit issued February 17, 1981. Emission limitations prescribed in that permit are as follows:

A. The consumption of fuel oil during initial startup and system check shall not exceed 12,500 tons/year.

B. Once operational, the total emissions of SO_2 will not exceed 40 tons/year.

3.7.3 DIESEL GENERATOR EMISSIONS TO AIR

Each unit has available two diesel-powered generators which are designed to supply auxiliary power in the event of loss of offsite power. The diesel generators are rated at 7000 kW each and burn 3600 lb/h of no. 2 diesel fuel oil at full power. It is expected that each diesel generator will be operated once a month for 1 to 3 h for test purposes.

If each of the four 7000-kW diesels are operated for a total of 2 h/month, the total expected annual emissions are:

A. SO_2 - 1.7 tons/year.

B. NO_x - 10.7 tons/year.

In addition, there is a 750-kW diesel generator which serves as the standby power source for the security lighting system and technical support system in the event of loss of the normal ac power supply. The emissions from this generator are insignificant in comparison to the standby auxiliary power diesels because of its size (750 kW compared to four generators at 7000 kW each) and the projected infrequent time of operation.

Based on these low levels of emissions, the State of Georgia on December 22, 1981 (J. L. Ledbetter letter to T. E. Byerley), exempted the diesel generators from air quality permitting requirements. 1

3.7.4 OIL LEAKAGE

Oil leakage is discussed in CPSER subsection 3.8.2.

3.7.5 FLUID BED DRY WASTE PROCESSOR EMISSIONS TO AIR

The fluid bed dry waste processor is described in detail in Final Safety Analysis Report (FSAR) section 11.4. Radioactive emissions for the building that houses the fluid bed dry waste processor and other volume reduction equipment are analyzed in FSAR section 11.3.3.

The expected annual nonradiological emissions from the fluid bed dry waste processor are:

TABLE 3.7-1

SANITARY WASTE DESIGN PARAMETERS

Sewage load, maximum (gal/day)	33,500[a]
5-day biochemical oxygen demand (lb)	48[a]
5-day biochemical oxygen demand removal (percent)	90 to 95
Suspended solids removal (percent)	90
Aeration tank retention time, minimum (h)	24
Clarifier detention time, minimum (h)	3.6
Residual chlorine, minimum (mg/l)	0.4
Residual chlorine, maximum (mg/l)	0.5

a. During shutdown periods, 48,000 gal/day sanitary waste will be produced with 96 lb of 5-day biochemical oxygen demand.

TABLE 3.9-3

LAND USE CATEGORIES OCCUPIED BY TRANSMISSION CORRIDORS

Name of Line/Section	Classification of R/W (Acres)				
	Wooded		Fields and Cultivated	Wetlands	Urban
	Pines	Hardwoods			
Plant Vogtle-Wadley-Wallace Dam-Plant Scherer 500-kV transmission line					
• Plant Vogtle-Wadley section	280	232	224	7	--
• Wadley-Wallace Dam section	419	310	257	13	4
• Wallace Dam-Plant Scherer section	534	313	96	16	5
• Total	1233	855	577	36	9
Plant Vogtle-Effingham-Thalmann 500-kV transmission line[a]					
• Plant Vogtle-Effingham section	408	455	385	42	--
• Effingham-Thalmann section	866	730	8	9	2
• Total	1274	1185	393	51	--
Plant Vogtle-Goshen No. 1, No. 2, and No. 3 230-kV transmission line	275	220	123	8	2

a. Some wetland acreages were also classified and counted as woodlands.

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

VEGP-OLSER-3

5.2 RADIOLOGICAL IMPACT FROM ROUTINE OPERATION

5.2.1 EXPOSURE PATHWAYS

5.2.1.1 Biota Other Than Man

Aquatic biota may be exposed to external radiation from radionuclides in the water and sediment and to internal radiation from the assimilation of these radionuclides. In addition to uptake via the ingestion of food organisms, fish and invertebrates can acquire radionuclides through direct absorption from the water and can at least partially assimilate radioactivity from ingested sediment. Figure 5.2-1 is a flow chart representing the transfer of radionuclides through the aquatic ecosystem.

The organisms which constitute the lower trophic levels of the aquatic food web (plankton and benthic invertebrates) in the Savannah River and Beaverdam Creek are described in subsection 2.2.2. Dominant phytoplankton are the green algae (Chlorophyta), blue-green algae (Cyanophyta) and diatoms (Bacillariophyceae). Genera that will predominate include the rotifers (Keratella, Polyarthra, and Synchaeta); the cladocerans (Bosmina, Ceriodaphnia, and Daphnia); the copepods Diaptomus, Mesocyclops, and Cyclops); and the larvae of the dipteran, Chaoborus. Rotifers probably will be the dominant taxa in the river, while the cladocerans and copepods will be secondarily dominant. Benthic macroinvertebrates typically play an important role in the aquatic food web, serving as a link between the detrital level and the higher trophic levels. Mayfly larvae, dipteran larvae, and mollusks are examples of the benthic macroinvertebrates that are found in the Savannah River in the vicinity of the VEGP. Fish feeding upon the plankton, benthic macroinvertebrates, and other fish constitute a higher trophic level of the aquatic food web.

The terrestrial ecology of the VEGP area is described in subsection 2.2.1. Terrestrial biota may be exposed to external radiation from immersion in the plant's gaseous effluents, from swimming in water containing the plant's liquid effluents, and from direct shine from radionuclides that have deposited on the ground and shoreline. Internal exposure of terrestrial organisms may result from the inhalation of radioactive materials from the plant's gaseous effluents and from the ingestion of foods that have assimilated radioactive materials from both gaseous and liquid plant effluents. Figure 5.2-2 presents the pathways by which terrestrial biota other than man are exposed to radioactive material released from the VEGP.

The routes of internal exposure to terrestrial biota other than man are highly varied due to the diversified feeding habits of

the animals living in the vicinity of the site. The vegetation in the region will receive radionuclides from deposition onto the plant foliage and from the uptake of radioactivity initially deposited on the ground. Deer, rabbits, squirrels, and other herbivorous animals could then be internally exposed from the ingestion of this vegetation. In turn, foxes, bobcats, and other predatory animals living in the vicinity may be internally exposed to radiation from feeding on those animals that have concentrated radionuclides in their flesh.

5.2.1.2 Man

As a result of the operation of the VEGP there are several potential radiation exposure pathways to man. Figure 5.2-3 presents the various potential pathways. These potential pathways may be divided into two categories, those pathways resulting in a radiation dose via internal exposure and those pathways resulting in a dose via external exposure. External exposure to an individual may result from contact with radioactivity deposited on the ground, immersion of an individual in a cloud containing radioactive gaseous effluents, direct irradiation from the plant, or direct contact with water containing radioactive liquid effluents while swimming or engaging in a similar activity. Internal exposures may result from the ingestion of water, various foods, and inhalation.

5.2.1.2.1 Internal Exposure

Liquid radioactive effluents from VEGP are combined with cooling tower blowdown, waste water retention basin effluent, and additional dilution flow if required to meet 10 CFR 20 requirements prior to discharge downstream of the river intake structure. However, internal exposure via the domestic potable water pathway will be minimal, because the nearest location of potable use of river water is in Beaufort County, South Carolina, approximately 112 river miles downstream of the plant site (paragraph 2.1.3.8.2). No crop irrigation with Savannah River water has been observed within 50 miles of the plant site, so exposure from this pathway is expected to be minimal. 1

Although recreational and commercial fishing within 50 miles of the site is limited, these activities could result in internal exposure through the aquatic food chain (paragraphs 2.1.3.4 and 2.1.3.5).

The remoteness of the VEGP site ensures few human activities within 5 miles of the plant. There are no wildlife preserves, or sanctuaries in the vicinity of the VEGP. However, there are some small rural farms with gardens and small amounts of 3

livestock (subsection 2.1.3). These create potential routes for internal radiation exposure to man and result from the deposition of radioactive wastes discharged into the atmosphere. The potential routes are air-vegetable-man, air-grass-meat or milk animal-man, and inhalation. The location of the nearest site boundary, residence, garden, meat animal, and milk cow to VEGP is presented in tables 5.2-1 and 5.2-2 (see Final Safety Analysis Report (FSAR) tables 2.3.5-10 and 2.3.5-11). 1 3

The majority of the land within a 50-mile radius of the plant is devoted to agricultural activity. The annual meat, milk, and truck farming production is discussed in subsection 2.1.3. 1

5.2.1.2.2 External Exposure

People living in the vicinity of or frequenting the plant site are subject to low level external exposures due to plant liquid and gaseous effluent releases. Although the general public has access to the river downstream of the plant site, external exposure as a result of contact with river water while boating, swimming, and fishing is expected to be minimal due to the remoteness of the site and the absence of any large recreational attractions.

The principal external exposure will result from gaseous releases due to immersion in the effluent cloud and from particulate ground deposition.

5.2.2 RADIOACTIVITY IN THE ENVIRONMENT

The radionuclides discharged in the liquid and gaseous effluents are provided in section 3.5. This section considers how these effluents are distributed in the environment surrounding the VEGP site. Specifically, estimates have been made for the radionuclide concentration in the water, in the atmosphere around the site, on land areas, and on vegetation surrounding the plant.

The models and assumptions used to determine annual average air concentration (X/Q), depleted concentration, and deposition (D/Q) are described in FSAR subsection 2.3.5. The meteorological data used in these models is described in detail in FSAR tables 2.3.5-8 and 2.3.5-9. The concentrations were calculated at points within a radial grid of sixteen 22.5° sectors centered at true north and extending to a distance of 50 miles from the station. The data points are located in each sector at 0.5, 1.5, 2.5, 3.5, 4.5, 7.5, 15, 25, 35, and 45 miles. In addition, calculations were also made at the critical receptors in each sector within 5 miles of the site. These distances

and directions are presented in tables 5.2-1 and 5.2-2 (see FSAR tables 2.3.5-10 and 2.3.5-11 along with the X/Q, depleted X/Q, and D/Q). 1

The highest anticipated airborne concentrations in the vicinity of the site due to gaseous releases have been calculated using these meteorological data and the source terms presented in section 3.5. The concentrations are presented in FSAR table 11.3.3-3. The concentrations of radionuclides on the ground and in vegetation are controlled by the deposition of gaseous effluents, since irrigation of crop land with Savannah River water is not anticipated. These concentrations are also presented in table 5.2-3 at the nearest residence.

5.2.2.1 Surface Water Models

The effects of liquid radioactive effluents released to the Savannah River from VEGP during normal operation were analyzed using the LADTAP II computer code[1] and initial dilution data obtained from the VEGP thermal plume analysis.[2] Based on the calculated releases of radioactive materials in section 3.5, the expected concentration of radionuclides in the liquid effluents discharged to the river is presented in FSAR table 11.2.3-1.

5.2.2.1.1 Transport Models

The LADTAP II code is based in part on the calculational models for the estimation of aquatic dispersion outlined in Regulatory Guide 1.113. Data in the VEGP thermal plume analysis were determined using the three-dimensional submerged jet model recommended in Regulatory Guide 1.113.

The VEGP analysis uses the conservative steady state stream tube model with no reconcentration for one-unit operation with radwaste discharge. As noted in paragraph 5.2.1.2.1, radioactive liquid waste is mixed with cooling tower blowdown, nonradioactive waste, and an additional dilution flow when necessary prior to discharge into the river.

For a 15,500 gal/min (34.5 ft^3/s) effluent discharge into the Savannah River with 5800 ft^3/s minimum flow, the VEGP thermal plume analysis utilizes a dilution factor of 10 for summer discharge conditions and 20 for winter discharge conditions. For conservatism, the lower dilution factor of 10 was utilized for the LADTAP II analysis. Furthermore, a transit time of 0.0 was used.

The transmission lines associated with the VEGP will have no significant environmental impact due to ozone formation as discussed in CPSER paragraph 5.4.1.4. 3

5.5.2 ENVIRONMENTAL EFFECTS OF MAINTENANCE OF THE TRANSMISSION SYSTEMS

Rights of way will be recleared every 3 years; in addition, a herbicide will be sprayed in selected areas by helicopters every 6 years (or less frequently depending on local vegetative conditions). The reclearing is accomplished with rotary or drum mowers and with some hand clearing using chain saws and hand tools. No permanent access roads to the rights of way will be maintained. Any damage to rights of way during maintenance will be repaired. Herbicide for reclearing will be sprayed in compliance with all U.S. Environmental Protection Agency and State of Georgia Environmental Protection Division regulations. Present practice is to spray herbicide using a helicopter with a microfoil boom. Spraying is limited to periods when the wind does not exceed 1 1/2 to 2 mph. The application rate is in accordance with label directions to adequately reclear the rights of way. Only broad-leafed plants are killed. This process does not adversely affect either pines and other vegetation near the rights of way or grasses and narrow-leafed plants on the rights of way. 1

Part of the land management program of GPC is the right of way conversion program in which GPC will pay the landowner to plant the cleared right of way in pasture, crops, or game food plots. Planting is limited to grasses, crops, and low-growing shrubs and trees that will not reach a height that will hinder the operation of the transmission lines. In addition, the edge effect created by clearing or planting crops along rights of way will enhance wildlife habitat.

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 6200 acres which will be removed from the growing of timber, however, this land can be returned to its former state if desired. 2 3

Amend. 1 2/84
Amend. 2 4/84
Amend. 3 5/84

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 9755.9 acres, which is about 0.19 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. 3

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 1333 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.

groundwater and surface waters. Twenty-five samples of groundwater were collected and analyzed. Samples were collected in accordance with general practice to avoid contamination from the flow of producing wells, springs, and streams or were bailed from nonflowing observation wells. Tests were conducted to determine the amounts of common anions, cations, total dissolved solids, total hardness, pH, and conductivity in accordance with the Standard Methods for the Examination of Water and Wastewater.(1) The results of this testing are presented in FSAR paragraph 2.4.12.1.3.4.

6.1.2.2 Models

The effects on groundwater and surface water bodies of an accidental release of spilled radioactive material are discussed in FSAR subsection 2.4.13.

6.1.3 AIR

Refer to subsections 2.3.3, 2.3.4, and 2.3.5 of the FSAR.

6.1.4 LAND

6.1.4.1 Geology and Soils

The program of geologic investigation consisted of the following:

A. A thorough review of all pertinent geologic literature.

B. Interviews with university, state, and federal geologists having knowledge of geologic conditions in the area.

C. Geologic reconnaissance of the plant site and surrounding area.

D. Interpretation of maps and aerial photographs.

E. An investigation of the subsurface including soil and groundwater conditions in the area by means of a test boring program, electric logging, laboratory analyses, and seismic refraction traverses.

The results of this investigation have been documented in FSAR subsections 2.4.12 and 2.4.13, section 2.5, and appendix 2B.

Environmental impact considerations based on the results are addressed in these sections. Boring data were accumulated from bore hole locations which were strategically distributed to encompass all vital environmental regions within and surrounding the plant area as discussed in FSAR appendix 2B and section 2.5.

The stratigraphy of the area was determined from a comprehensive literature search, foundation and geologic borings, seismic refraction surveys, and correlations between electrically logged borings. These borings, drilled to depths between 25 and 300 ft, penetrated formations of Quaternary, Tertiary, and Cretaceous age (see FSAR section 2.5).

6.1.4.2 Land Use and Demographic Surveys

The CPSER estimates of population distribution and land use (section 2.1) in the vicinity of VEGP were updated using field surveys, current U.S. Census Bureau population information, current maps, and data supplied through population surveys conducted by municipalities in the area and GPC personnel.

6.1.4.2.1 Land Use Survey

6.1.4.2.1.1 Use of Adjacent Lands and Waters. Information contained in subsection 2.1.3 on use of adjacent lands and waters in the vicinity of VEGP was obtained using field surveys, Landsat photographs, and data from public agencies. Due to the remoteness of the VEGP site property from heavily populated areas, there are few human activities within a 5-mile radius (from the midpoint of the power block) of the plant site. A review of a survey conducted by the Central Savannah Area Planning and Development Commission and communications with the Savannah River Plant were used to determine any areas of large scale public use. 3

6.1.4.2.1.2 Residences, Meat Animals, Milk-Producing Cows/Goats, and Vegetable Gardens Within 5 Miles of the VEGP Plant Site. The area surrounding the VEGP site was surveyed house to house by GPC personnel. Each of the 16 compass headings and 22.5° sectors radiating from the midpoint of the power block to a radius of 5 miles was investigated to locate the nearest residence, meat animal, milk-producing animal, and vegetable garden in each sector.

6.1.4.2.1.3 Land Use Within a 5-Mile Radius. Data on land use was obtained from the Georgia Department of Natural

where:

X_1 = population of deer per square mile.

t1 = number of sets of tracks crossing the transect per mile.

D = average daily range of a white-tailed deer.

6.1.4.3.5.3 Small Game Mammals. Squirrel populations and habitats were assessed by conducting morning and evening direct observation counts at specified points on the site. These counts were made during the winter months when leaves did not obstruct the observer's vision. Rabbit signs along roadsides, road kills, and sightings were recorded to establish a general evaluation of the rabbit population.

6.1.4.3.5.4 Furbearers. Furbearer populations were evaluated from the abundance of signs that were observed in areas where tracks and droppings would be visible, such as along streams, river banks, and old road beds. Road kills and visual sightings were also recorded.

6.1.5 RADIOLOGICAL MONITORING

The objective of a radiological environmental monitoring program is to determine the nature and extent of any radiological changes in the environment attributable to plant operation. The program provides measurements of radiation and radioactive materials in the exposure pathways for those radionuclides which are expected to produce the highest potential radiation exposure to individuals as a result of plant operation. The program provides information needed to determine whether exposures in the environment are within established limits. The preoperational phase of the program is described in this subsection and the operational phase in subsection 6.2.1. The general bases for establishing the environmental monitoring program are set forth in reference 5. Additional guidance is provided by references 6 and 7.

In the preoperational phase of the program, background radiological levels, both natural and manmade, are measured. These background measurements may then be compared with measurements to be taken during the operational phase of the program. Also during the preoperational phase, procedures and techniques are developed, equipment is evaluated and calibrated, and personnel are trained.

Some samples and monitoring points not expected to be affected by plant operations will be monitored during the preoperational period to establish baseline data. These samples and locations need not be monitored during operation until there is reason to believe that they may become sufficiently affected by plant operations to warrant monitoring.

Preoperational monitoring began in August 1981. Periods of 6 months to 2 years, depending on the sample, are usually sufficient to provide an adequate data base for comparison with operational data and to provide experience which may improve the efficiency of the operating program. This period will be extended as feasible; however, the preoperational phase will be concluded at at about the time of initial criticality of Unit 1, if not before.

Measurements are taken chiefly at two kinds of locations: indicator stations where long term or maximum radiological levels attributable to operation of the plant are anticipated; and control stations where radiological levels are not expected to be significantly influenced by plant activities. However, all of the indicator and control stations are susceptible to any radiological effects which might be attributed to the operation of neighboring nuclear facilities, as well as to fallout from nuclear weapons tests. These could confuse the proper comparison of the radiological levels between the indicator and control stations or between the periods of operation and preoperation when attempting to show the effects of plant operation. Measurements may also be taken at locations of special interest, such as nearby institutions or towns, or residences. Deviations are permitted from the sampling schedule if specimens are unobtainable due to hazardous conditions, unavailability, inclement weather, malfunction of equipment, or other conditions. 3

Samples are collected and analyzed according to table 6.1-1. The locations of the sampling stations are described in tables 6.1-1 and 6.1-2 and are shown in figures 6.1-8 through 6.1-12. The number and locations of the sampling stations were determined largely by the guidance provided in reference 8. Site specific considerations such as accessibility also influenced some of the locations of the sampling stations.

Changes in the program relative to the description given at the construction permit stage come as a consequence of the experience gained with the operation of the radiological environmental monitoring program at Hatch Nuclear Plant. These changes also reflect developments in the regulatory guidance.

TABLE 6.1-2

THERMOLUMINESCENT DOSIMETER LOCATIONS

	Station	Distance (miles)	Direction (sector)
1	Hancock Landing Road	1.1	N
2	River bank	0.8	NNE
3	River bank	0.7	NE
4	River bank	0.8	ENE
5	River bank	1.2	E
6	Plant Wilson	1.1	ESE
7	Simulator building	1.5	SE
8	River road	1.1	SSE
9	River Road	1.1	S
10	River Road	1.1	SSW
11	River Road	1.2	SW
12	River Road	1.1	WSW
13	River Road	1.3	W
14	River Road	1.4	WNW
15	Hancock Landing Road	1.5	NW
16	Hancock Landing Road	1.4	NNW
17	Savannah River Plant - River Road	5.1	N
18	Savannah River Plant - D Area	5.0	NNE
19	Savannah River Plant - Road A.13	4.6	NE
20	Savannah River Plant - Road A.13.1	5.0	ENE
21	Savannah River Plant - Road A.17	5.3	E
22	River bank upstream of Buxton Landing	4.2	ESE
23	Griffin's Landing Road	4.4	SE
24	Chance Road	4.7	SSE
25	Chance Road and Highway 23	5.2	S
26	Highway 23, mi 15.5	4.6	SSW
27	Highway 23, mi 17	4.8	SW
28	Hancock Landing Road	5.0	WSW
29	Claxton-Lively Road	5.0	W
30	Cobbie Grove Church Road	4.7	WNW
31	River Road at Allen's Church Folk	5.2	NW
32	River bank	4.8	NNW
33	Nearby residence	3.3	SE
34	Girard Elementary School	7.7	SSE
35	Girard	8.0	SSE
36	Waynesboro	15.0	WSW

3

6.4 PREOPERATIONAL ENVIRONMENTAL RADIOLOGICAL MONITORING DATA

Radiological monitoring began August 1981 and is conducted as specified in subsection 6.1.5. The results of the radiological monitoring program for the period from August 1981 through December 1982 are summarized in this section. Although data on both manmade and naturally occurring radionuclides are presented in the tables, discussion is limited to manmade radionuclides.

All of the radiological analyses of the environmental samples were contracted to the Center for Applied Isotope Studies at the University of Georgia in Athens, Georgia. Thermoluminescent dosimeters were analyzed by Hazelton Environmental Sciences of Northbrook, Illinois.

Gross beta activity of airborne particulates and atmospheric radioiodine concentrations are monitored by five continuous air samplers. The date sampling began, number of samples collected, and estimated average activities are summarized in table 6.4-1. Average gross beta activity at the indicator stations ranged from 0.019 pCi/m^3 to 0.024 pCi/m^3. The average gross beta activity in the nearest community (Girard) and at the control station (Waynesboro) were 0.031 pCi/m^3 and 0.025 pCi/m^3, respectively. Airborne I-131 activity was below the minimum detectable concentration in all samples analyzed. A summary of specific radionuclides found in quarterly composites of air particulate samples is presented in table 6.4-2. Cs-137 was the only fission product detected and was present at the minimum detectable concentration in 4 of 30 composite samples from both indicator and control stations.

Water from the Savannah River is collected using composite samplers, two at control stations upstream of the plant site and three at indicator stations downstream of the plant site. Results of monthly gamma spectroscopic analysis and quarterly analysis of composites for tritium are summarized in table 6.4-3. The following fission products were detected in river water samples: Zr-95, Nb-95, and Cs-134 in one sample out of 39 collected at indicator stations; and Cs-137 in 4 of 39 samples collected at indicator stations and 3 of 32 samples collected at control stations. The average tritium concentrations at control stations and indicator stations were 634 pCi/l and 1813 pCi/l, respectively.

Drinking water samples are collected from one upstream location and two downstream locations. Drinking water samples have been collected from Cherokee Hill Water Treatment Plant since November 1981 and North Augusta Water Treatment Plant beginning December 1982. Results are summarized in table 6.4-4. Thirteen

water samples have been analyzed from Cherokee Hill Water Treatment Plant. Gross beta activity averaged 5.3 pCi/l. Gamma spectroscopic analysis identified Cs-134 (45 pCi/l) and Cs-137 (56 pCi/l) in one sample collected in November 1982. No gamma emitting nuclides were detected in the remaining 12 samples. Tritium concentrations averaged 4259 pCi/l in five composite samples. Only one drinking water sample is reported for the North Augusta Water Treatment Plant. Gross beta activity was 2.32 pCi/l, and the tritium concentration was 501 pCi/l.

Sediment samples are collected at two locations above the plant site and one location below the plant site. Four sediment samples were collected between September 1981 and December 1982. A single sample was collected from each of the two upstream control locations, and two samples were collected from the downstream indicator station (table 6.4-5). Samples from the control stations contained Zr-95, Nb-95, and Cs-134 (one sample) and Cs-137 (both samples). Samples from the indicator stations contained Nb-95 (one sample) and Cs-137 (both samples). The Cs-137 concentrations for the indicator and control sections were 98 and 235 pCi/kg, respectively.

The closest operating dairy (prior to March 1984), Dixon Dairy, is located 9.5 miles southeast of the plant site (see response to question 470.3). A summary of I-131 activity and gamma spectroscopic analysis of milk samples are presented in table 6.4-6. I-131 activity was below the minimum detectable concentration in all samples. Cs-137 was the only fission product detected in milk samples. Cs-137 was detected in 4 of 33 samples with an average detectable activity of 23 pCi/l. 3

Grass samples are collected from two locations on the plant site and from one control site. Results of gamma isotopic analysis of dried grass are summarized in table 6.4-7. Samples were collected beginning in December 1981. The following fission products were detected in grass samples: Nb-95, in 1 sample out of 14 collected at indicator stations; Cs-134, in 1 sample out of 10 collected at the control station; and Cs-137, in all 14 samples collected at indicator stations and 1 of 10 samples collected at the control station.

Fish samples are collected on the Savannah River above and below the plant site. Fish tissue was obtained from four species collected during six surveys. Cs-137 was found in all fish tissue samples (table 6.4-8). Concentrations ranged from 110 pCi/kg in catfish to 890 pCi/kg in largemouth bass at the indicator stations, and 116 to 370 pCi/kg at the control station for these same species.

Groundwater samples are taken at four locations on or near the plant site. The results of a single series of groundwater samples are summarized in table 6.4-9. No gamma emitting radionuclides were found in any of the groundwater samples. Tritium concentrations were 240 pCi/l for a sample from the regional aquifer, 1280 pCi/l for a sample from the Mallard's Pond spring, and 3810 pCi/l for a sample from the bluff at river mile 150. No sample was available from the test well near the nuclear power block.

External radiation is monitored by thermoluminescent dosimeters (TLDs) located as given in table 6.1-2. The results are summarized in table 6.4-10. The average exposure at the plant boundary and 5 miles from the plant site were 15.2 and 14.5 mR/91 days, respectively. TLDs placed at locations of interest recorded exposures of 16.2 mR/91 days at the nearest residence, 14.0 mR/91 days at the nearest elementary school, and 15.4 mR/91 days at the nearest community. Control TLDs placed in Waynesboro received an average exposure of 18.1 mR/91 days. New locations for the control station and for indicator stations with unusually high or low readings are being evaluated.

TABLE 6.4-10

AVERAGE ON-STATION DOSE ACQUIRED BY THERMOLUMINESCENT DOSIMETERS BETWEEN AUGUST 5, 1981 AND JANUARY 4, 1983

		Exposure (mR/91 days)		
Station No.	Location	No. of Samples	Average	Range
1-16	Plant boundary	95	15.2	9.9-20.6
17-32	Five mile radius	93	14.5	8.3-24.2
33	Nearby residence	4	16.2	15.7-17.7
34	Girard Elementary	4	14.0	13.4-14.7
35	Girard	8	15.4	13.3-18.7
36	Waynesboro	6	18.1	17.1-19.6

3

Table 8.1-5 is a tabulation of total system production costs along with the capacity factor, fuel cost, and variable cost of VEGP Plant Units 1 and 2. This scenario represents the Southern electric system load as pictured in the latest forecast. Table 8.1-6 is a similar tabulation except that the Southern electric system load is held constant at the 1983 forecasted value during the study years.

Table 8.1-7 is a tabulation of total system production costs if Vogtle should not be in operation during the period from 1987 through 1993. Sources of replacement energy, cost of fuel for replacement energy, and variable operation and maintenance for replacement energy are also tabulated. Table 8.1-8 is the same form of tabulation except that the Southern electric system load for the 1987 through 1993 study period is held constant at the 1983 value. The present value (at 10 percent discount) of savings in production costs for the 1987 to 1993 period, assuming normal load growth, is $2.1 billion (1987 dollars).

8.1.2 INDIRECT BENEFITS

8.1.2.1 Tax Revenues

Additional property tax revenues will accrue to Burke and Richmond Counties where new facilities are or will be constructed. The plant will produce the largest increment in property taxes, all of which will accrue to Burke County. In addition, new transmission lines and substations will be constructed to transport and distribute the plant's output; these facilities will add to other counties' tax bases and property tax revenue.

A report[1] prepared for Georgia Power Company contains projections of Burke County ad valorem taxes to be generated by the project. Table 8.1-9 presents estimates of ad valorem taxes to be paid to Burke County during the period 1983 to 1989. Taxes are in 1982 dollars and are based on the projected value of the plant at the time it begins operation. Table E310.6-1 presents estimates of ad valorem taxes to be paid to Burke County during the period 1990 to 1994 in 1984 dollars. 3

Table 8.1-10 shows the amount of estimated local option tax (LOT) Burke County can expect to receive in coming years. The sales tax portion of LOT is generated by GPC sales of electricity in the county. The use tax portion is generated by VEGP construction. The use tax estimates do not decline after construction is completed due to replacement of nuclear fuel and other ongoing equipment and supplies expenditures which are

subject to the use tax. Burke County is the recipient of the total LOT. The LOT was first instituted in Burke County in 1982. Table 310.6-1 presents revised estimates of the LOT in 1984 dollars during the period from 1990 to 1994. The County Commission keeps 70 percent of the amount received, and three municipalities split the remainder according to population. Currently Waynesboro receives 22.71 percent, Sardis 4.65 percent, and Midville 2.64 percent. 3

The VEGP will generate a variety of tax revenues. Jurisdictions benefiting from the new taxes are counties, schools, other districts where generating and transmission facilities are located, and the state and federal governments. Local governments will mainly benefit from property taxes on land and fixed assets relating to the projects. The state government will derive taxes from sales and use taxes, a levy in support of the state Public Service Commission based on assessed value, and the state corporate income tax (see table E310.6-1). The federal government will derive additional taxes via the corporate income tax. Both state and federal governments will derive additional taxes via personal income taxes of plant operating personnel. 3

8.1.2.2 Employment

A work force of approximately 664 employees is anticipated for operation of VEGP. The annual payroll is expected to be $20,771,000 (1984 dollars) (see response to question E310.2). Of the employees moving into the area for plant operation, most are expected to rent or purchase homes in Burke, Richmond, or surrounding counties. 3

8.1.2.3 Annual Savings in Consumption of Fuel Oil

Estimates of the Southern electric system oil consumption as primary fuel were derived from the system operation simulations described in paragraph 8.1.1.3. Again, these estimates were done on a Southern Company electric system basis because of the integrated operation of all generating units on the system. These estimates do not include any oil used for unit startup or flame stabilization of thermal generating units. Expected values of emergency purchases by the Southern electric system were assumed to come from oil-fired sources and were coverted to barrels using a conversion ratio of 1.6 barrels/MWh (based on a heat rate of 9600 Btu/kWh and a heat content of 6000 kBtu/bbl). Simulations of system operation with and without VEGP were used, and the resulting estimates of oil consumption are shown in table 8.1-11.

In table 8.1-12, the yearly reductions in oil consumption due to operation of VEGP are multiplied by the projected cost (from Southern Company Services) of oil to demonstrate the value of the reductions to the system and its customers. Reductions in oil consumed with VEGP range as high as 1.2 million barrels (1991) and total approximately 4.9 million barrels over the 9-year period from 1987 through 1995. The cost projections are based on an average of projections for No. 2 fuel oil. No. 2 fuel oil is used in these projections because the majority of the oil-fired electric generating plants within the Southern electric system use this grade of fuel oil. On a present worth basis, in 1982 dollars and using a factor of 10 percent, the value of reduced oil consumption for the period 1987 through 1995 is approximately $200 million.

8.1.2.4 Displacement of Air Pollutants

The operation of VEGP will displace generation that would otherwise be made from fossil fuel boilers. This will result in displacement of air pollutants that would be emitted from fossil fuel generation. Assuming an annual generation capacity of 1.2 x 10^{10} kWh for a 1971 to 1978 design coal-fired boiler of approximately 10,000 Btu/kWh, the annual savings in air pollutants would be 1.2 x 10^{7} lb particulate, 2.57 x 10^{8} lb SO_2, and 8.4 x 10^{7} lb of NO_x.

8.1.2.5 Employee Recreation Area

There will be an employee recreation area located near the VEGP. The recreation area will be approximately 2 miles southwest from the plant site. It will consist of 125 acres of land, of which 50 acres will be developed. The recreation facilities include a softball field, tennis court, small pond, overnight camping, and picnic area. 1

REFERENCE

1. Batelle Columbus Laboratories, "Action Plan for Burke County," January 1983.

TABLE 11.1-1 (SHEET 1 OF 2)

SUMMARY OF COSTS-BENEFITS OF VEGP OPERATION

Effect	Magnitude or Reference
Direct benefits	
Energy (kWh/year)	1.2×10^{10}
Continuous peak period rating/ unit (MWe)	1125
Capacity factor (%)	64
Proportional distribution of energy (percent)	
Industrial	37
Commercial	21
Residential, sales for resale, other	42
Improved diversity of supply	Paragraph 8.1.1.2
Improved system reliability	Paragraph 8.1.1.3
Savings in production costs (net present value)	$2,100 million (1987 dollars)
Indirect benefits	
Local taxes	Tables 8.1-9, 8.1-10, and E310.6-1
Employment	957
Annual payroll	$20.771 million (1984 dollars)
Displacement of air pollutants (lb/year)	
Particulates	1.20×10^{7}
SO	1.44×10^{8}
NO	8.40×10^{7}
Displacement of fuel oil	Paragraph 8.1.2.3
Increased knowledge of the environment	Sections 2.2 and 2.6
Direct costs	
Revenue requirements for capital recovery	$908 million (levelized)
Fuel	$537 million (levelized)
Operation and maintenance	$261 million (levelized)
Decommissioning	$100 million (1980 dollars)

3

NUCLEAR REGULATORY COMMISSION
QUESTIONS AND RESPONSES INDEX
VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
OPERATING LICENSE STAGE ENVIRONMENTAL REPORT
NRC DOCKET NUMBERS 50-424 AND 50-425

NRC Question	OLSER Section/Subsection	Keywords
E240.7	2.4	Floodplain Management, Executive order 11988
E240.8	7A.4	Liquid pathway release from postulated core melt accident

Question E240.7

Definition (from Executive Order 11988 Flood Plain Management) of Flood Plain: The lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum that area subject to a 1 percent or greater chance of flooding in any given year.

A. Provide descriptions of the flood plains of all water bodies, including intermittent water courses, within or adjacent to the site. On a suitable scale map provide delineations of those areas that will be flooded during the 1-percent chance flood in the absence of plant effects (i.e., preconstruction of flood plain).

B. Provide details of the methods used to determine the flood plains in response to A above. Include your assumptions of and bases for the pertinent parameters used in the computation of the one-percent flood flow and water elevation. If studies approved by Flood Insurance Administration (FIA), Housing and Urban Development (HUD) or the Corps of Engineers are available for the site or adjoining area, the details of analyses need not be supplied. You can instead provide the reports from which you obtained the flood plain information.

C. Identify, locate on a map, and describe all structures and topographic alterations in the flood plains.

D. Discuss the hydrologic effects of all items identified in C above. Discuss the potential for altered flood flows and levels, both upstream and downstream. Include the potential effect of debris accumulating on the plant structures. Additionally, discuss the effects of debris generated from the site on downstream facilities.

E. Provide the details of your analysis used in response to D above. The level of detail is similar to that identified in item B above.

F. The flood plain mapping should be of suitable quality for use in the Environmental Statement.

Response

VEGP is located in the Savannah River basin at about river mile 151.1. A description of the Savannah River basis is given in Final Safety Analysis Report (FSAR) section 2.4. The flood

prone area due to the 1-percent probability flood in the Savannah River in the vicinity of VEGP is shown in figure 240.7-1 and was reproduced from the United States Geological Survey (USGS) flood prone area map of Shell Bluff Landing (Georgia-South Carolina Quadrangle (USGS 1965) and Girard NW, South Carolina-Georgia Quandrangle (USGS 1964)). The flood profiles at various river miles of the Savannah River for different probability of flood occurrence are shown in figure 240.7-2 and were provided by the Corps of Engineers Savannah district, Savannah, Georgia. Figure 240.7-1 and figure 240.7-2 show the flood prone area and the flood profiles respectively in the vicinity of VEGP before construction.

The main plant facilities such as powerhouse, cooling towers, etc., which are outlined in figure 240.7-1 are above the 100-year flood zone and regimen. The intake structure with canal, the barge unloading facilities, the site runoff flume, and site discharge pipe are also outlined in figure 240.7-1. These structures may be flooded by a 100-year flood.

The main plant structure facilities other than intake structure, barge structure, runoff flume, and discharge pipe are above the 100-year flood zone. From figure 240.7-2, the 100-year flood level at river mile 151.1 is about 107 ft msl. The river cross-sections at river miles 143.0, 148.3, 151.1, and 151.8 are given in figure 240.7-3. From these croos sections, it is obvious that the Savannah River has very large flood plain areas above elevation 85 where the flood plain starts.

At a 100-year flood level, the flow cross-section at Savannah River miles 143.0, 148.3, 151.1, and 151.8 are 219,600 sq ft, 192,000 sq ft, 240,000 sq ft, and 244,800 sq ft, respectively. All cross sections except at river mile 151.8 are field-surveyed. At river mile 151.1, the river bank has been modified and orientated 25 degrees towards the river for a total distance of about 120 ft, which has resulted in the reduction of a flow cross-section of about 2,000 sq ft at a 100-year flood level. This is a less than 1-percent reduction. The barge structure, runoff flume, and discharge pipe has minimal effect on flow cross-section.

At 100-year flood flow elevation of 107 ft msl, the flow area obstructed by any of the above facilities is insignificant as compared to the very large flood plain flow area available. Hence it is concluded that the construction of VEGP Units 1 and 2 and related facilities has no significant effect on flood flows or flood levels in the Savannah River or any other stream upstream or downstream of the VEGP site.

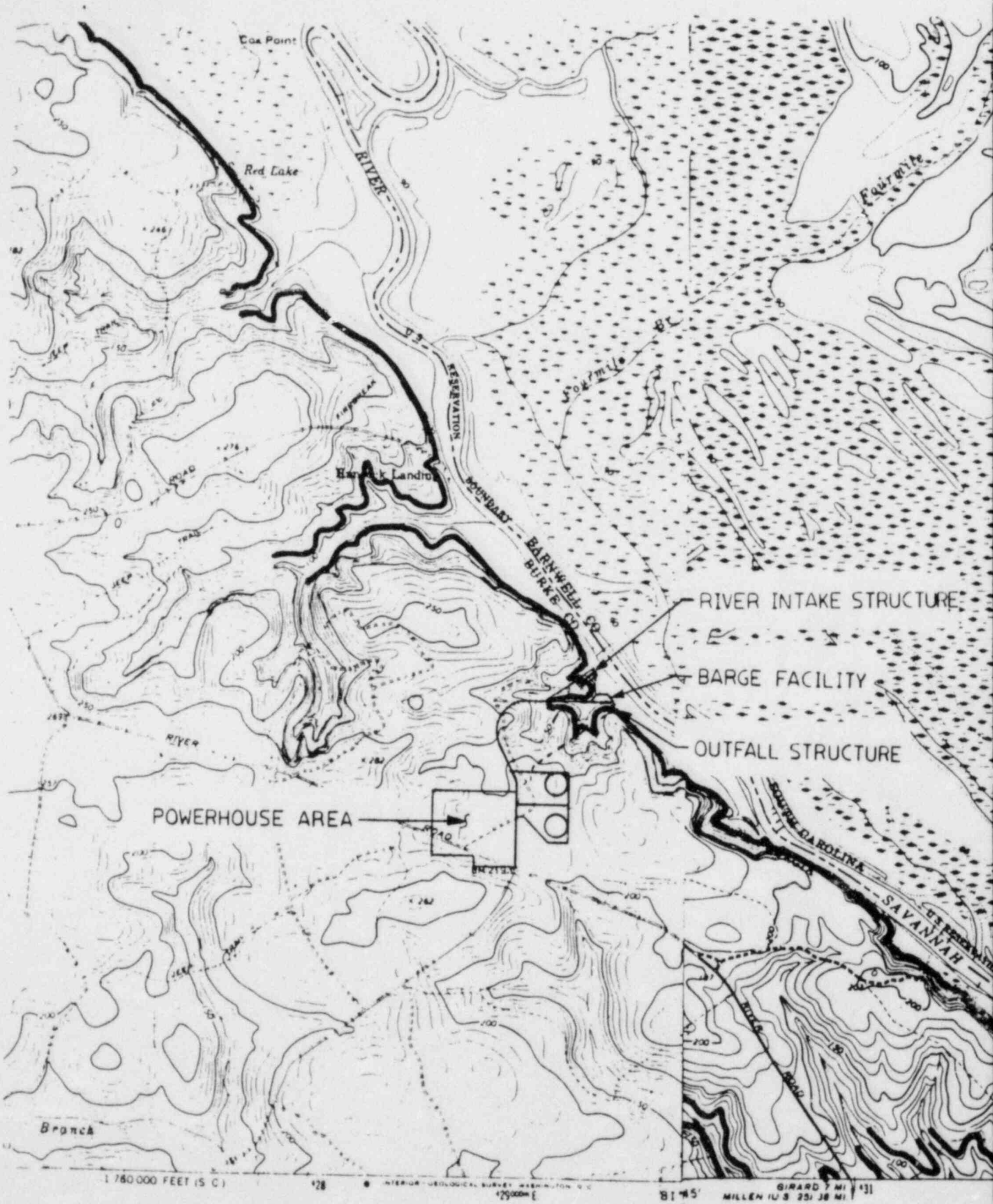
No debris is expected to be generated at the VEGP site. Debris accumulation on the plant site is not expected and hence there is no potential effect on downstream flood prone areas.

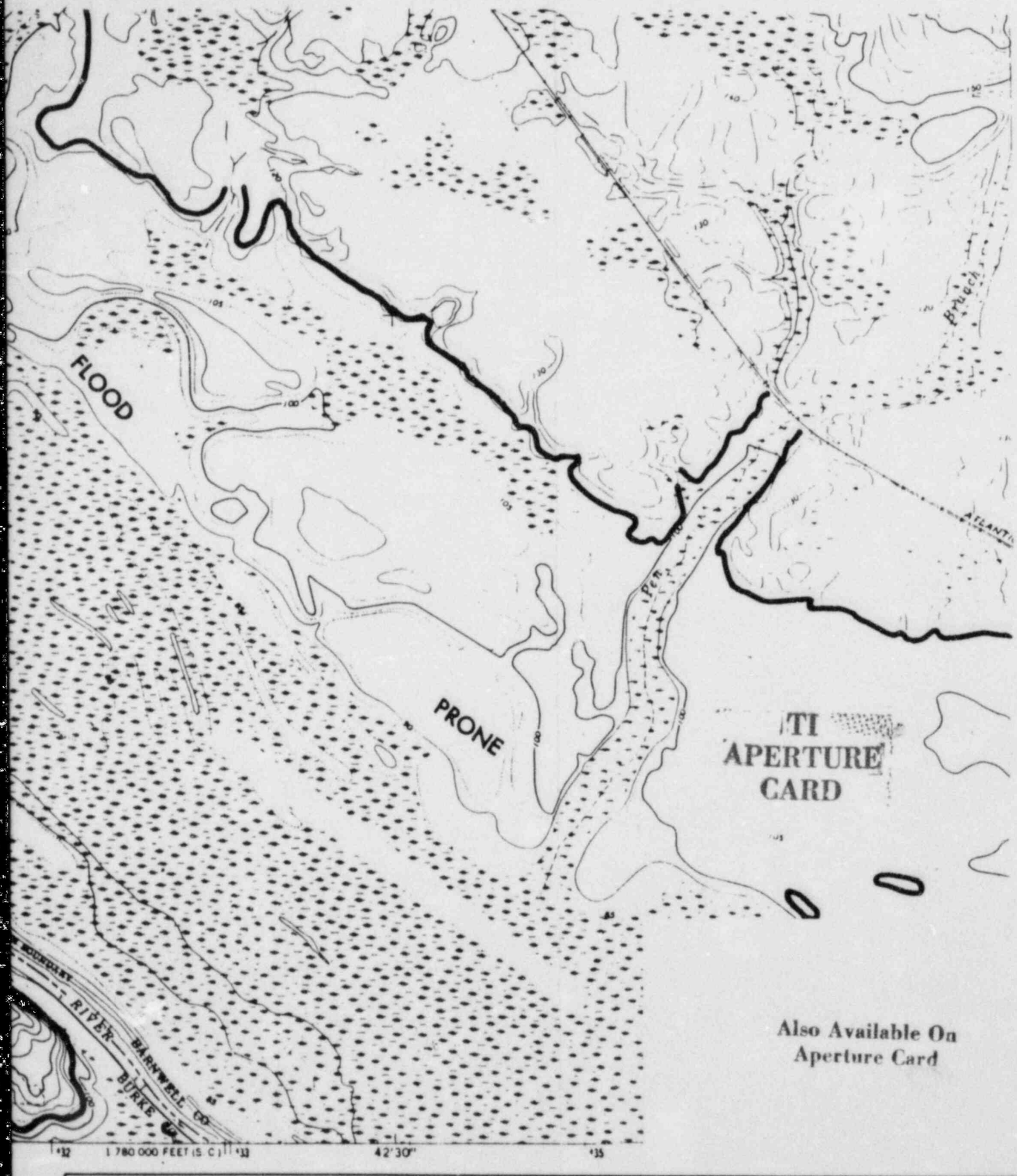
Following is a list of the references cited in this response.

1. United States Geologic Survey, "Map of Flood Prone Areas Shell Bluff Landing, GA-SC," 1965

2. United States Geologic Survey, "Map of Flood Prone Areas Girard NW, SC-GA," 1964.

3. U. S. Army Corps of Engineers, Savannah District, "Profiles Savannah River," Plate - 10, DMS G2/119, July 1971.


Cox Point
Red Lake
RIVER
RESERVATION
BOUNDARY
BARNWELL CO
BURKE CO
RIVER INTAKE STRUCTURE
BARGE FACILITY
OUTFALL STRUCTURE
POWERHOUSE AREA
SOUTH CAROLINA
SAVANNAH
Branch
1 760 000 FEET (S C)
GIRARD 7 MI
MILLEN (U S 25) 38 MI

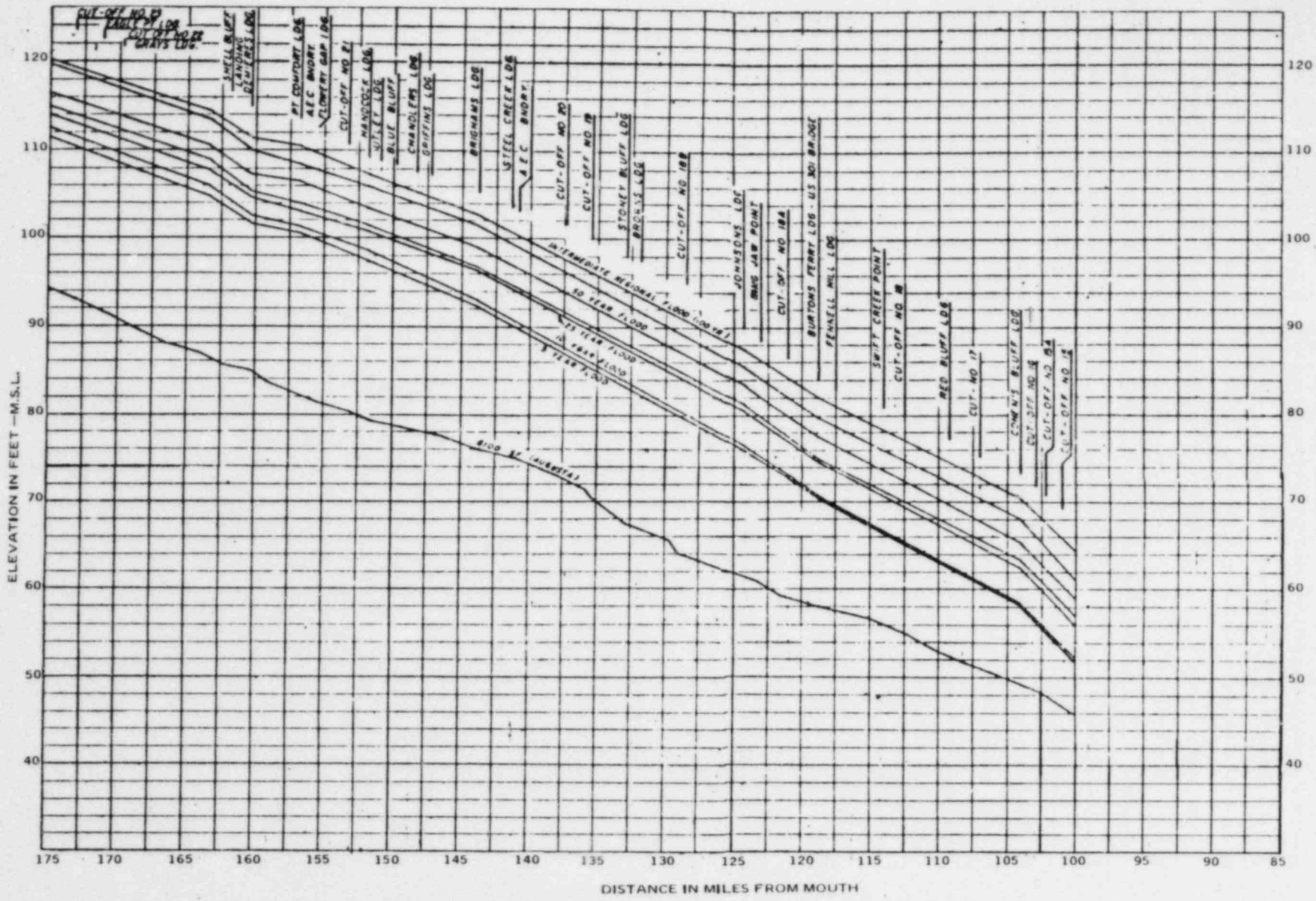


Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT

FLOOD PRONE AREAS

FIGURE E240.7-1



Georgia Power

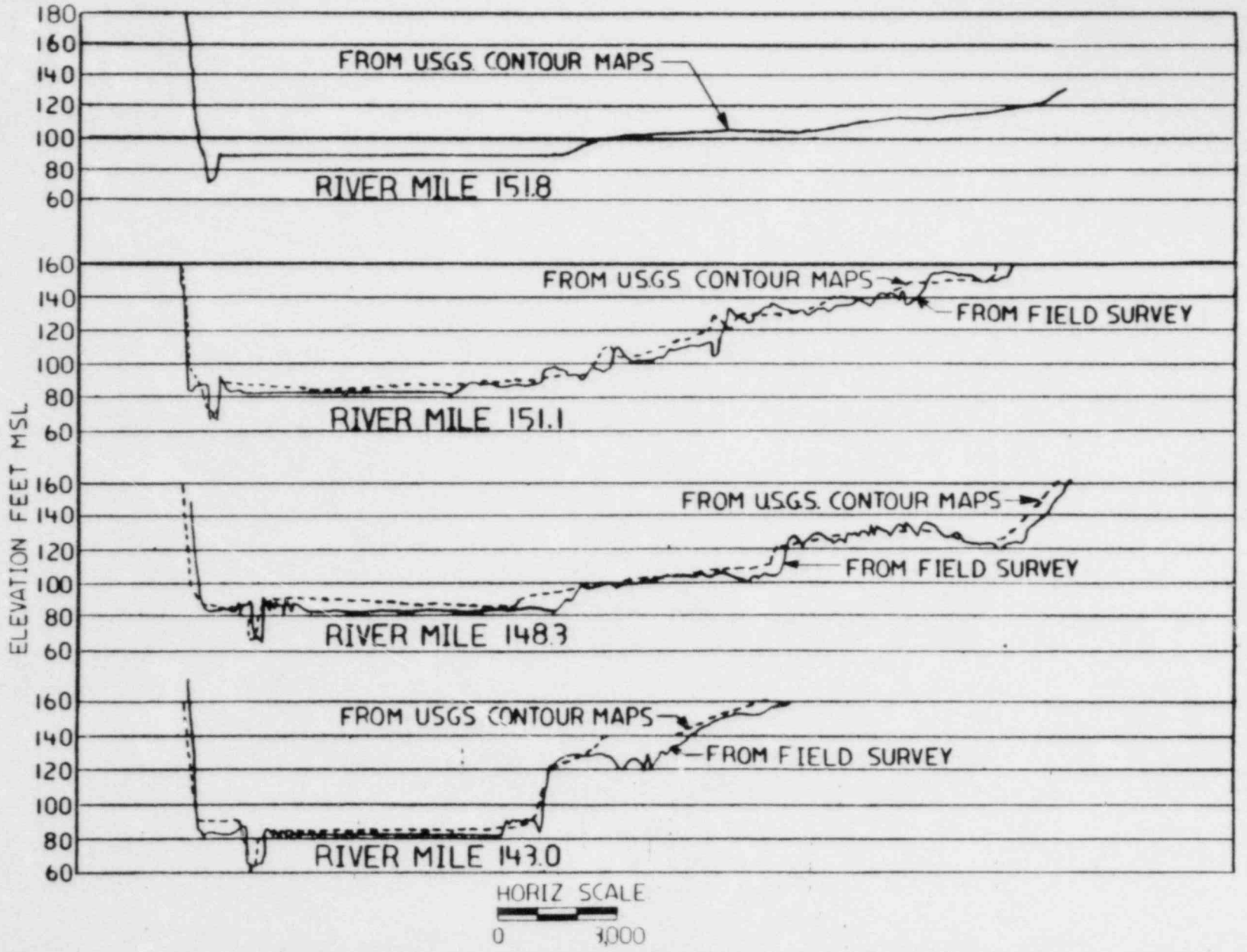
VOGTLE
ELECTRIC GENERATING PLANT

SAVANNAH RIVER PROFILES

FIGURE 240.7-2

Amend. 3 5/84

433-9



Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT

COMPARISON OF FIELD SURVEYS AND C OF E CONTOUR MAPS

FIGURE 240.7-3

Amend. 3 5/84

433-9

Question E240.8

Calculate the radiological consequences of a liquid pathway release from a postulated core melt accident. The analysis should assume, unless otherwise justified, that there has been a penetration of the reactor basemat by the molten core mass, and that a substantial portion of radioactivity contaminated sump water was released to the ground. Doses should be compared to those calculated for the Liquid Pathway Generic Study (NUREG-0440, 1978) land-based river site. Provide a summary of your analysis procedures and the values of parameters used (such as permeabilities, gradients, populations affected, water use).

Response

OLSER Appendix 7A has been amended (Amendment 1, February 1984) to provide the radiological consequences of a liquid pathway release from a postulated core melt accident.

NUCLEAR REGULATORY COMMISSION
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VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
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NRC Question	OLSER Section/Subsection	Keywords
E290.8	3.6.4	Salt drift emissions
E290.9	5.7	Site acreages disturbed by construction activities and figure
E290.10	5.5.2	Herbicide treatment of transmission rights-of-way
E290.11	2.2.3	Endangered species
E290.12	5.6	Noise ordinances
E290.13	2.7	VEGP preconstruction and construction sound level studies
E290.14	5.5	Transmission line sound level study
E290.15	5.6	Switchyard facilities map and physical characteristics
E290.16	5.6	Cooling tower noise study
E290.17	5.6	NSCW tower description and figure
E290.18	2.2.1.2	Site vegetation map
E290.19	5.6	Future of nearby trailer camps after start of plant operations
E290.20	3.9	Sketch of transmission line configuration

NRC Question	OLSER Section/Subsection	Keywords
E291.20	3.6.3	Waste water retention basin pump-out rate
E291.21	5.1.1	Dechlorination system description and target effluent concentrations
E310.1	3.1	Changes in station's external appearance
E310.2	8.1.2.2	Average annual plant workforce breakdown for VEGP
E310.3	8.0	Socioeconomic impacts from station operation
E310.4	8.1	Estimate of average annual worker payroll
E310.5	8.1	Estimate of average annual local purchases attributable to VEGP
E310.6	8.1	Estimate of taxes attributable to VEGP
E310.7	8.2	Impacts on local traffic patterns due to VEGP
E310.8	2.6/5.5/12.1	Transmission line rights-of-way maintenance impacts on cultural resources
E310.9	2.6/5.5/12.1	Correspondence's from State Historic Preservation Officer regarding station impacts on cultural resources
E310.10	2.1.2.3	Breakdown of transient population
E470.2	2.1.3.1/5.2	Update of site specific data base

NRC Question	OLSER Section/Subsection	Keywords
E470.3	2.1.3.1	Milk producing animals and gardens within 5 miles of VEGP
E470.4	2.4	Potable water supply for Girard, Georgia
E470.5	2.4	Source of irrigation water near VEGP
E470.6	2.2/5.2	Site-specific data for estimating liquid pathway doses
E470.7	6.1.5	Radionuclides from VEGP, SRP, and weapons testing
E470.8	6.1.5	River radiological sampling locations
E470.9	6.1.5	Clarification of location of nearest residence to VEGP

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 guaranteed 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. 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. Refer to the response to question E451.17 for 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, Volume [illegible], May 1978.

6. U. S. Atomic Energy Commission, "Final Environmental Statement Related to [illegible]er 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 Statement 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 1 OF 2)

COOLING TOWER DRIFT PARAMETERS FOR VOGTLE AND FOUR OTHER PLANTS

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
Number of cooling towers		2	2	1	1	4	2
Height of cooling tower		550 ft	540 ft	501 ft	501 ft	520 ft	522 ft
Drift Rate	Guaranteed	0.03%	0.02%	0.05%	0.013%	0.05%	0.008%
	Expected	0.008%	0.002%	0.005%	NA	0.002%	NA
Circulating water flow rate		484,600 gpm	478,000 gpm	480,400 gpm	507,400 gpm	482,000 gpm	572,000 gpm
Concentration in makeup		60 mg/ℓ (avg)	432 mg/ℓ (max) [a]	204 mg/ℓ (avg)	203 mg/ℓ (avg)	70 mg/ℓ (avg)	376 mg/ℓ (avg)
Concentration factor		4 (avg)	3.8 (avg)	1.8 (avg)	1.8 (avg)	7.7 (avg)	5 (max) [a]
Concentration in blowdown		240 mg/ℓ (avg)	1640 mg/ℓ (max) [a]	368 mg/ℓ (avg)	365 mg/ℓ (avg)	539 mg/ℓ (avg)	1880 mg/ℓ [a] (max)
Evaporation rate		3.0%	2.3%	1.5%	2.0%	1.5%	1.8%
Plant capacity		0.8	0.8	0.8	0.8	0.8	0.8
Droplet size distribution	<100μm	45%	20%	NA [d]	35%	NA	45%
	100-300 μm	50%	70%	NA	65%	NA	55%
	>300μm	5%	10%	NA	0%	NA	0%
	Rate	17 lb/acre/yr	3 lb/acre/yr	80 lb/acre/yr	3 lb/acre/yr	400 lb/acre/yr	NA
Max onsite drift deposition	Distance from CT	0.9 miles	0.6 miles	0.3 miles	0.75 miles	0.3 miles	NA
	Wind sector deposited in	SE	NE	SE	SW	SW	NA

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	NA	5.02 lb/acre/yr
	Distance from cooling tower	1.0 miles	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%	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.

Question E290.9

Please provide a figure showing the up-to-date and projected plot plan, which shows all lands on the site that have been or will be disturbed by construction activities, including borrow and spoil areas, laydown areas, landfills, permanent facility areas, parking lots, etc. Compare the extent of land disturbance with that expected at the Construction Permit Stage. Indicate which areas outside of the permanent facility areas will be reclaimed and state the expected uses, if any, of these lands.

Response

Figure E290.9-1 shows all lands on the site that have been or are expected to be disturbed by construction activities. The land disturbed by construction activities at VEGP is approximately 1,492 acres. The land disturbance expected at the time of the Construction Permit was 1011 acres. Disturbed areas outside the permanent facility will be reclaimed with emphasis on forestry, wildlife management, and landscaping. Reclamation will include planting trees, grassing, planting seed producing vegetation for wildlife, and leaving areas for natural succession to occur. All spoil, stockpile, borrow, and landfill areas will eventually be revegetated as construction activities on these areas is completed. Construction and laydown areas will be reclaimed when practical as they are released by the construction department.

1980 VEGETATION COMMUNITIES

1. SANDHILL - UPLAND HARDWOOD-PINE
2. SANDHILL - UPLAND HARDWOOD - PLTD. SLASH PINE
3. BRANCH HARDWOOD
4. BRANCH HARWOOD
5. BRANCH HARDWOOD
6. COVE HARDWOOD
7. SLASH PINE PLANTATION (18 - 23 YRS.)
8. SLASH PINE PLANTATION (10 YR.)
9. BLUFF HARDWOOD
10. BOTTOMLAND HARDWOOD (RIVER SWAMP)
11. SANDHILL LONGLEAF PINE
12. SANDHILL LONGLEAF PINE
13. SANDHILL LONGLEAF PINE
14. POND
15. SANDHILL - CLEARED
16. FIELDS

ROADS

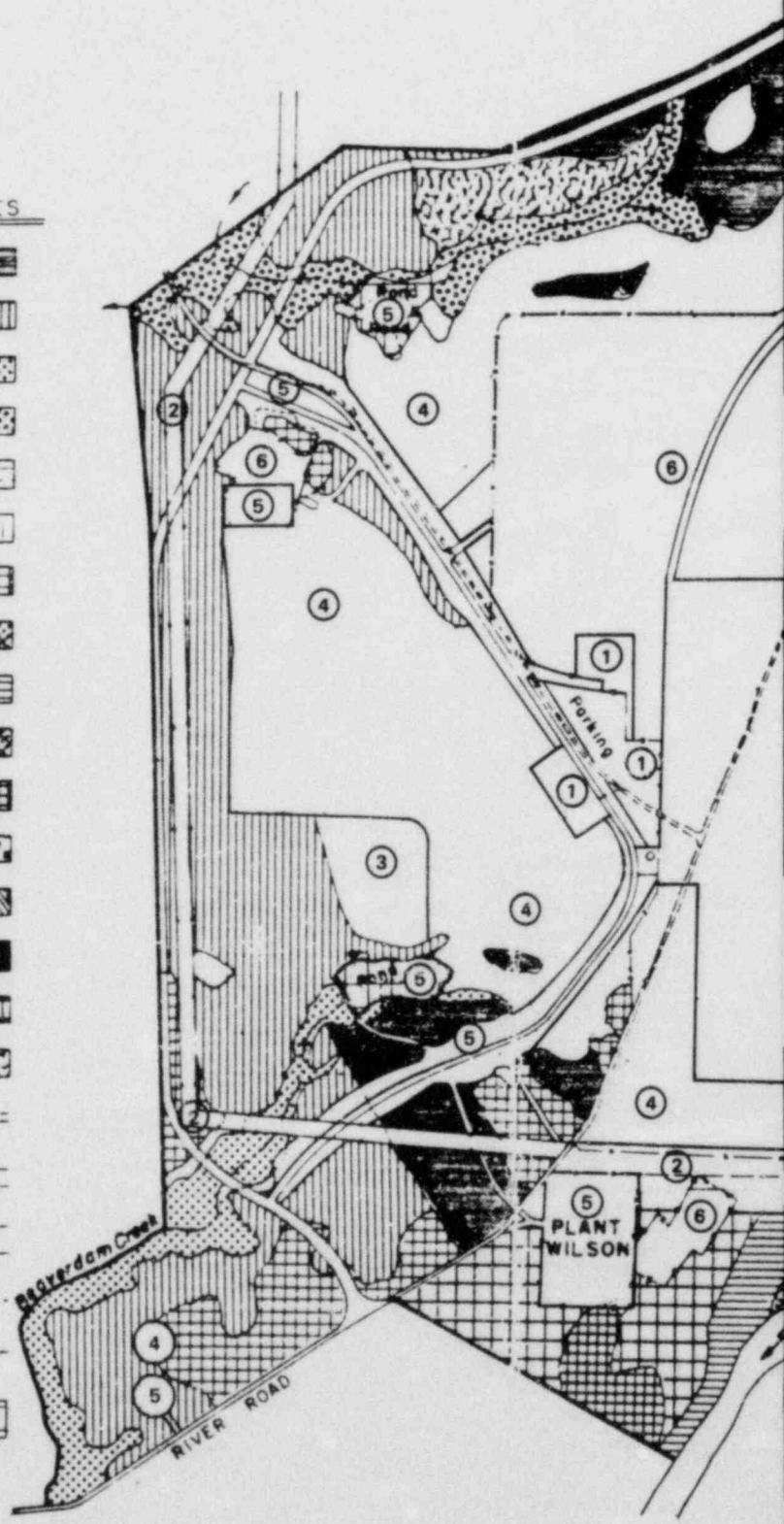
TRANSMISSION LINES

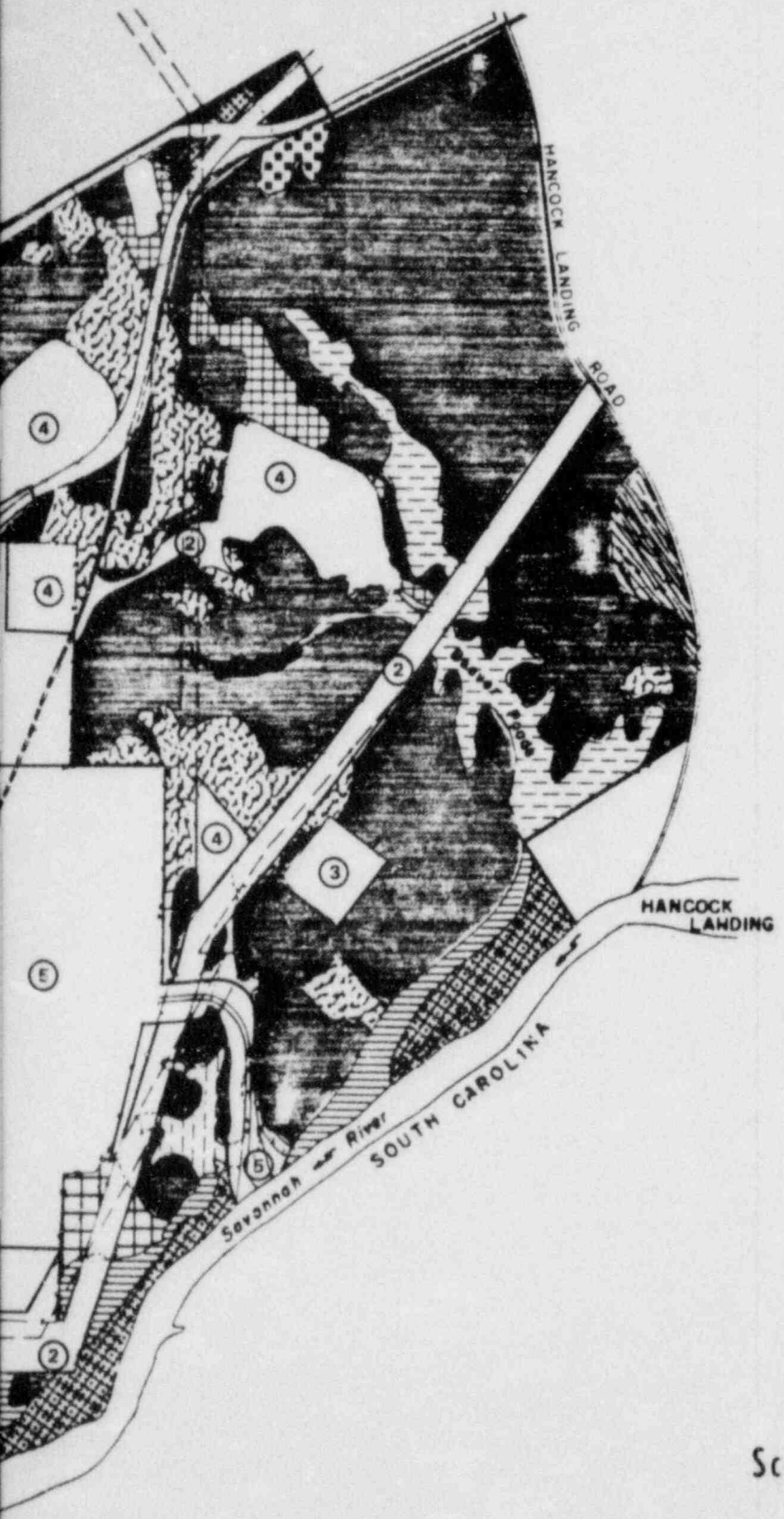
FUTURE TRANSMISSION LINES

1972 STAND BOUNDARY

CONSTRUCTION AREA FENCE

SEDIMENT PONDS





1. PARKING
2. TRANSMISSION LINES
3. LANDFILLS
4. SPOIL, STOCKPILE & BORROW AREAS
5. PERMANENT FACILITY
6. CONSTRUCTION & LAYDOWN AREAS

TI APERTURE CARD

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Scale

0 .5 1.0 mi
0 .5 1.0 1.6 km

Georgia Power

VOGTLE ELECTRIC GENERATING PLANT

PLOT PLAN SHOWING AREAS DISTURBED BY CONSTRUCTION OF PLANT VOGTLE

FIGURE E290.9-1

8406040166-02

Question E290.10

Please specify what types of areas along power line corridors will be treated with herbicides and why herbicide treatment is necessary in these areas. Give the expected total acreage that might be treated with herbicides and describe the herbicide application procedure.

Response

Georgia Power Company uses herbicides to maintain its rights-of-way mainly in inaccessible mountainous areas. Both mowing and hand cutting are less efficient than aerial spraying in these areas. Also, cutting tools are more dangerous to use in difficult terrain.

Georgia Power Company has maintained less than 1 percent of its rights-of-way brush with herbicides over the last 3 years. For this period, the average number of brush acres maintained has been 40,069. An average of only 299 brush acres were aerially sprayed. This represents less than 1 percent of the total number of brush acres maintained. Spraying activities of the rights-of-way acreages associated with VEGP should not be more than one percent of the area.

Georgia Power Company aerial spraying is conducted according to the following procedures and specifications:

1. Only herbicides approved by the Environmental Protection Agency for rights-of-way use are applied.

2. Application is done by a licensed pesticide applicator.

3. Herbicide is applied only when wind velocity or other weather conditions will not be detrimental to the quality of work or the surrounding area.

4. A Georgia Power Company employee familiar with herbicide application and use will continually monitor the application when spraying is done within the system.

Question E290.11

The persistent trillium (Trillium persistens), hairy rattleweed (Baptisia arachmifera), and Green pitcher plant (Sarracenia orephila) are endangered species that occur in Georgia (50 CFR 17.12, 1983). Please provide information on their potential occurrence at Plant Vogtle and on the powerline routes.

Response

Persistent trillium is known to occur only in the Georgia counties of Rabun, Habersham, and Stephens. Hairy rattleweed is only known to occur in Wayne and Brantley counties. The pitcher plant occurs only in Towns county. None of the Georgia counties in which these plants are found will be affected by the VEGP or its powerline routes.

Question E290.12

Are there any State or local noise ordinances applicable to the community surrounding the Vogtle site? If so, state the requirements or limitations of the ordinances and likelihood of compliance by operation of VEGP.

Response

There are no known state or local noise ordinances applicable to the community surrounding the Vogtle site.

Question E290.13

Provide the ambient noise survey reports for the Vogtle site:

A. "Sound Level Study at the Alvin W. Vogtle Nuclear Plant Site Prior to Construction" by C. E. Hickman, Southern Company Services, Inc., 1974.

B. "Construction Sound Level Survey, Alvin W. Vogtle Nuclear Plant" by C. E. Hickman and H. A. Fearing, Southern Company Services, Inc., Birmingham, Alabama, May 1981.

Response

A copy of these two reports was provided by D. O. Foster's letter to H. R. Denton dated May 25, 1984.

Question E290.14

Provide the transmission line noise study prepared by Southern Company Services for the Miller-Arkadelphia 500-kV line.

Response

A copy of this report was provided by D. O. Foster's letter to H. R. Denton dated May 25, 1984.

Question E290.15

Provide locations (on a map) of the main step-up, auxiliary, and service transformers for Units 1 and 2. Also provide for each type of transformer:

- Equivalent two-winding rate in MVA.
- Breakdown insulation level.
- Number of phases (single phase, three phases) and whether they are in a single or separate tanks.

Response

Locations of the transformers are shown in figures E290.15-1 and E290.15-2. Tables E290.15-1 and E290.15-2 present specific information regarding the transformers.

TABLE E290.15-1

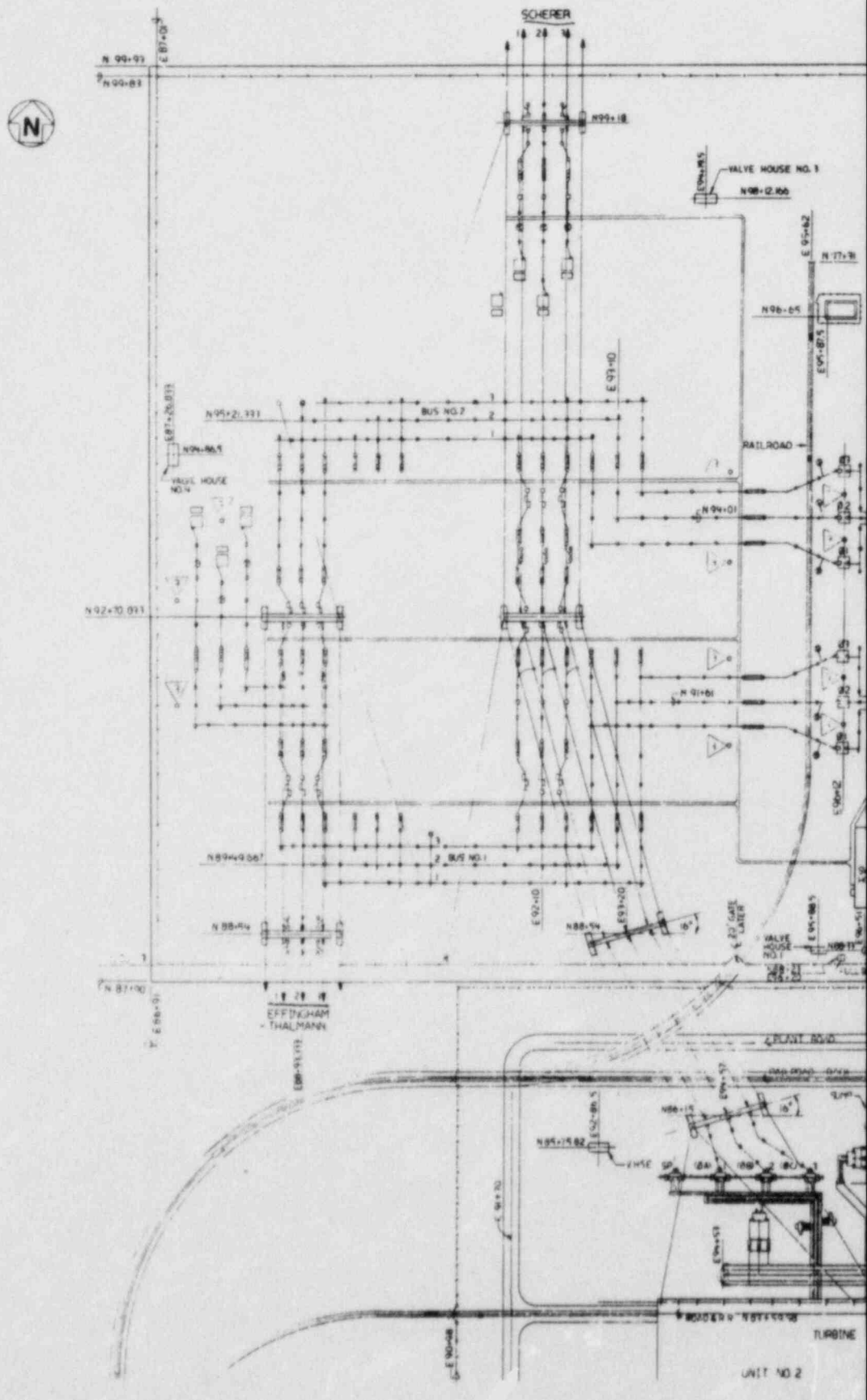
VEGP UNIT 1 TRANSFORMERS

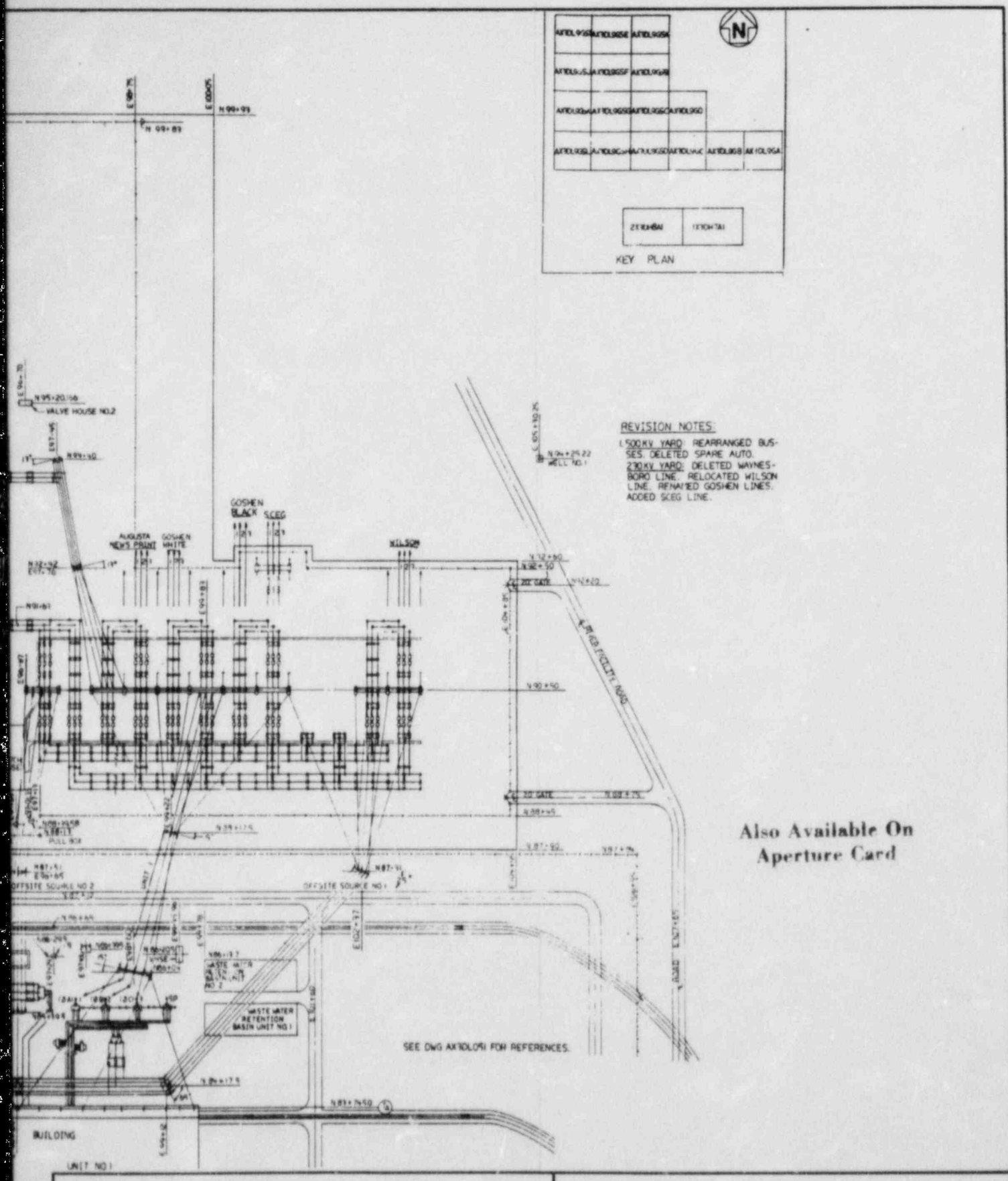
	Main Power Transformer (to 230-kV line)	Unit Auxiliary Transformer	Reserve Auxiliary Transformer
Equivalent 2-winding rating	404 MVA/tank/ phase 1212 MVA/ phases	56 MVA/tank/ 3 phases	60 MVA/tank/ 3 phases
No. of transformers	3 for 1 bank (404 MVA each) 1 spare (404 MVA)	2	2 1 spare for both units
Breakdown insulation level	High-voltage winding lead--750 kV High-voltage winding neutral lead--150 kV Low-voltage winding line and neutral leads--150-kV	High-voltage winding line lead--150 kV Low-voltage 1-4 kV Low-voltage 1 winding leads--95 kV Low-voltage 2--13.8 kV Low-voltage 2 winding leads--110 kV	High-voltage winding line lead--750 kV High-voltage winding neutral lead--150 kV Low-voltage 1--75 kV Low-voltage 2--110 kV
No. of phases	3 (1 spare)	3	3
No. of tanks	3 (one per phase) (1 spare)	1	1

TABLE E290.15-2

VEGP UNIT 2 TRANSFORMERS

	Main Power Transformer (to 500-kV line)	Unit Auxiliary Transformer	Reserve Auxiliary Transformer
Equivalent 2-winding rating	404 MVA/tank/ phase 1212 MVA/3 phases	56 MVA/tank/ 3 phases	60 MVA/tank/ 3 phases
No. of transformers	3 for 1 bank (404 MVA each) 1 spare (404 MVA)	2	2 1 spare for both units
Breakdown insulation level	High-voltage winding lead--1450 kV High-voltage winding neutral lead--150 kV Low-voltage winding line and neutral leads--150-kV	High-voltage winding line lead--150 kV Low-voltage 1-4 kV Low-voltage 1 winding leads--95 kV Low-voltage 2--13.8 kV Low-voltage 2 winding leads--110 kV	High-voltage winding line lead--750 kV High-voltage winding neutral lead--150 kV Low-voltage 1--75 kV Low-voltage 2--110 kV
No. of phases	3 (1 spare)	3	3
No. of tanks	3 (one per phase) (1 spare)	1	1





Also Available On Aperture Card

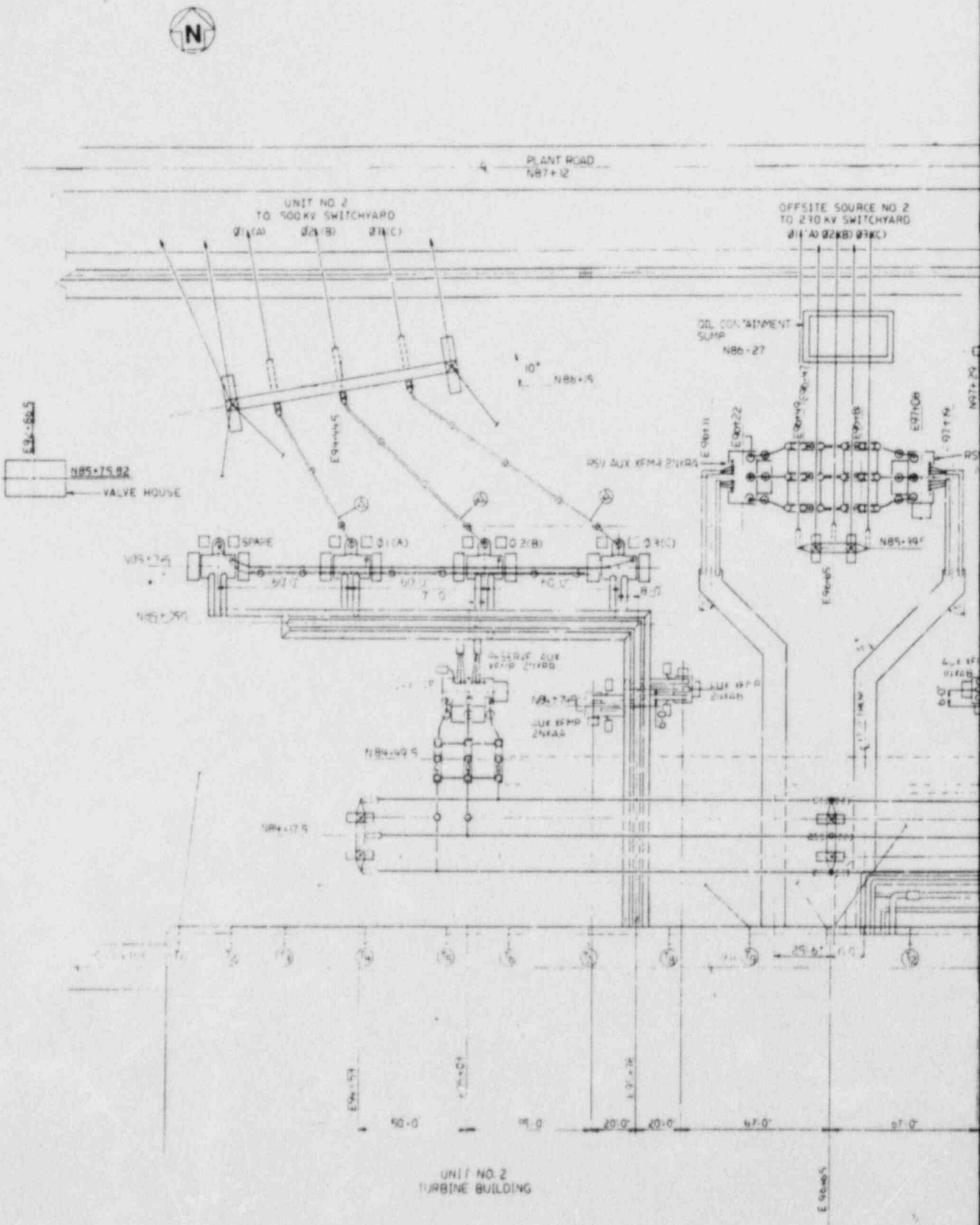
Georgia Power

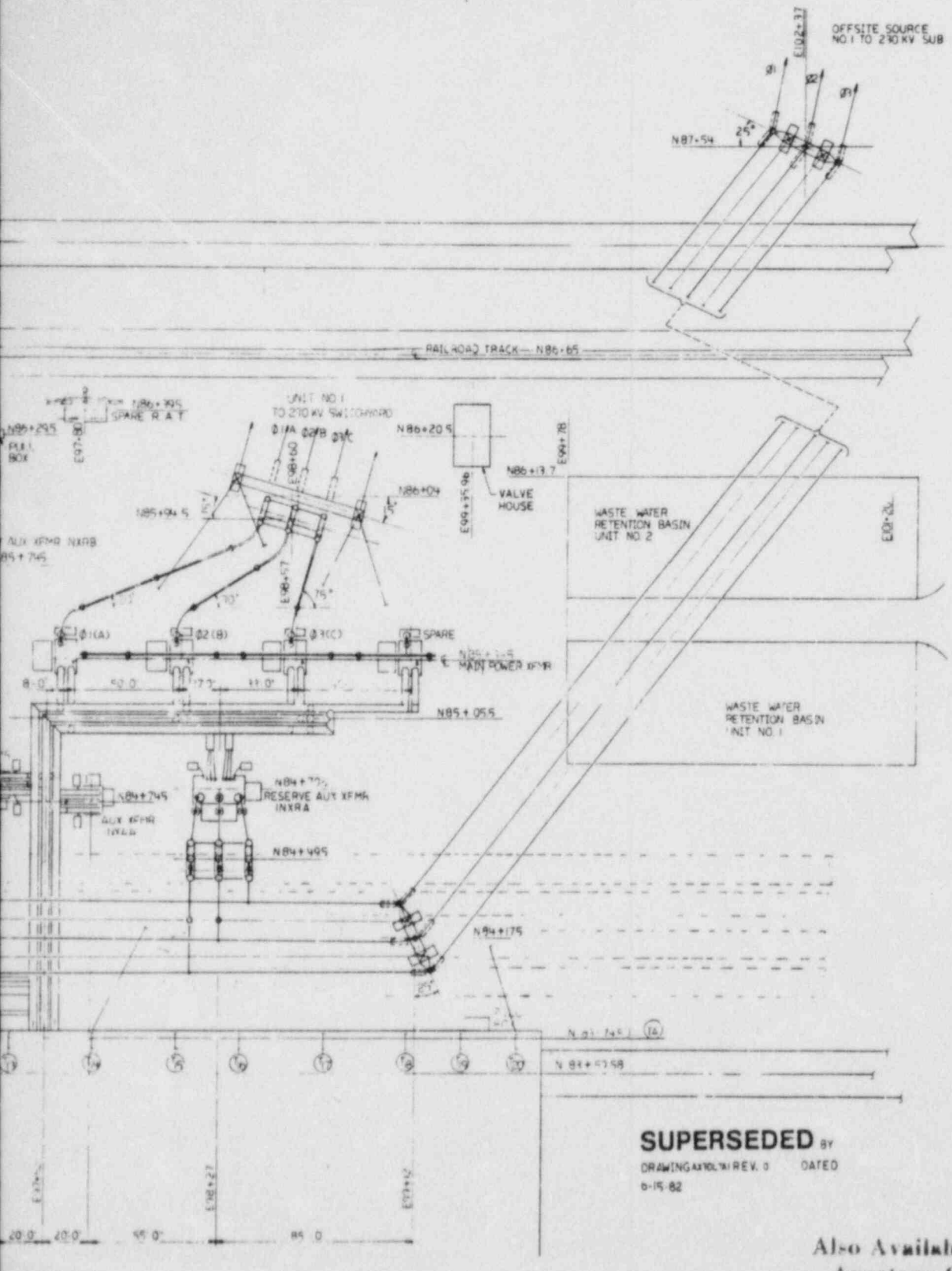
VOGTLE ELECTRIC GENERATING PLANT

SWITCHYARD GENERAL ARRANGEMENT

FIGURE E290.15-1

8406040166-03


N
PLANT ROAD
N87+12
UNIT NO. 2
TO 500 KV SWITCHYARD
OFFSITE SOURCE NO. 2
TO 230 KV SWITCHYARD
OIL CONTAINMENT
SUMP
N86+27
10°
N86+15
E94+45
E36+85
N85+75.92
VALVE HOUSE
E90+11
E90+22
E97+08
E97+24
N85+19
E94+05
SPARE
N85+75
N85+39
N84+49.5
N84+17.5
50'-0
95'-0
20'-0
20'-0
47'-0
97'-0
UNIT NO. 2
TURBINE BUILDING
E96+65



Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT

LOW VOLTAGE SWITCHYARD
GENERAL ARRANGEMENT - UNITS 1 & 2

FIGURE E290.15-2

Question E290.16

Provide report on noise from natural and mechanical draft cooling towers entitled "Cooling Tower Noise" prepared by Southern Company Services. Noise data on the circular mechanical-draft cooling towers are presented there.

Response

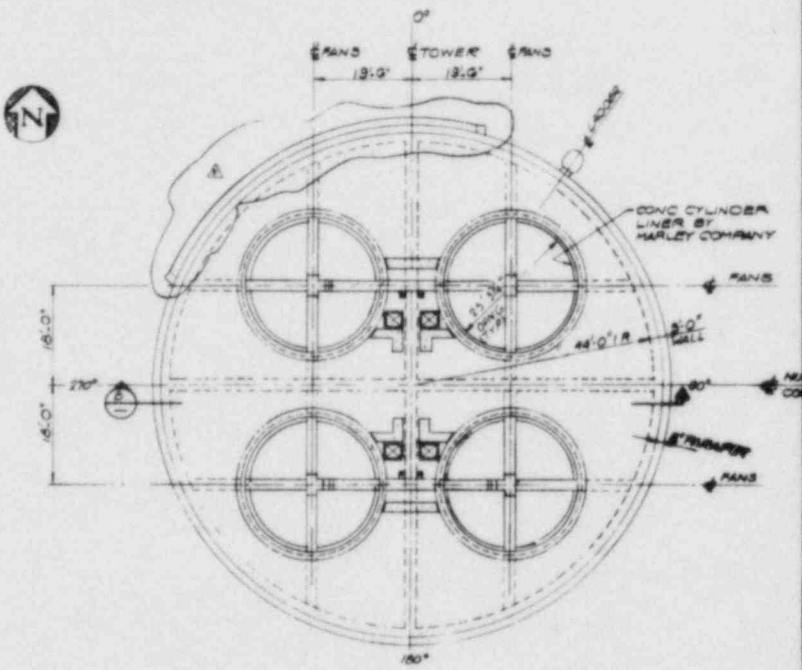
A copy of this report was provided by D. O. Foster's letter to H. R. Denton dated May 25, 1984.

Question E290.17

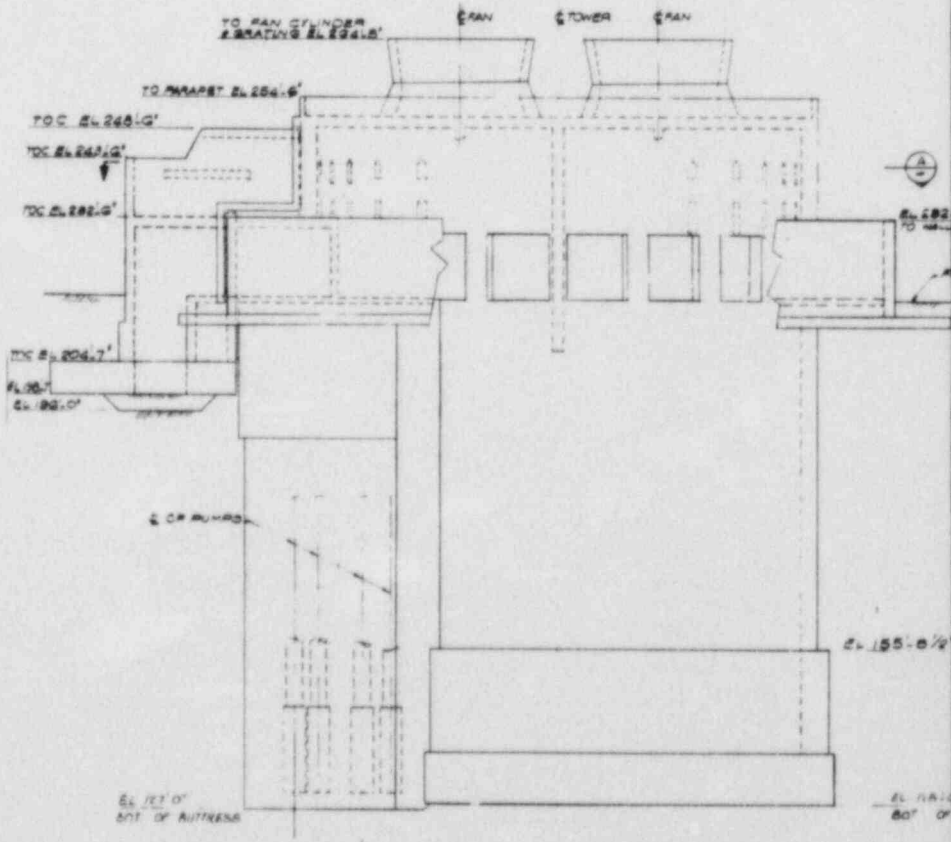
For the circular mechanical-draft towers, provide the number of blades per fan and fan rotation speed. Provide a sketch of the towers including their height above ground.

Response

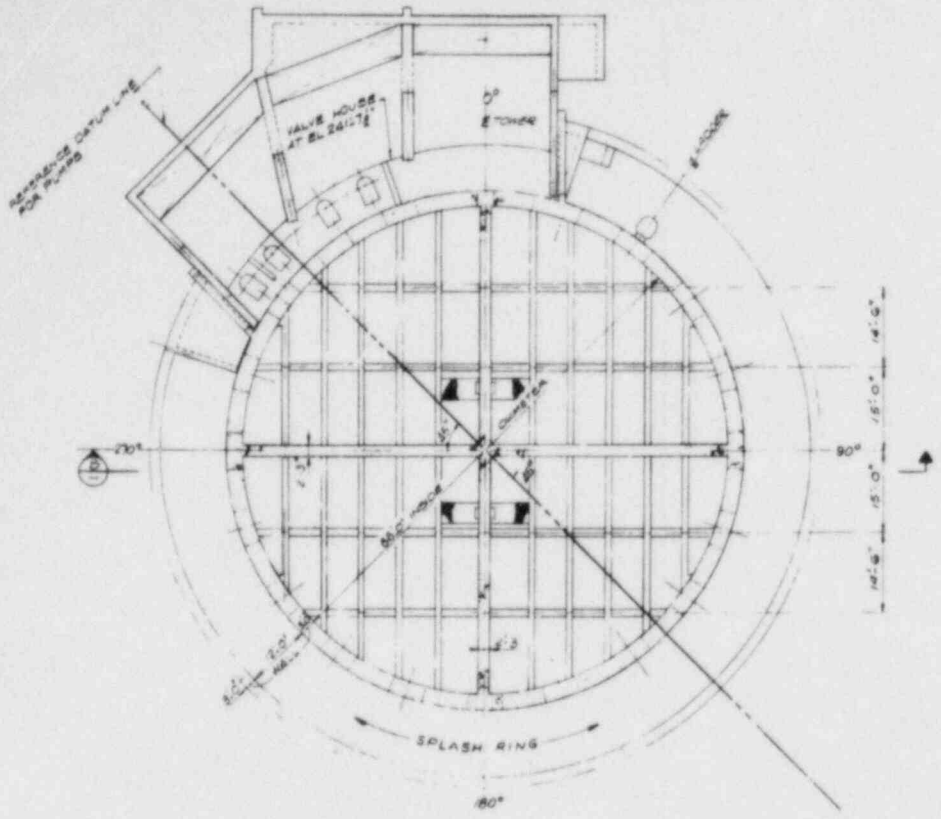
Each unit has two nuclear service cooling water towers. Each tower has four fans, eight blades per fan (diameter = 20 feet). The fan rotational speed is 164 r/min. Figure E290.17-1 is a sketch of the nuclear service cooling water towers including elevations.



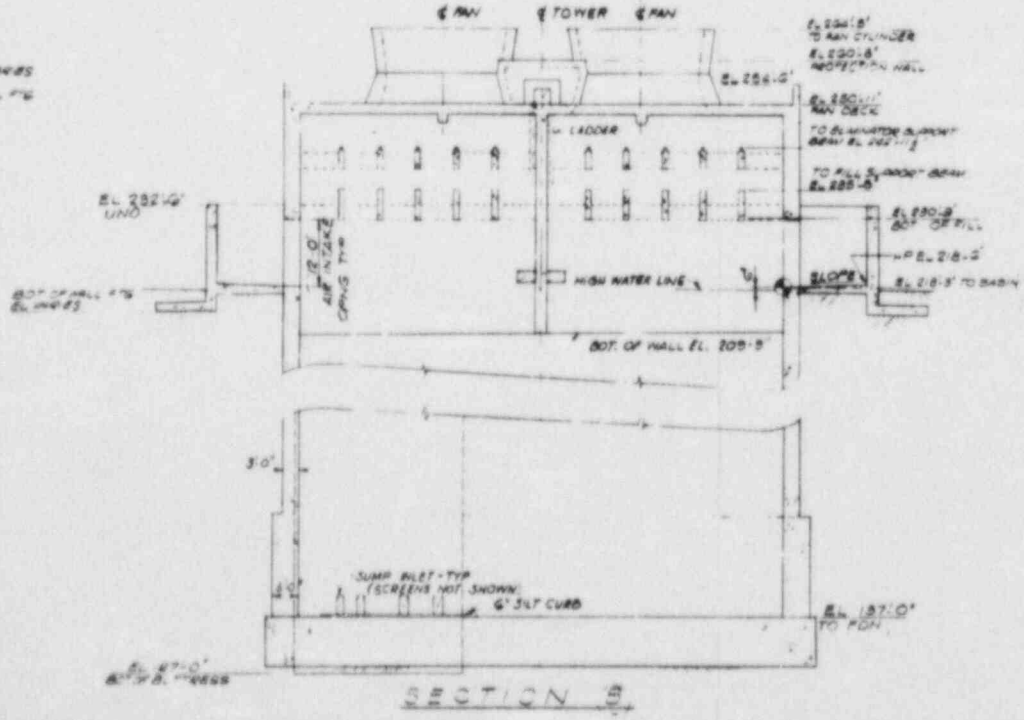
PLAN AT FAN DECK
EL. 250'-11" AND ABOVE



WEST ELEVATION



PLAN SECTION (4)
EL 242'-11½" AND BELOW



SECTION B

TI APERTURE CARD

Also Available On Aperture Card

Georgia Power VOGTLE ELECTRIC GENERATING PLANT	NSCW COOLING TOWERS 1A AND 1B GENERAL ARRANGEMENT PLAN, ELEVATION AND SECTIONS
	FIGURE E290.17-1

8406040166-05

Question E290.18

Provide a map of vegetation in the vicinity of the site (including vegetation inside the site boundaries and within a few hundred meters outside the site boundary).

Response

A vegetation map of the site is provided in OLSER figure 2.2-1. The vegetation communities within a few hundred meters outside the site boundary are essentially the same as the adjacent vegetation communities within the site boundary.

Question E290.19

Indicate whether the trailer camps in the site vicinity will remain (including those at noise measurement locations A and B) there after the plant begins operation.

Response

It is anticipated that the trailer/mobile home camps at noise measurement locations A and B (see OLSER figure 2.7-1) will remain after the plant begins operation, although the number of trailers will be reduced. Trailer camps at greater distances are less likely to remain.

Question E290.20

Present a sketch of the configuration of the transmission line showing conductor spacing height above the ground. Include the number of conductors. Present a plot plan locating the nearest home (found during site visit to be 1 - 2 miles from the site) and its position with respect to the lines.

For the transmission line itself, include:

A. Diameter of each conductor bundle in mm.

B. Number of subconductors in each bundle.

C. Surface voltage gradient of conductor bundles in kV/cm.

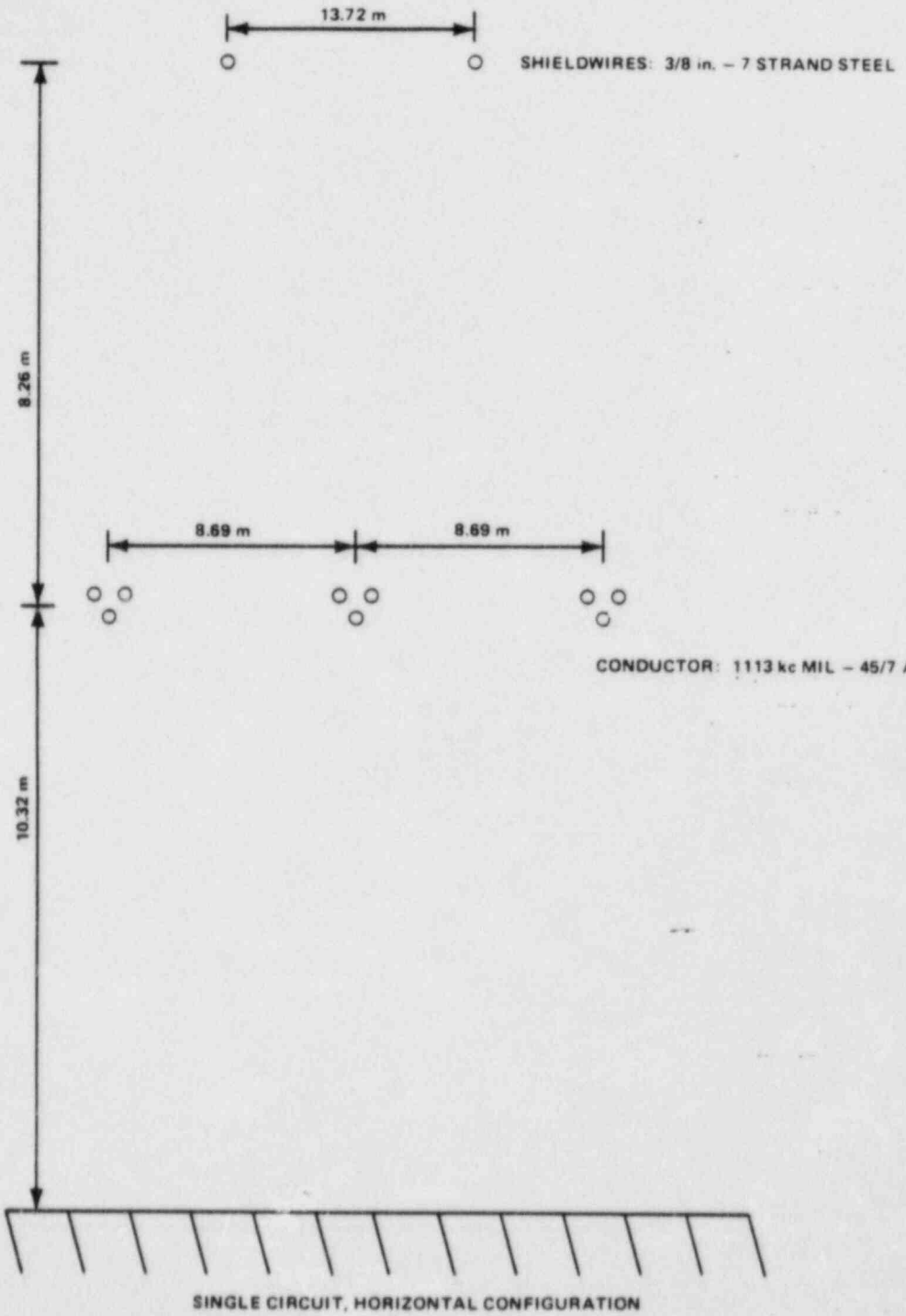
D. Number of conductor bundles.

Questions A - D assume an a.c. line. If the lines are d.c., indicate which is the positive conductor bundle.

Response

Figure 290.20-1 shows conductor spacing height above ground at the designed lowest point. Figure 290.20-2 provides a plot plan locating the nearest home (found during the March 21, 1984 site visit). The home is approximately 130 ft from the centerline of the right-of-way and approximately 55 ft from the edge of the right-of-way.

500 kV TRANSMISSION LINE



SINGLE CIRCUIT, HORIZONTAL CONFIGURATION

LINE CHARACTERISTICS:

A. DIAMETER OF CONDUCTOR BUNDLE – 533 mm.
B. NUMBER OF SUBCONDUCTORS IN EACH BUNDLE – 3.
C. SURFACE VOLTAGE GRADIENT OF CONDUCTOR BUNDLES – 17 kV/cm.
D. NUMBER OF CONDUCTOR BUNDLES – 3.

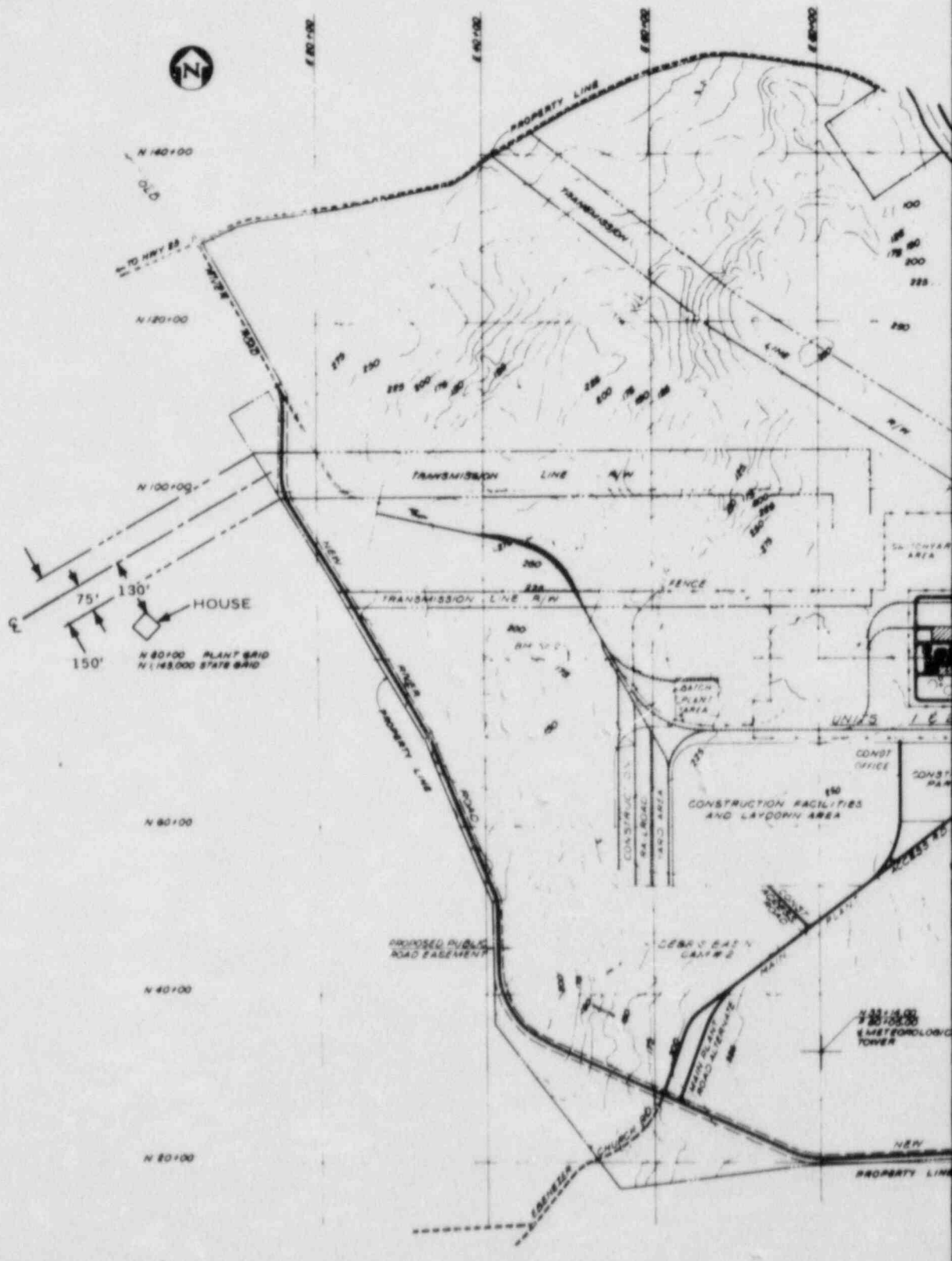
Georgia Power

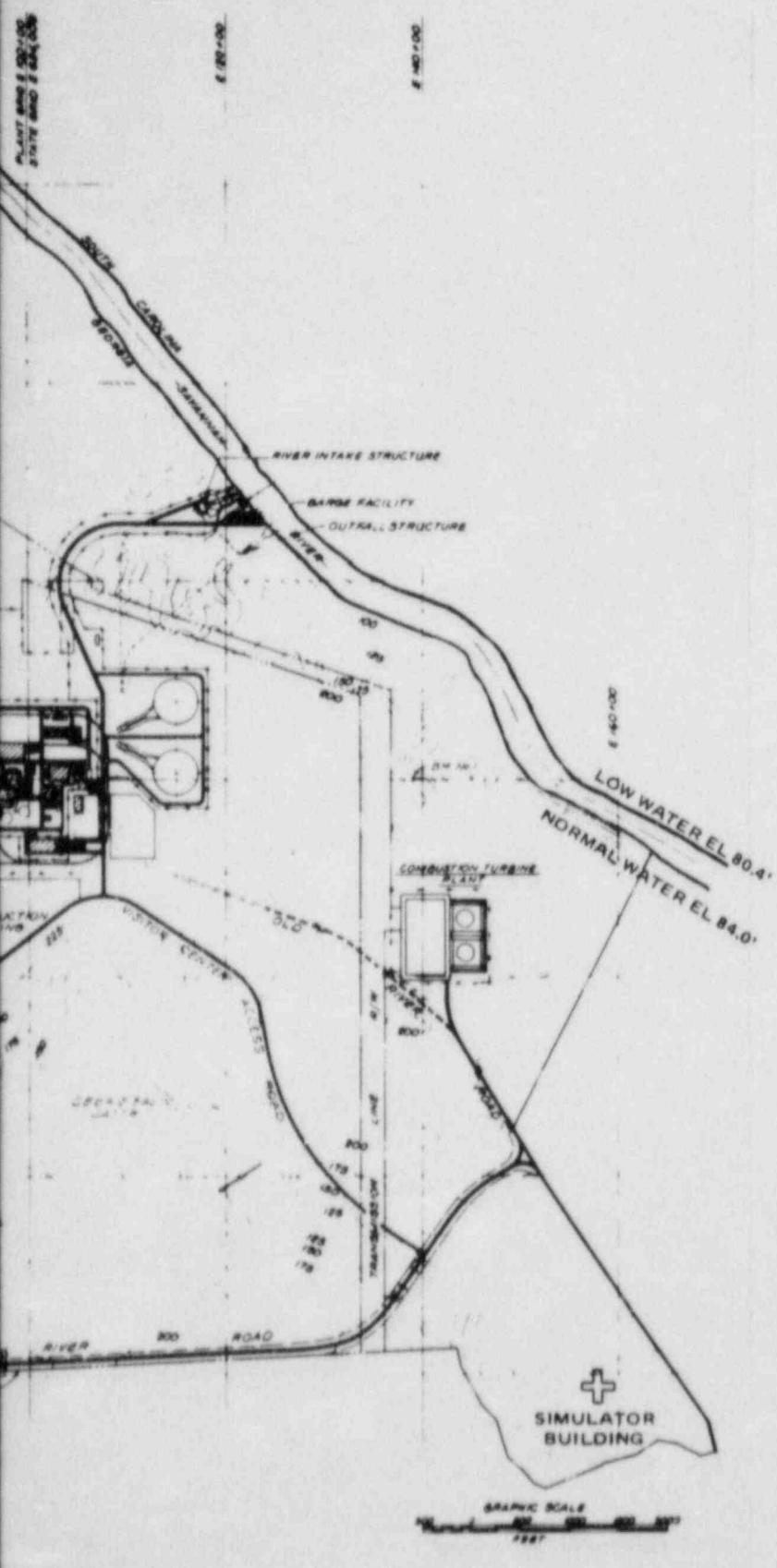
VOGTLE
ELECTRIC GENERATING PLANT

500 kV TRANSMISSION LINE

FIGURE 290.20-1

433-9


N
PROPERTY LINE
N 140+00
OLD
TO HWY 55
N 120+00
TRANSMISSION LINE R/W
N 100+00
75'
130'
150'
HOUSE
℄
N 80+00 PLANT GRID
N 145,000 STATE GRID
FENCE
TRANSMISSION LINE R/W
NEW
PROPERTY LINE
ROAD
BATCH PLANT AREA
CONST OFFICE
CONSTRUCTION FACILITIES AND LAYDOWN AREA
N 60+00
PROPOSED PUBLIC ROAD EASEMENT
CEDAR BASIN CANAL
N 40+00
NEW PLANT ROAD ACCESS
METEOROLOGICAL TOWER
N 20+00
NEW
PROPERTY LINE



Also Available On
Aperture Card

CX2D45V002

Georgia Power

VOGTLE
ELECTRIC GENERATING PLANT

LOCATION AND VICINITY MAP

FIGURE E290.20-2

Question E291.20

Indicate the expected frequency of pump-out of the waste retention basins to the plant blowdown sump during normal operation. Indicate the maximum and normally anticipated pump-out rate to the blowdown sump.

Response

Pumps for the waste water retention basin will be controlled by float switches. It is anticipated that the basins will be "pumped-out" for periods varying from a few hours per day to a few hours per week under normal operating conditions. Maximum pumping rate to the blowdown sump is 2000 gpm. Normal pumping rate is 800 gpm.

Question E291.21

The application for an NPDES Permit for VEGP which was submitted to the State of Georgia on November 3, 1983, indicates that a dechlorination system may be used to reduce the residual chlorine concentration in the cooling tower blowdown. Provide a description of this system, as proposed. Include the means for accomplishing chlorine concentration reduction, point(s) of application, system capacity, expected duration and timing (i.e., time of year) of system operation if not continuous, and target effluent concentrations for free available chlorine and total residual chlorine in the blowdown.

Response

The main components of the sulfonation system include three sulfonators coupled with two liquid sulfur dioxide evaporators and gas pressure-reducing valves. Gas is routed from the evaporators to the sulfonator/injector combination, where it is dissolved in water supplied through automatic flow control valves. Automatic solution control valves regulate solution flow to the injection point (the blowdown sump), and manual valves provide solution shutoff. A residual chlorine analyzer monitors residual chlorine and, with a sulfonator control module, provides feedback for automatic gas feed rate control. A dechlorination control panel provides overall system control. The three sulfonators are each designed to introduce up to 475 lbs of sulfur dioxide per day.

(Total capacity: 475 lbs/day X 3 = 1425 lbs/day.)

The plant effluent dechlorination system is a common system serving both Unit 1 and Unit 2. The dechlorination system is expected to be used when adding chlorinated river water makeup to plant systems during Corbicula spawning season (April-November). The Environmental Protection Agency's (EPA) effluent limits for free available chlorine of 0.2 mg/l average and 0.5 mg/l maximum apply to the cooling tower blowdown prior to mixing in the blowdown sump. There are no EPA effluent limitations (concentration) for total residual chlorine for cooling tower blowdown (see OLSER section 3.6.1).

Question E310.1

Provide a description of changes in the station's external appearance or layout which have been made subsequent to the description provided in chapter 3 of the CP-FES.

Response

Changes in the overall external appearance of the VEGP can best be perceived by comparing the artist's conception in OLSER figure 3.1-1 to FES-CP figure 3.1 and comparing the site plot plan in OLSER figure 3.1-2 to FES-CP figure 3.2 (also see Construction Permit Stage Environmental Report section 3.1). Detailed descriptions of the plant structures and changes in plant appearance are addressed in OLSER section 3.1 (External Appearance). The primary changes in plant appearance since the construction permit review are the reduction in plant size from four to two units and the deletion of the enclosure buildings.

Question E310.2

Chapter 8 of the OLSER indicates that 664 employees are anticipated for operation of VEGP. Is this an estimate of the average annual number of workers (plant employees and contractor employees) that will be required during operation of the two units? If yes, provide breakdown.

Response

The average annual number of workers required during operation at the two VEGP units is estimated for 1990 (the first year both units will operate for an entire year).

VEGP employees	842
Plant Wilson	15
Subtotal GPC	857
Contract workers	100
Total personnel	957

Question E310.3

Identify the likely residential locations (i.e. names of communities, counties) of the operating workers. Identify any anticipated impacts on the affected communities' facilities and services (i.e. schools, hospitals, water and waste treatment, fire, police) that would result from the workers' residence. List facilities and services that would require expansion or additions to capacity. Provide the same information for any VEGP demands on community services.

Response

Anticipated Residential Location of Workers

The anticipated residential location of VEGP operation and maintenance workers can be estimated based on the residential choices made by the more than 300 permanent employees already onsite, together with earlier research performed by Battelle (Columbus Division) for Georgia Power Company. The proximity of the Augusta metropolitan statistical area (MSA) (population 327,372 according to the 1980 census) has a major effect on locational decisions of VEGP employees. Most workers opt to live in the metropolitan area within a one hour commuting distance of VEGP to take advantage of urban services and amenities, housing supply, and job opportunities for spouses. A similar conclusion was reached in two recent major studies of power plant socioeconomic impacts:

- Electric Power Research Institute, Socioeconomic Impacts of Power Plants, Final Report, EPRI EA - 2228, Palo Alto, California, February 1982.

- U.S. Nuclear Regulatory Commission, Socioeconomic Impacts of Nuclear Generating Stations, Summary Report on NRC Post - Licensing Studies, NUREG/CR - 2750, U.S. Government Printing Office, Washington, D.C., July 1982.

The average annual workforce in 1990, the first year the two units at VEGP are both operational, is expected to be 957 employees, approximately 640 of whom will have moved into the VEGP region. The balance of the work force will be living in the region prior to employment. Table E310.3-1 shows the estimated residential distribution of operating workers at VEGP by county for year 1990. According to our projections most in-moving workers will elect to live in the Augusta MSA. It is estimated that as much as 80 percent of all new population associated with VEGP operation will reside in the metropolitan area.

Areas in Richmond County where in-moving employees are most likely to reside include the City of Augusta and the Neco and Gracewood census divisions. Neco and Gracewood divisions are located between Augusta and Burke County and have capacity for expansion. New employees are also expected to be attracted to the Martinez area of Columbia County, a rapidly urbanizing suburb of Augusta easily accessible to VEGP via interstate 520 and Georgia Highway 56. North Augusta in Aiken County, South Carolina, is another area of the MSA which can be expected to house some new workers.

Within Burke County, areas most likely to be populated by in-moving population associated with the operation of the VEGP are Green's Cut census division (the Shell Bluff community) and Waynesboro. Green's Cut division is located in the north-eastern part of Burke County adjacent to Richmond County.

Anticipated Impacts on Affected Communities' Facilities and Services

Detailed assessments of the impacts on communities housing VEGP operation employees are contained in the Final Report on Assessment of Service Needs for Burke and Richmond Counties prepared for Georgia Power Company, January 6, 1982, by Battelle Columbus Division. The information which follows is based on those assessments, modified to account for the latest estimate of the number of operating and maintenance workers at VEGP in 1990.

Richmond, Columbia, and Burke Counties are projected to receive about 90 percent of all in-moving population (employees and their families) as a result of VEGP. However, VEGP operation phase will have a very small effect on these counties. In fact, for each of these counties, the number of in-moving people will amount to less than one percent of the 1980 population of the county. (The projected population increases due to VEGP operation are 1,157 for Richmond County, 335 for Columbia County and 168 for Burke County.) Thus, all three counties will be able to absorb the anticipated population growth from the operation of VEGP with relatively little, if any, effect.

Most of the services in Richmond, Columbia, and Burke Counties are sufficient to not only provide for current demands, but also provide an adequate level of service to future levels of population including new population associated with VEGP.

For each county, certain existing deficiencies in service levels have been identified. These deficiencies are items local governments must address regardless of the population effects of VEGP. Richmond County needs immediate improvements in housing

generally and in sewer distribution serving the southern portions of the county. (Within the last two years, Richmond County has raised the level of service for water and solid waste disposal in southern portions of the county.) Immediate concerns in rapidly growing Columbia County are thoroughfares and schools. Services in Burke County and Waynesboro in need of immediate improvement include sewer and water, health care, and housing.

There are a number of other services for which the need is not immediate but, nevertheless, will increase over the long term as a function of population growth. However, the need for additional services for new population associated with VEGP will be insignificant in comparison to the overall demand. Services in this category include fire and police protection, and recreation.

In summary, VEGP operation workers will not significantly impact the communities in which they choose to live, due to the relatively small numbers of in-moving people involved, and their natural dispersal over a metropolitan area as the result of locational choices they individually make.

Anticipated VEGP Demands on Community Services

VEGP is located so remotely that it will make virtually no demands on community services during operation. All water, waste treatment, storm drainage, fire protection, and recreational needs will be provided internally. Additional traffic safety patrols, provided at shift changes by the Burke County Sheriff's Office during the plant's construction phase, are not anticipated to be needed during plant operation.

Litter collection along offsite road rights-of-way in the vicinity of VEGP can be expected to require a higher degree of county government attention than if VEGP did not exist. However, a cooperative county-industry effort under the auspices of the Georgia Clean and Beautiful Program will ensure that VEGP takes part in the solution to the litter problem.

The Burke County Hospital in Waynesboro and a public hospital in Augusta will receive funds directly from VEGP to handle added responsibilities due to radiological health requirements of VEGP. In addition, Burke County will receive taxes attributable to VEGP to offset costs of maintaining the Burke County Hospital, to which industrial accident patients are likely to be taken for treatment.

TABLE E310.3-1

ESTIMATED RESIDENTIAL DISTRIBUTION OF OPERATING WORKERS AT VEGP BY COUNTY FOR THE YEAR 1990

	Estimated Percentage	Estimated Number of Employees
Richmond County	60	574
Columbia County	20	191
Burke County	10	96
Aiken County, SC	1	10
Other counties (all less than 1%)	9	86
	100%	957

Source: Georgia Power Company, Community Development Department.

Question E310.4

Provide an estimate of the average annual workers payroll for the two units (give the year in which the dollars are stated).

Response

The estimated average annual workers' payroll for 1990-1994, in 1984 dollars, is $20,771,000.

Question E310.5

Provide an estimate of the average annual dollar amount of local purchases of materials and supplies resulting from the operation of the two units. Include a definition of the local area in preparing the estimate (i.e. counties, major towns, SMSA). Give the year in which the dollars are stated.

Response

The estimated average annual dollar amount (in 1984 dollars) of local purchases of materials and supplies resulting from the operation of the two units is $3,545,000. The local purchase area used in preparing this estimate includes Burke County and the Augusta metropolitan statistical area, consisting of Richmond and Columbia Counties in Georgia and Aiken County, South Carolina.

Question E310.6

In tabular form provide a dollar estimate of the taxes attributable to the two units of VEGP. For each of the units' first 5 full years of operation, provide the dollar estimates by type of tax and by taxing jurisdictions (excluding federal taxes). Give the year in which the dollars are stated. What percent of the jurisdiction's total tax revenues are represented by the taxes attributable to VEGP operation?

Response

Refer to table E310.6-1 and table E310.6-2.

TABLE E310.6-1 (SHEET 1 OF 3)

DOLLAR ESTIMATE OF TAXES
ATTRIBUTABLE TO THE TWO UNITS OF VEGP[a]

Type of Tax and Taxing Jurisdiction	1990	1991	1992	1993	1994
Ad valorem tax[b]					
Burke County Board of Commissioners	$ 6,384.7	$ 6,384.7	$ 6,384.7	$ 6,384.7	$ 6,384.7
Burke County Board of Education	$ 5,746.3	$ 5,746.3	$ 5.746.3	$ 5,746.3	$ 5,746.3
Ad valorem subtotal	$12,131.0	$12,131.0	$12,131.0	$12,131.0	$12,131.0
Local option sales and use tax[c]					
Burke County Board of Commissioners	$ 917.0	$ 963.2	$ 1,012.2	$ 1,063.3	$ 1,117.2
City of Midville	34.6	36.3	38.2	40.1	42.1
City of Sardis	60.9	64.0	67.2	70.6	74.2
City of Waynesboro	297.5	312.5	328.4	345.0	362.5
Local option subtotal	$ 1,310.0	$ 1,376.0	$ 1,446.0	$ 1,519.0	$ 1,596.0

TABLE E310.6-1 (SHEET 2 OF 3)

Type of Tax and Taxing Jurisdiction	1990	1991	1992	1993	1994
State Sales and Use Tax[d]					
State of Georgia	$ 3,930.0	$ 4,128.0	$ 4,338.0	$ 4,557.0	$ 4,788.0
Total	$17,371.0	$17,635.0	$17,915.0	$18,207.0	$18,515.0

Source: Georgia Power Company, Community Development Department, with data from Georgia Power Company State and Local Tax Office, and Oglethorpe Power Corporation.

a. In 1000's, using 1984 dollars.

b. Ad valorem tax figures are based on budgeted expenditures for VEGP real estate and improvements, with allowances for anticipated pollution control expenditures. Ad valorem taxes given are compilations of estimates of taxes to be paid by Georgia Power Company and Oglethorpe Power Corporation, together with "in lieu of tax payments" to be paid by the Municipal Electric Authority of Georgia. The remaining coowner, the City of Dalton, does not pay ad valorem taxes to Burke County. It is assumed that millage rate will remain constant at 4.50 mills for the Burke County Board of Commissioners, and 5.00 mills for the Burke County Board of Education.

c. Local option sales and use tax estimates are based on estimated operating and maintenance expenditures for Georgia Power Company and coowners. The local option sales and use tax is a 1-percent tax paid on all goods delivered into or used in Burke County. The tax is payable on materials and supplies used at VEGP, including nuclear fuels. A nearby county would only receive local option tax on supplies sold to VEGP if VEGP picked up the supplies in that county. Georgia Power is responsible for payment of this tax and is then reimbursed by the coowners for their pro rata share. Figures reflect gross estimated amounts of sales and use tax without any deduction for vendor's compensation or State of Georgia administrative fees. It is assumed that the percentage split of total local option tax collected remains constant at Burke County (70.0 percent), City

TABLE E310.6-1 (SHEET 3 OF 3)

of Waynesboro (22.71 percent), City of Sardis (4.65 percent), and City of Midville (2.64 percent).

d. The State of Georgia receives a 3-percent sales and use tax on the same items on which the local option tax is paid.

TABLE E310.6-2

PERCENTAGE OF LOCAL JURISDICTIONS
TOTAL TAX REVENUES REPRESENTED BY
TAXES DIRECTLY ATTRIBUTABLE TO VEGP OPERATION,
ESTIMATED FOR THE YEAR 1990[a]

Taxing Jurisdiction	Estimated VEGP Share of Total Local Taxes
Burke County Board of Commissioners	80 - 85%
Burke County Board of Education	85+%
City of Midville	25 - 30%
City of Sardis	40 - 45%
City of Waynesboro	18 - 23%
State of Georgia	less than 1/10 of 1 percent

Source: Georgia Power Company, Community Development Department with data from the Georgia Department of Community Affairs.

a. Estimates of the percentage of each local jurisdiction's total tax revenues represented by the taxes attributable to VEGP operation can be made based on tax figures for 1982, the latest year total tax revenues are available. Adjustments must be made to account for the increase in the proportion of taxes VEGP will pay as the plant is completed.

Question E310.7

Identify any places where traffic congestion or problems of interference with patterns of local traffic may be anticipated due to plant operation or maintenance. Discuss anticipated measures that would be undertaken to alleviate such possible situations.

Response

No significant traffic congestion or problems of interference with patterns of local traffic are anticipated due to plant operation or maintenance. VEGP is in an extremely rural area with very low indigenous traffic counts. The area's road network has been improved during the construction phase of VEGP to adequately handle the construction work force of more than 10,000 commuting workers. This road network will be easily capable of accommodating traffic demands created by less than 1000 plant operation and maintenance personnel.

One location where minor interference with patterns of local traffic may occur is at the intersection of Georgia Highway 80 and River Road (State Route 56C) in Burke County. The intersection is controlled by stop signs facing the Highway 80 traffic. Traffic between the plant and the Augusta metropolitan area, travelling River Road at shift change time, could cause minor delays for farm vehicles travelling on Highway 80 between fields and farmhouses. The magnitude of this potential conflict is so small that mitigation measures should not be required.

Question E310.8

Identify any impacts to cultural resources (sites in or eligible for the National Register of Historic Places) which could potentially result from the operation and maintenance activities related to the plant and transmission lines.

Response

Impacts to cultural resources primarily occur during construction activities. Impacts during operation and maintenance are controlled through Cultural Resource Management (CRM) Plans. A specific CRM Plan will be submitted as required to the Georgia Department of Natural Resources, Historic Preservation Section for approval (see the response to question E310.9). Ongoing maintenance and operation activities will be conducted in accordance with the approved CRM Plan to control impacts to cultural properties.

Question E310.9

Provide copies of any correspondence with the cognizant State Historic Preservation Officers relating to any potential operating impacts of the plant and transmission lines on cultural resources in or eligible for the National Register.

Response

During 1973 a study was done under the direction of the State archaeologist of the cultural resources on the VEGP site. The results of this study formed the basis for L. H. Larson's letter to R. P. Head, Jr., of February 11, 1974 (see attachment 310.9-1) indicating that Georgia Power Company had "... met all their obligations with respect to the archaeological resources of the Plant Vogtle site area."

During 1982 the Oglethorpe Power Corporation (OPC) submitted its Borrower's Environmental Report to the Rural Electrification Administration (REA). As part of that review, OPC contacted the State Historic Preservation Officer (SHPO). The SHPO's response of January 27, 1982 (attachment 310.9-2) indicated reliance on the 1973 study of the site. The SHPO's letter indicates "... it does not appear that any further development of Plant Vogtle will impact significant cultural resources in the plant area proper."

The SHPO's January 27, 1982 letter indicates their major concern to be the transmission line corridors. Attachment 310.9-3 is a letter from the SHPO dated September 27, 1983 concerning the Cultural Resource Management Plan for the VEGP-Wadley portion of the VEGP-Scherer transmission line. This plan is in place and its provisions will apply for the life of the transmission line. Similar plans are being developed for submission to the SHPO for each transmission line associated with the VEGP project.

STATE ARCHAEOLOGIST
GEORGIA HISTORICAL COMMISSION
A DIVISION OF THE OFFICE OF SECRETARY OF STATE BEN W. FORTSON, JR.
ROOM 103 MARTHA MUNRO
WEST GEORGIA COLLEGE
CARROLLTON, GEORGIA 30117
TELEPHONE 834-6835

February 11, 1974

Mr. R. P. Head, Jr.
Assistant to Executive Vice President
Georgia Power Company
P. O. Box 4545
Atlanta, Georgia 30302

Dear Mr. Head:

I am writing this letter to provide formal notification to the Georgia Power Company that, in my estimation, they have met all their obligations with respect to the archaeological resources of the Plant Vogtle site area. These obligations would seem to have been fulfilled with the submission of Nicholas Honerkamp's report on the excavations at the Brown's Cabin site locale. The report is a complete statement of what was found, the procedures involved in finding it, and the context in which the material occurred. I not only was able to observe Mr. Honerkamp's field operations and discuss with him and advise him concerning the nature of these operations and problems connected with them; but, I was also able to generally provide advice and direction during the period when the material was undergoing laboratory analysis.

There is, of course, always the possibility that archaeological sites, now unknown, might be encountered in connection with future Georgia Power Company operations at the Plant Vogtle site. However, it is my feeling that the Georgia Power Company has made a conscientious effort to deal with the archaeological resources at the site in as complete a manner as is presently possible. They have utilized professional archaeological expertise in meeting their responsibilities. I sincerely feel that no more can be asked of the company in this respect.

I will be most happy to address these same comments to the Atomic Energy Commission, or, if it is more convenient, I would be most happy to have you forward a copy of this letter to that agency.

Sincerely,

Lewis H. Larson, Jr.
State Archaeologist

COPY

ATTACHMENT 310.9-1

LHL/ma
cc: Mrs. Mary G. Jewett

Amend. 3 5/84

Department of Natural Resources
PARKS, RECREATION AND HISTORIC SITES DIVISION
270 WASHINGTON ST., S. W.
ATLANTA, GEORGIA 30334
(404) 656-2754

Joe D. Tanner
COMMISSIONER

Henry D. Struble
DIRECTOR

January 27, 1982

Mr. Donald L. Martin
Section Manager, Power Production
Oglethorpe Power Corporation
2888 Woodcock Boulevard, Tulane Building
Post Office Box 105033
Atlanta, Georgia 30348

Re: Borrower's Environmental Report
Alvin W. Vogtle Electric Generating Plant
Waynesboro, Burke County, Georgia

Dear Mr. Martin:

The Historic Preservation Section has received the request for information on cultural resources within the environmental impact area of the Alvin W. Vogtle Electric Generating Plant. We are aware that the Borrower's Environmental Report is in progress and look forward to an opportunity to review the finished report.

A review of our files indicates that a 1973 archaeological survey and testing program was completed for the original Plant Vogtle site. The results of this survey indicated only one site was potentially eligible for National Register nomination, and this site was found to be largely destroyed after initial testing. No other areas of archaeological concern are mentioned in this report, and it does not appear that any further development of Plant Vogtle will impact significant cultural resources in the plant area proper.

Our major concern at this point will be for the location of new transmission line corridors and related construction that may impact any existing archaeological and historic structural resources. A letter to our office from the Georgia Power Company, dated July 16, 1981, indicates that Georgia Power will complete an Operating License Stage Environmental Report (OSLER) that will include many details of the project relating to transmission line corridor routes. We strongly

urge that any cultural resource investigations be coordinated between Oglethorpe Power Corporation and the Georgia Power Company so that duplication of effort is avoided. This is especially true in those areas in which the Borrower's Environmental Report and OLSER responsibilities overlap.

Please contact Candice Colando, Environmental Review Coordinator (404/656-2840), if we can be of assistance concerning the Plant Vogtle project, or if you have any questions about our comments.

Sincerely,

Elizabeth A. Lyon

Elizabeth A. Lyon, Chief
Historic Preservation Section
State Historic Preservation Officer

EAL:rww

Department of Natural Resources
PARKS AND HISTORIC SITES DIVISION
HISTORIC PRESERVATION SECTION
270 WASHINGTON STREET, S.W.
ATLANTA, GEORGIA 30334
(404) 656-2840

Joe D. Tanner
COMMISSIONER

Henry D. Struble
DIRECTOR

September 27, 1983

Mr. James J. Shive
Land Department 260/2
Georgia Power Company
Post Office Box 4545
Atlanta, Georgia 30302

RE: Plant Vogtle Cultural Resource Plan
Burke and Jefferson Counties, Georgia
HPS #83-08-18-001

Dear Mr. Shive:

The Historic Preservation Section has reviewed the Plant Vogtle Project Cultural Resource Management Plan for the Vogtle-Wadley transmission line in Burke and Jefferson Counties, Georgia. This office appreciates the opportunity to comment on the plan and offers the following comments which we feel will strengthen this proposal.

We concur with your determination that in-place preservation is an appropriate strategy for these archaeological properties, given the nature of the project and the management plan. Specifically, the management plan appears to be adequate to allow for protection of the resources but could be strengthened by specifying the interval of inspection for the three archaeology sites. We suggest that the initial inspections be done on a quarterly basis, with a brief memo to document the results of each inspection. This memo would be filed with the Georgia Power Company, the State Historic Preservation Office, and the Federal Energy Regulatory Commission. At a time agreed upon by all three parties, the inspection time could be extended to a semi-annual or annual basis depending upon the findings of the initial inspections.

We would also like to stress the importance of these sites as cultural properties in, archaeologically speaking, a relatively unexplored area of Georgia, and the long-range responsibility undertaken through a long-range management plan. Our office is available to assist the Georgia Power Company in handling this responsibility and looks forward to working with the Georgia Power Company and the Federal Energy Regulatory Commission in the future on this undertaking.

Please contact Joe McCannon, Environmental Review Coordinator, at 404/656-2840, if you have questions about these comments or if we can be of further assistance.

Sincerely,

Elizabeth A. Lyon/dj.

Elizabeth A. Lyon, Chief
Historic Preservation Section
State Historic Preservation
Officer

EAL:rwm

Question E310.10

Data on transient population is provided in tables 2.1-26 through 2.1-42 and discussed in section 2.1.2. It is our understanding that the transient population figures in the tables represent the total 24-hour population expected to be found in the different sectors. If yes, provide a breakdown of the figures by shift such as day, night, or other for 1987.

Response

Section 2.1.2 and tables 2.1-26 through 2.1-42 have been amended to provide a breakdown of transient population projection estimates for 1987.

Question E470.2

Provide the following site specific information:

1. Update or reconfirm the information in sections 3.1.3.1, 5.2.1.2.1, and tables 5.2.1, 5.2.2, and 5.2-6 to include any changes noted during the latest land use census or survey conducted.

2. For the applicable receptor locations given in tables 5.2.1, 5.2.2, and 5.2.6, give most recent data or reconfirm original submittal,

   A. The dates of the grazing seasons.

   B. The fractions of daily intake of milk cows, beef cattle and milk goats (if any) listed in tables 5.2-1, 5.2-2, and 5.2-6 derived from pasture or fresh green chop during the grazing season.

   C. Fraction of the year leafy vegetables are grown.

   D. Fraction of ingestion rates of produce and leafy vegetables that are produced in the garden of interest by people of various age groups.

Response

1. Tables 5.2-1 and 5.2-2 are being revised to incorporate the latest land use survey data (May 14, 1984). The corresponding values will be recalculated. Also, the dose calculations presented in table 5.2-6 will be recalculated for those nearest receptor sites whose values have changed. These tables will be incorporated in amendment 4 to the OLSER.

2. The responses to these items are as follows:(a,b)

   A. Year Round.

   B. Milk cows - 50 percent on an annual basis.

      Beef cattle - 80 percent on an annual basis.

      Milk goats - There are none in the area.

   C. Three months out of the year.

   D. Not greater than 2 percent on a weight basis.

a. Information obtained on May 10,1984 from Bill Craven, County Agent, Georgia Cooperative Extension Service, Burke County.

b. Due to the lack of site specific information, the data utilized in the original submittal was obtained using the suggested conservative methodology outlined in section 5.2, reference 6 and given below (U.S. Nuclear Regulatory Commission, "Calculation of Radiation Exposure to Man from Routine Release of Nuclear Reactor Gaseous Effluents," GASPAR Computer Code, NUREG 0597, June 1980).

1. Nine months for cows.

   Ten months for goats.

2. Milk cows - 100 percent on an annual basis.

   Beef cattle - 100 percent on an annual basis.

   Milk goats - 100 percent on an annual basis.

3. Seven months out of the year.

4. The recommended usage factors for the maximum exposed individuals as outlined in Regulatory Guide 1.109, Rev. 1:

	Leafy Vegetables(kg/yr)	Other Produce (kg/yr)
Adult	64	520
Teen	42	630
Child	26	520
Infant	0	0

Question E470.3

The VEGP-OLSER-2, Amendment 1, Section 2.1.3.1 (p. 2.1-6) states that there were no milk-producing animals identified in any of the 16 meteorological sectors within 5 miles (8 km) of the plant site.

1. Are there any gardens greater than 50 square meters (500 sq ft) producing broad leaf vegetation in any of the 16 meteorological sectors within a distance of 5 miles (8 km) of the plant site?

2. If such garden(s) exist, GPC should sample the broad leaf vegetation for the preoperational and operational radiological monitoring program, in accordance with the Radiological Assessment Branch Technical Position (BTP) requirements (pp 3-4 of BTP, Revision 1, November 1979).

Response

During the latest land use survey (May 14, 1984), an operating dairy, located in the southeast sector, was noted. The dairy herd is 4.6 miles (7403 meters) from the plant. The owner started selling milk in March or April 1984. Milk from this herd will be regularly sampled while the dairy is in operation.

Table 5.2-1 provides the distance to the nearest vegetable garden greater than 500 sq ft in each of the 16 meteorological sectors within 5 miles of the plant site. Grass was chosen for sampling in lieu of broad leaf vegetation because: grass can be expected to be available nearly year-round whereas broad leaf vegetation would be available for only about half of the year; sampling stations can often be placed at desired locations; and grass has been found to be a suitable collector for I-131 and other radionuclides (as cited in the following reference: Jackson, W. Morrison, Noakes, J. E., and Spaulding, J. D., "Forage: A Sensitive Indication of Airborne Radioactivity," Health Physics Journal, vol. 40, pp 91-94).

Vegetation sampling is performed at the site boundary at two locations; this should eliminate the need for a garden survey. (See footnote on p 3 of the BTP.) Vegetation is also sampled at a control location approximately 15 miles from the plant.

Question E470.4

During the site visit meeting on May 22, 1984, the applicant stated that the potable water supply for the town of Girard, about 7.5 miles downstream from the plant, comes from well water.

1. Is there a potential for recharge of well water by the Savannah River?

2. If so, provide effluent transit time and dilution factor at the point of intake in Girard.

Response

The alternating beds of sand, clay, marl, and limestone that underlie the Coastal Plain of South Carolina and Georgia comprise a complex sequence of aquifers and confining layers that dip to the southeast only slightly more than the regional ground surface. Water enters the permeable sands and limestones principally by direct infiltration of precipitation in their outcrop areas, and migrates downdip. The interbedded clays and marls, being nearly impermeable, confine the water within the aquifers, leading to artesian conditions. Recharge to the aquifers can also occur from small streams crossing their outcrop areas, but most streams, including the Savannah River, receive ground water discharge in the aquifer outcrop areas.

There are two major aquifers, the Cretaceous aquifer and the Tertiary aquifer, underlying the Girard area. These are both confined aquifers. The Cretaceous aquifer is also known as the lower aquifer and consists of Cretaceous age water-bearing strata of the Tuscaloosa Formation. These strata are confined beneath the Huber and Ellenton Formations which are of low permeability. The Huber and Ellenton Formations also separate the Cretaceous aquifer from the overlying Tertiary aquifer. The Tertiary aquifer, also known as the upper aquifer, is the principal artesian aquifer in this area. It consists of water bearing strata confined beneath the Blue Bluff Member of the Lisbon Formation, a layer of low permeability. Above the Lisbon Formation hydraulically interconnected strata of the Barnwell Group are under unconfined water table conditions and form a minor aquifer which is used locally to provide water for domestic, municipal, and irrigation purposes. For a more detailed description of the aquifers in this region, refer to Final Safety Analysis Report subsection 2.4.12 or Studies of the Postulated Millett Fault (Bechtel Corporation, "Studies of Postulated Millett Fault, Vogtle Electric Generating Plant," Georgia Power Company, Atlanta, Georgia, October 1982).

The section shown on figure E470.4-1 is located along River Road which is approximately parallel to the Savannah River, about 1.5 miles southwest of the river and 3.5 miles northeast of Girard. The section was prepared during investigation of the postulated Millet fault and shows the location and depth of observation wells constructed for that study, with corresponding water levels, and pertinent hydrogeologic units. As can be seen on the figure the potentiometric surface of the lower (Cretaceous) aquifer ranges from about 155 to 170 ft above sea level along this section. The potentiometric surface of the upper (Tertiary) aquifer is about 128 ft above sea level at the same location. The water surface in the Savannah River northeast of the section is less than 80 ft above sea level. Thus, there are two reasons why water from the Savannah River cannot enter the upper or the lower aquifers. First, the low permeability of the confining units overlying these aquifers (and underlying the river bed) effectively prevent infiltration of river water into these aquifers. Second, and more significantly given present conditions, the head of water in these aquifers is higher than the head of water in the river. Water under the influence of gravity moves from a high head condition to a lower head condition. Water from the aquifers will therefore discharge to the river in any location where a hydraulic connection is present rather than vice versa. In fact, surface water gauging stations at Augusta and at Burtons Ferry Bridge indicate that the Savannah River between these two stations has been a gaining river, i.e., water is discharged to it from the ground-water system (Bechtel Corporation, "Studies of Postulated Millett Fault, Vogtle Electric Generating Plant," Georgia Power Company, Atlanta, Georgia, October 1982).

In the town of Girard there are two town wells that provide water for municipal consumption. One of these wells is reported to be 365 ft in depth and is probably pumping water from the Tertiary aquifer. As noted above, this aquifer does not receive recharge from the Savannah River between the VEGP and Girard.

The other town well is reported to be 150 ft deep and pumps water from the unconfined water table aquifer. The static water level in this well was at an elevation of 196.2 ft when measured on April 22, 1982. The bottom of this well is at an elevation of 93 ft, which is above the level of the river. Even under an extreme condition of water table drawdown, water from the Savannah River would not recharge this well.

There are a number of other wells in the Girard area. The water levels of 16 of these wells were measured in a 1982 well canvass. None of these wells penetrate the Cretaceous aquifer, a few appear to penetrate the upper portion of the Tertiary aquifer but most are drawing water from the water table aquifer. The lowest water level measured in any of these wells

was 141.8 ft above sea level. Thus, the possibility of any of these wells receiving recharge from the Savannah River is similar to that of the Girard town wells. To achieve a reversal of gradient between the river and the wells would require a combination of water level drawndown in the area and river level increase substantially exceeding 60 ft for an extended period of time. This is a situation which, considering the capacity of the aquifers, the climatic conditions, and expected development in the region, will not occur. How much it would have to exceed a 60-ft differential, and for how long would depend on the permeability of the material between the river and Girard and the amount of recharge occurring from infiltration of precipitation between the river and wells. Thus, for the wells in Girard to receive recharge from the Savannah River a combination of circumstances would be required which have not existed in the past, do not presently exist, and are not likely to exist in the future.

Question E470.5

During the site visit on March 21, 1984 the RAB reviewer observed two (2) irrigation rigs off highway 23, past the town of Girard at about 8 miles (12 km) SSE of the VEGP site and some cattle grazing on two small farms in the vicinity.

1. Identify the source of irrigation water.

2. If the source of irrigation water is the Savannah River, then for irrigated foods provide:

   a. The crop type and its use (e.g., human consumption, milk, and/or meat animals consumption).

   b. Total food yield (kg) within the 80 km (50 mile) radius of the plant.

   c. Annual production (kg/yr).

   d. Annual production (by type) within the 80 km (50 mile) distance surrounding the VEGP-1 and 2.

   e. The amounts (kg/yr) of each consumed by the maximally exposed adult, teenager, and child and by the average adult, teenager, and child within the 80 km (50 mile) radius of the VEGP-1 and 2.

   f. Transit time from point where the discharge stream enters an unrestricted area to the points of withdrawal, estimated dilution at each withdrawal point, and the basis for calculating transit times and dilution factors.

   g. The fraction of the animal water intake not obtained from the irrigation system.

Response

The sources of water for the irrigation rigs are not from the Savannah River. As noted in paragraph 5.2.1.2.1, there is no known crop irrigation with Savannah River water within 50 miles of the plant. These irrigation rigs (one at about 5.7 miles in the south sector, one at about 5 miles in the south-southwest sector) pump water from surface water ponds. The rig in the south sector fills the pond from a 6-in. well approximately 200 ft deep. The other rig (south-southwest sector) rarely operates but uses water in a pond which forms the headwater of Jobs Branch.

Question E470.6

Provide the following site-specific information for estimating liquid pathway doses:

1. The nearest present and known locations where an individual can obtain aquatic food.

2. The nearest present and known future aquatic areas that an individual can use for recreation purposes. Also provide a breakdown of usage (person-hours per year) by activity (shoreline activity, swimming, and boating).

3. For the locations identified in 1 and 2 above, the transit time of each plant discharge stream containing liquid radwaste from the point where the stream enters an unrestricted area to the identified location, and the estimated stream dilution at that location.

4. For each liquid radwaste discharge, the transit time from input to a plant discharge stream to the point where the steam enters an unrestricted area.

5. a. The present commercial fish and invertebrate catch (in kg/yr) from waters within 80 km downstream of the plant radwaste; major catch locations; their distance from the plant radwaste discharge.

   b. The amount of sport fish and invertebrate catch consumed (in kg/yr) within 80 km of the plant; transit time from the point where the discharge stream enters an unrestricted area to each major catch location, the estimated dilution at each location, and the basis for calculating transit time and dilution.

6. For present and known future drinking water intake locations within 80 km of the plant radwaste discharge (downstream or radius): the transit time and estimated dilution at each major location, the basis for calculating transit time and dilution, the populations served and the daily water consumption at each location.

7. Unusual animals, plants, agricultural practices, game harvests, or food processing operations having the potential of contributing on the order of 10% or more to either individual or population doses (examples are Asiatic clams found in the surface-water intake of a municipality; growing sweet potatoes in excess of any other food crop; producing most of the region's Irish

potatoes in the general vicinity of the reactor; and producing deer in a game management area in quantities comparable to beef and pork production) and food processing operations involving large quantities of water, e.g., breweries and bottling plants: their annual production and water-supply sources.

Response

The responses to the above items are as follows:

1. The nearest aquatic area from which an individual could obtain aquatic food is the Savannah River adjacent to the VEGP site.

2. The nearest aquatic area an individual could use for recreation would be the Savannah River adjacent to the VEGP site. As referenced in the Final Safety Analysis Report 2.1.3.3, there are five river access points within 10 miles of the plant, all of which are privately owned. The Georgia Department of Natural Resources 1980 fishing activity survey revealed an estimated 231 fishermen per year, a number too small to breakdown by boating or shoreline activity. Since there are no beaches within a 10-mile radius of the plant, swimming activity is estimated to be negligible.

3. Since the unrestricted area is the Savannah River adjacent to the VEGP site, the original submittal (OLSER subsection 5.2.2.1) used a transit time of 0.0 h and a dilution factor of 10 which was estimated to be the lowest value based on the average for summer and winter conditions for near-field dilution.

4. The transit time from input of a liquid radwaste discharge to a plant discharge stream to the point where the stream enters an unrestricted area is approximately 5 to 10 min.

5. a. The Georgia Department of Natural Resources (DNR) does not have any data available on commercial fishing (vertebrate or invertebrate) within 80 km downstream of the plant discharge. Georgia Power Company personnel have found no evidence of commercial fishing activity during routine surveys over the last several years. Georgia Power Company personnel found no evidence of commercial fishing activity during routine surveys over the last several years.

b. The Georgia DNR is scheduled to have a final report out on the sport fishery of the Savannah River in December of 1984. Refer to the data in table 2.1-49 of the VEGP-OLSER for currently available DNR data on recreational fishing in the Savannah River. The transit time from the point of discharge to an unrestricted area is essentially zero. The data collected by the DNR do not identify any major catch locations because of the methods of data collection.

6. There are no present or known future drinking water intake locations within 80 km of the plant radwaste discharge. More information on downstream water users can be found in section 2.1.3.8.2.

7. No such unusual animals, plants, agricultural practices, game harvests, or food processing operations have been identified in the area that would have the potential of contributing on the order of 10 percent or more to either individual or population doses.

Question E470.7

Section 6.1.5, p. 6. 1-16 of the VEGP-OLSER-2 states:

"Measurements are taken chiefly at two kinds of locations: indicator stations where long term or maximum radiological levels attributable to operation of the plant are anticipated; and control stations where radiological levels are not expected to be significantly influenced by plant activities. However, all of the indicator and control stations are susceptible to any radiological effects which might be attributed to the operation of neighboring nuclear facilities, as well as to fallout from nuclear weapons tests. These could confuse the proper comparison of the radiological levels between the indicator and control stations or between the period of operation and preoperation when attempting to show the effects of plant operation."

Identify the common radionuclides in the effluents released by VEGP, the Savannah River Plant, and in fallout from nuclear weapons tests. It seems that if one can identify these common radionuclides and the radionuclides which are characteristic of each of the above three sources, one may be able to make proper comparison of the radiological levels between indicator and control stations or to detect and observe the effects of plant operation.

Response

The actual or potential effluents from the Savannah River Plant (SRP), the expected effluents from VEGP, and the fallout from nuclear weapons tests consist of a wide variety of essentially the same fission products, corrosion products, and activation products. In addition, releases at SRP and fallout from nuclear weapons tests may contain certain heavy isotopes (e.g., isotopes of uranium and plutonium). Only for a relatively small number of radionuclides (such as H-3, Co-60, Sr-90, and Cs-137) in SRP effluent streams have the releases been great enough for detection offsite in environmental samples.

The effects of VEGP operations might be distinguished from those of extraneous origin based on considerations of the following factors: (1) sampling locations (e.g., indicator versus control); (2) monitoring period (e.g., preoperational versus operational or before versus after known releases); (3) comparison of radionuclide content of environmental sample with those released, and (4) the ratios of the activity levels of certain radionuclides. In the event of a substantial release, radionuclide ratios (such as, Sr-89/Sr-90 or I-133/131) might be useful to establish the origin of the radionuclides or may

provide a means of distinguishing releases which differ in time.

It can be expected that any future weapons tests would be publicized and that VEGP would be punctually informed of any substantial releases from SRP. The transient impact in appropriate VEGP environmental samples might then be anticipated.

Should anomalous radiological levels be reached in any VEGP environmental samples and an explanation of extraneous origin is not available, calculational methods might also be resorted to determine VEGP contributions to low level long term radiological levels in the VEGP environs.

Question E470.8

Paragraph No. 11, section 6.1.5, p 6.1-17 of the VEGP-OLSER-6 states:

"River water sampling locations were placed at the specified locations to distinguish between VEGP and Savannah River Plant discharges, as well as to assess the effect of VEGP operations."

Explain and clarify how the discharges from VEGP and Savannah River Plant are distinguished and how the effects of VEGP operations will be assessed.

Response

Five surface water sampling stations have been positioned on the Georgia side of the river. The number and location by river mile (approximate distance from the Atlantic Ocean) of each of these stations are as follows:

No.	River mile
81	153.1
82	151.2
83	150.6
84	149.5
85	146.7

Beaver Dam Creek discharges from the Savannah River Plant (SRP) between stations 81 and 82 (approximately one mile above station 82). Differences between the radiological levels in samples collected at these two stations provide an indication of the effect of this SRP effluent stream to the river.

The VEGP intake and discharge structures are located at approximately river mile 150.9 between stations 82 and 83. Any significant differences in the radiological levels of samples collected at these two stations after operations begin are indications of an effect of VEGP operations. Four Mile Creek enters the river from SRP opposite station 83 but the samples collected at station 83 are not affected by the Four Mile Creek effluents.

A few bends of the river and a narrowing of the river's width between stations 83 and 84 should provide good mixing of the VEGP and the Four Mile Creek effluents in the river for samples taken at Station 84. Differences between the levels at stations 83 and 84 should provide an indication of the effect of SRP's effluents from Four Mile Creek. There are no other SRP effluent streams between stations 83 and 84.

There are a few lesser streams entering the river from SRP between stations 84 and 85. Any differences between readings at these stations would provide an indication of the impact of these lesser streams from SRP. The next SRP effluent stream (Steel Creek) is more than 5 miles further downstream.

The impact of the SRP effluent streams in the vicinity of the VEGP intake and discharge can probably be established during preoperation. It might be determined that only stations 82 and 83 are needed after VEGP operations begin in order to access the radiological impact of plant operations.

Question E470.9

Station no. 33 in table 6.1-2, at 2.8 miles (4.5 km) SE is described as "Permanent residence with highest $\frac{x}{Q}$." Why is this residence not listed in table 5.2-1? Table 5.2-1 of VEGP-OLSER-5 Amendment 1 (February 1984) only lists a residence at 5150 m or 5.2 km in the SE sector with $\frac{x}{Q}$ of 3.5E-08 (s/m^3). According to the same table 5.2-1, the residence at 1931m or 1.9 km WSW has the highest $\frac{x}{Q}$ of 1.2E-07 (s/m^3). Explain and clarify.

Response

The distance to station no. 33 in table 6.1-2 of 2.8 miles (4.5 km) SE is incorrect. The correct distance to station no. 33 is 3.3 miles (5.2 km) SE. The residence at station no. 33 is the same residence as listed in table 5.2-1 (February 1984) at 5150 m or 5.2 km in the SE sector.

TLDs were not placed at the locations of the other nearby residences listed in table 5.2-1 since a TLD is located at the site boundary in each sector. The $\frac{x}{Q}$ value at each of these site boundary locations is slightly higher than that at the residence in that sector.

The residence (a trailer park) at 1931 m or 1.9 km WSW in table 5.2-1 has the highest $\frac{x}{Q}$ of 1.2E-07 (s/m^3).

Question E451.17 (Regulatory Guide 4.2, section 5.1.4)
(OLSER 5.1.4)

The discussion of the atmospheric effects resulting from operation of the natural draft cooling towers (section 5.1.4 of the OLSER) appears to be unchanged since submittal of the OLSER at the Construction Permit Stage. However, since that time, additional meteorological information has been collected at the site, and additional information on cooling tower modeling has been developed (see NUREG/CR-1581, "Evaluation of Mathematical Models for Characterizing Plume Behavior from Cooling Towers," September 1980, and EPRI CS-1683, "Studies on Mathematical Models for Characterizing Plume and Draft Behavior from Cooling Towers," January 1981). Considering the additional onsite meteorological information and the additional information on cooling tower modeling presented in the above references, reassess the estimates of visible plume location, extent, and frequency and salt deposition due to cooling tower drift. Also, confirm the rationale for the assumption of a uniform deposition of 305 lb/acre/year for cooling tower drift within 1 mile of the plant, considering variations with meteorological conditions.

Response

Additional meteorological data collected at the VEGP site since submittal of the Construction Permit Stage Environmental Report (CPSER) is comparable to the data which was used to predict plume behavior.

A review of plume behavior at other power plants indicates that the meteorology, cooling tower operating characteristics, and plume behavior at VEGP is comparable to those at the other plants. Several of these plants used the recent state-of-the-art plume behavior and drift deposition models recommended by the Nuclear Regulatory Commission (NRC). Since the predicted plume behavior at VEGP is in reasonable agreement with that of other plants, the plume predictions cited in the CPSER are considered reasonable and more sophisticated modeling programs for characterizing plume behavior are unnecessary.

The estimate of uniform salt deposition of 305 lb/acre/year deposited entirely within a 1-mile radius of the plant was based on conservative design parameters, e.g., a conservative salt emission rate of 1050 lb/tower. A more realistic salt emission rate, based on expected operating conditions would be 111 lb/day from each tower. This reduction is due mainly to the changes of drift loss from 0.03 percent to 0.008 percent and concentration factor from 8 to 4. A review of the peak deposition rates at other power plants several of which used Nuclear Regulatory

Commission approved models for their drift rate analysis and all of which have similar cooling tower characteristics and meteorological conditions as VEGP, indicates that the peak deposition will occur within 0.3 to 0.9 miles of the cooling towers. Table E290.8-1 compares cooling tower characteristics and meteorological conditions at VEGP with four other plants. It is estimated that the peak deposition rate at the VEGP, in the prevailing wind direction will occur onsite and will be less than 17 lb/acre/year within 0.9 miles from the cooling towers.

Extensive data on salt drift deposition patterns available from Susquehanna and Beaver Valley Unit 2 were used as a basis for predicting offsite peak salt deposition rates at VEGP. Susquehanna has a deposition curve with two peaks whereas Beaver Valley Unit 2 has only one peak and from that point on the deposition rates decrease with the increase of distance from the cooling tower. Applying each of these deposition patterns at VEGP and considering wind rose frequencies, the worst case offsite peak salt deposition at VEGP would occur about 1.0 mile southeast of the cooling towers at the site boundary with a rate of less than 15 lb/acre/year.