RIVER BEND STATION ENVIRONMENTAL REPORT

OPERATING LICENSE STAGE

SUPPLEMENT 6

Acknowledgement of Receipt of

Supplement to Environmental Report -

Operating License Stage

River Bend Station

Please sign, date, and return this sheet to:

L. L. Dietrich
Lead Licensing Engineer
Stone & Webster Engineering Corporation
3 Executive Campus
P. O. Box 5200
Cherry Hill, NJ 08034

Receipt of Supplement 6 to the Environmental Report - Operating License Stage is acknowledged.

My copy has been brought to current status and superseded pages have been removed and destroyed, as applicable.

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SUPPLEMENT 6 INSERTION INSTRUCTIONS RIVER BEND STATION ENVIRONMENTAL REPORT - OPERATING LICENSE STAGE

The following instructions are for the insertion of Supplement 6 into the RBS ER-OLS. Remove the pages, tables, and/or figures listed in the REMOVE column and replace them with the pages, tables, and/or figures listed in the INSERT column. Dashes (---) in either column indicate no action required.

Vertical bars have been placed in the margins of inserted pages and tables to indicate revision locations.

VOLUME 3

Remove	Insert
Page Q&R 2-i/ii and Q&R 2.1-1/2	Page Q&R 2-i/ii and Q&R 2.1-1/2
---	Page Q&R 2.2-3/-. Insert immediately after page Q&R 2.2-1/2
Page Q&R 2.4-1/-	Page Q&R 2.4-1/2
Page 3-v/vi	Page 3-v/vi
Page 3.1-1/2	Page 3.1-1/1a and 3.1-1b/2
---	Figure 3.1-2a. Insert immediately after Figure 3.1-2
Page 4.6-3/4	Page 4.6-3/4
Page 5-iii/iv	Page 5-iii/iv

VOLUME 4

Remove	Insert
Page 5.6-1/2	Page 5.6-1/2 and 5.6-2a/2b
Page 5.6-3b/4	Page 5.6-3b/4
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---	Page Q&R 5.6-1/2
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Page 6.2-3/4, 6.2-4a/4b, 6.2-5/5a, and 6.2-5b/6	Page 6.2-3/4, 6.2-4a/4b, and 6.2-5/6[1]
Table 6.2-1 (Sheet 1, 2 and 3)	Table 6.2-1 (Sheet 1, 2 and 3)[1]
Page 6.6-3/4	Page 6.6-3/4
Table 6.6-2 (Sheet 3 and 4)	Table 6.6-2 (Sheet 3 and 4)
Page 7.1-1/2	Page 7.1-1/2[2]
Page Q&R 10-i/-	Page Q&R 10-i/-
Page Q&R 10.4-3/-	Page Q&R 10.4-3/-

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[1] Page 6-i, 6.2-1, 6.2-3, 6.2-5, 6.2-6, and Table 6.2-1 (Sheet 1 and 2) shown as Supplement 5.

[2] Page 7.1-1 shown as Supplement 4.

CHAPTER 2

QUESTIONS AND RESPONSES

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QUESTIONS AND RESPONSES

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QUESTION E470.1 (2.1)

Provide definitive sport and commercial fish harvest data within 50 miles (80 km). General information by parish is not adequate.

RESPONSE

Commercial and sport fisheries in the vicinity of River Bend Station are discussed in Sections 2.3.2.2.8 and 2.4.2.1.5. As stated, no data are available on sport fisheries in the area.

Commercial fisheries data are reported in Tables 2.3-12, 2.3-13, 2.4-43, and 2.4-44. Statistics reported by parish are the most definitive summarization available.

The estimated total fish and shellfish catch within a 80 km radius of River Bend are listed by year and species in Table 2.3-13a. 2

QUESTION E310.7 (2.1)

The external appearance of the plant and plant layout are discussed in Section 3 of the CP-FES and depicted in Figure 2.1-3 in terms of two units. In light of the current status of Unit 2 which is not scheduled, provide a discussion, accompanied by a new site layout figure, which incorporates Unit 1 physical structure and features and reflects any additions (i.e., Emergency Operations Facility), relocations, reorientations or other changes which have occurred since publications of the CP-FES.

RESPONSE

The response to this request is provided in revised Section 3.1.

6 An artist's sketch of a one-unit plant is shown in Figure 3.1-2a.

QUESTION E290.8

On page 2.2-3 it is stated that 170 acres of the site area permanently affected by construction are classified as prime farmland or farmland of statewide importance. Provide a map of the site identifying the prime farmland and farmland of statewide importance. Also provide in tabular form the total area of prime farmland and the area of farmland of statewide importance onsite and the area of each of the two classifications of farmland permanently affected by plant construction.

RESPONSE

The response to this request will be provided in a future supplement.

This response is contingent upon completion of a soil type survey to be taken by the U.S. Department of Agriculture, Soil Conservation Service.

QUESTION E291.13 (2.4)

References for Section 2.4 (p. 2.4-53). Provide copies of References 37, 38, and 39 for ER Section 2.4 or, if previously submitted to NRC, provide date and other identifying information regarding their submittals.

RESPONSE

Copies of these documents are provided under separate cover.

QUESTION E290.9

Mention is made in various places that natural resources of the River Bend site not needed for energy production will be managed (e.g., Table 2.4-5 certain forest will be maintained in a particular seral stage; page 2.4-9 an effort will be made to retain Needle Lake in a primitive condition, as wood duck habitat; page 2.4-19 deer herds onsite and vicinity are managed). Provide plans for management of these natural resource areas during plant operation.

RESPONSE

The response to this request will be provided in a future supplement.

CHAPTER 3

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PLANT DESCRIPTION

3.1 EXTERNAL APPEARANCE AND PLANT LAYOUT

The complex of buildings that make up River Bend Station is located in a thickly wooded area on a slight rise east of the Mississippi River. The main plant buildings are more than 1.6 km (1 mi) away from US Highway 61, which passes northeast of the 1,352-ha (3,342-acre) GSU property. The dense native growth along the roadside and scattered patches of timber, such as sweetgum, loblolly pine, hickory, Shumard oak, and water oak, screen the station from highway traffic. The highway elevation is about 25 ft above the site grade.

As the plant is approached from the North Access Road leading off US Highway 61, the buildings are first seen above the treetops, and then the station appears as a composition of large, simple concrete masses dominated by the twin cylindrical forms of the reactor building structures. The upper portions of the turbine buildings, recirculating motor-generating buildings, auxiliary boiler and water treatment building, and the portions of the administration complex (a complex of PAP facility, services building, warehouse, and office building) are enclosed in fluted metal siding. The metal siding and several yard tanks are painted with a dominant color which provides contrast with the natural color of untextured concrete. The open metal-framed structures such as switchyards, fuel cask handling area, and structural steel framing in transformer yard areas, are constructed of galvanized steel. From the roof of the auxiliary building the galvanized plant exhaust duct rises along the reactor building exterior shield wall up to the spring line and then follows the contour of the reactor building dome. The exhaust duct terminates at approximately 20 ft above the apex of the reactor building dome, at 195 ft above the yard grade (290 ft msl), thus releasing waste gases to the atmosphere above all other plant structures. Locations and elevations of all plant gaseous release points are shown in Figure 3.1-1.

The major plant structures cover approximately 51 ha (126 acres) and are arranged as shown in Figure 3.1-2. The station is entered through a primary access point (PAP) facility, a one-story brick-faced structure, serving as a security building. To the south of the PAP facility are the services building and the warehouse covered with fluted

metal siding. To the north of the PAP facil. / is the office building, having architectural window walls with continuous reflective insulating glass windows. An artist's sketch of a one-unit plant is shown in Figure 3.1-2a.

6

The reactor building structures housing the steel containment are the dominant features of this station. The smooth finish of the concrete walls accentuates their curvature which terminates in a shallow dome. These cylindrical structures are large vertical elements which tend to balance the

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proportions of the lower, rectangular buildings grouped around it and completes the geometric composition of the station.

The Training Center, which will also house the Emergency Operations Facility, will be located outside the plant security boundary but on GSU property near the intersection of U.S. Highway 61 and the North Access Road. This basically commercial type building has a "plantation" facade designed to blend with the antebellum culture of the area.

Permanent station roads and parking areas are asphalt paved, with lane markings painted in either yellow or white. A spur track from the Illinois Central Gulf Railroad line links the turbine and fuel buildings to the major railroad network for transporting waste products and other materials.

The site is landscaped to enhance the appearance of the buildings. Except at the entrances, where grass and shrubs of low profile are used to define walkways, the natural aspect of the wooded slopes and fields of meadow grass is retained. Trees frame vistas as well as baffle utilitarian areas, where possible, when consistent with security requirements.

At the conclusion of the construction activities, the facilities used for temporary construction buildings, laydown of equipment, construction switchyard, and parking during the construction stage will be removed and the land restored. The land will be graded and seeded to promote the return of vegetative cover.

Sedimentation basins and pits for the disposal of wastes from concrete operations, will be backfilled with soil when full. Areas used for the stockpiling of spoils will be allowed to revert to a natural state. The area occupied by the landfill facility will be reseeded when the facility is no longer required. Details of the site restoration plan are provided in Section 4.1.

Visual Impact on Surrounding Areas

In order to assess visual impact, visually sensitive and intensive land uses within 10 km (6.25 mi) of River Bend Station were identified. These included residential concentrations, major transportation routes, historic sites, and recreational attractions within approximately 10 km and properties listed on the National Register of Historic Places within 16 km (10 mi) of River Bend Station. All are

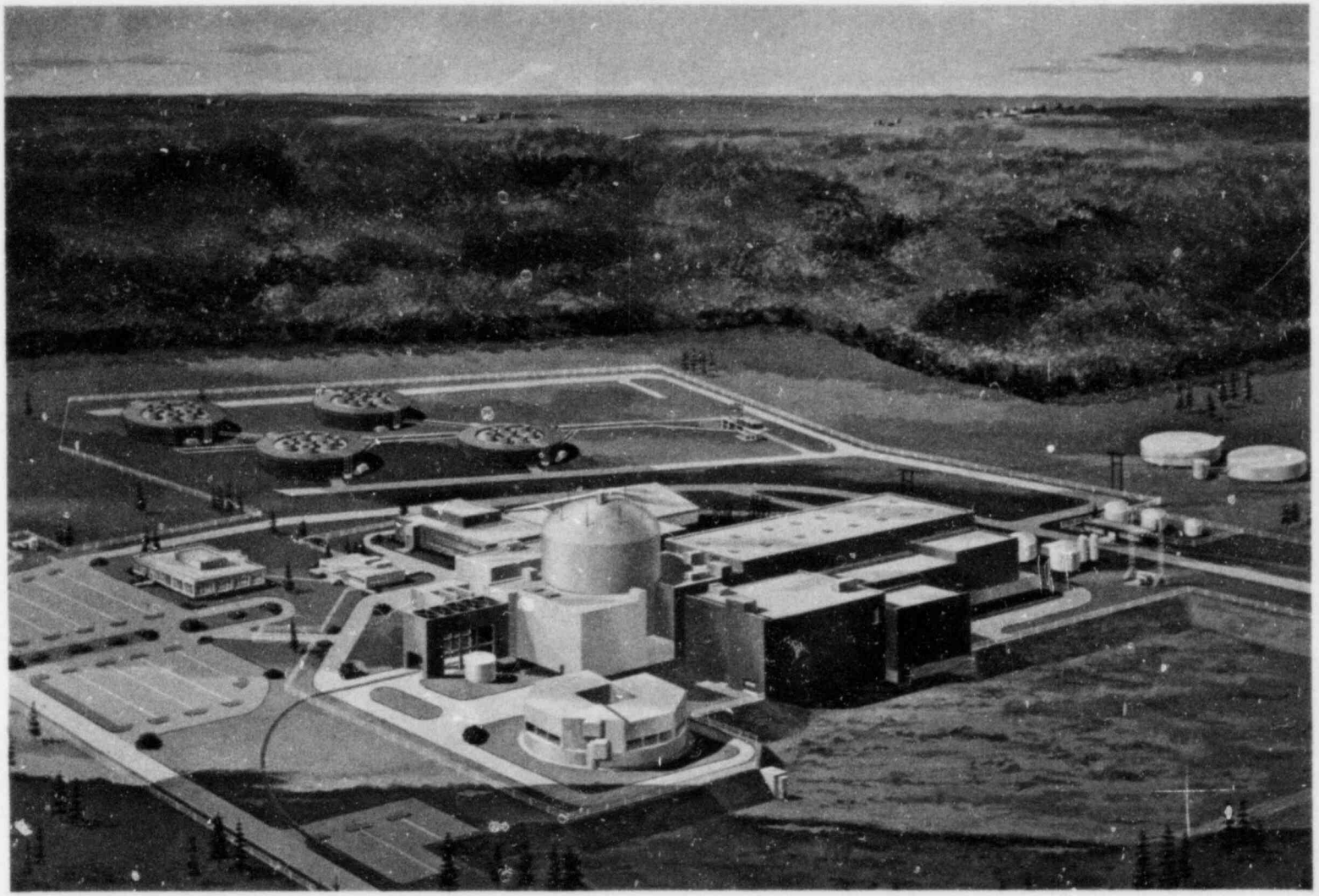

FIGURE 3.1-2a

ARTIST'S SKETCH
UNIT ONE

RIVER BEND STATION

ENVIRONMENTAL REPORT— OLS

than steep slopes and cultipacking in areas running perpendicular to the slope. In order to further reduce the extent of erosion, other control measures are being assessed for future use.

River bank erosion at the embayment area has been controlled by gentle sloping and by employing riprap.

Prior to plant operation the Army Corps of Engineers plans to construct a revetment composed of an articulated concrete mattress for stabilization of the east bank of the Mississippi River. The revetment will be tied into the embayment slope protection and will extend upstream and downstream for several miles.

Upon completion of Unit 1 construction, exposed tracts of land will be seeded to promote vegetation where practical. At the conclusion of Unit 2 construction activities, the construction-related facilities utilized by both units and any additional facilities or laydown areas required during Unit 2 construction will be removed. The land will then undergo final grading, seeding and landscaping. Grass cover also will be utilized to restore and stabilize areas affected by erosion and areas affected by deposition of eroded sediments.

4.6.3 Dust

Dust control is accomplished by paving or applying asphalt binders to the construction roads and by water sprinkling. No sprays were required to prevent dust blowing from the coarse fill stockpile.

4.6.4 Traffic

Construction of the North Access Road connecting US Highway 61 and State Highway 965 has minimized both congestion and noise on State Highway 965. Truck traffic on US Highway 61 was reduced by transporting coarse fill over an extended period and stockpiling.

Rush hour traffic generated by the construction work force congests US Highway 61 where it intersects North Access Road and State Highway 965, and the St. Francisville-New Road ferry crossing. These snarls are short-term and local residents have acclimated to the rush hours, generally avoiding travel at these times. A traffic light placed at the intersection of North Access Road and US Highway 61 has assisted in alleviating traffic congestion.

4.6.5 Effluents and Wastes

Construction activities result in temporary discharges into site water bodies and the Mississippi River. Effluents and wastes discharged into local streams comply with limits established in the National Pollutant Discharge Elimination System (NPDES) permit, thus minimizing impact to the receiving body.

Effluent from the sewage treatment plant empties into East Creek near Grants Bayou. The low level of residual chlorine in the effluent stream is reduced by the time the effluent reaches East Creek; therefore, chlorine has no effect at the point of release into East Creek. Sanitary wastes from the chemical toilets are transported to an offsite disposal facility. Effluent from the toilet facility at the switchyard is treated in a septic tank and transmitted to the soil through approved filter fields in the switchyard. 6

In order to comply with NPDES discharge criteria, waste water from the concrete batch plant is treated for suspended solids and high pH prior to its release into Upper West Creek.

Prior to plant operation, plant water conveyance and storage systems will be flushed. The final discharge will be in compliance with the limitations established by the EPA and the State of Louisiana.

River Bend Station will generate approximately 252,000 cu yd of construction wastes, 75 percent combustible and 25 percent noncombustionible. The combustible wastes (paper, cardboard cartons and wood boxes) are burned onsite and the resulting ashes together with noncombustible wastes (metals, concrete, fire retardant materials and roofing insulation) unsuitable for salvage are buried in a landfill. Permits to operate the incinerator and landfill were obtained through the Louisiana Air Control Commission and the State of Louisiana Department of Natural Resources, Office of Environmental Affairs, respectively.

The incinerator consists of an above ground burn pit and an air curtain destructor. The air curtain destructor swirls a curtain of air into the pit increasing the burning rate 3 to 4 times that of open burning. The air curtain also tends to trap the resulting smoke until it is consumed by the intense heat.

CHAPTER 5

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5.6 TRANSMISSION SYSTEM IMPACTS

5.6.1 Terrestrial

Operation of the transmission system is expected to have no significant effects on vegetation, wildlife habitat, land resources, or scenic values. Most of the woodland crossed by the corridors is discontinuous within privately owned land and therefore will provide little public access to these areas. Existing roads will be used almost exclusively for maintenance of the transmission lines.

Maintenance in the rights-of-way is scheduled as necessary. This work consists of mechanically removing tall growing trees within the rights-of-way as necessary to provide adequate clearance from the lines. Pesticides or herbicides will not be used to maintain the transmission system rights-of-way. By choosing the vegetative species for initial sowing upon completion of construction and by selectively removing undesirable species by hand cutting and/or mowing as needed, the growth of vegetation types that provide desirable low-growing ground cover, erosion control, improved appearance, and wildlife habitat are encouraged. 6

The rights-of-way will be inspected by plane and ground patrol periodically to ensure that each right-of-way is in proper condition for safe operation of the line.

The magnitude and significance of bird collisions with transmission lines are not well documented. Two recent bibliographies address avian mortality at man-made structures, which include transmission lines[1,2]. Because most incidences of bird strikes with wires probably go unnoticed and unreported, it is not clear how reported mortality compares to actual mortality. Human activity in areas where strikes are most frequent is often limited, and dead birds lying beneath wires are often concealed by dense vegetative cover. Predators and scavengers remove many of the injured or dead birds, further reducing the chance for discovery. Poor light conditions and inclement weather, particularly fog and wind, increase the possibility of bird strikes. In general, reported mortality levels due to bird collisions with transmission lines are low in comparison to those for certain other types of obstacles (e.g., television transmitting towers)[3].

Collision mortality with power lines appears to be more prevalent among larger birds, such as waterfowl and wading

birds[1]. Collisions also are more common where transmission lines are perpendicular to flight paths along migrational corridors or in areas where birds are involved in frequent local movements. Birds flying at high speeds at low altitudes are most susceptible. The River Bend transmission corridors do not cross large open wetlands, where the potential for strikes by low-flying birds is higher. Agricultural land is the primary land use in the transmission system area. Also, many of the lines follow existing transmission corridors. During long-distance migration, birds will usually be flying at higher altitudes and thus not encounter any transmission lines. The effects of a 500-kV transmission line which crossed the Columbia River was studied by the Bonneville Power Administration (BPA)[4]. Few "strikes" were reported for the lines crossing the river, although about 0.25 million waterfowl use the area annually for resting, feeding, and overwintering. In addition, it was found that the physical presence of the transmission towers discouraged the use of shoreline habitat by waterfowl and that they appeared to actively avoid the area[4]. The overhead groundwire studied by the BPA was equipped with 2-ft diameter aircraft marker balls and the towers were equipped with strobe lights. Both devices may have contributed to reducing the number of collisions recorded during the study.

6

Based on the results of the BPA study, the 500-kV line crossing the Mississippi River at the River Bend Station site is not expected to have a major impact on migratory waterfowl. The GSU towers are equipped with aircraft warning strobe lights which may reduce bird losses. In addition, no extensive open marshland is present in the area which would otherwise encourage use of the area by large numbers of waterfowl for resting, feeding or overwintering.

5.6.2 Aquatic

No endangered fish or aquatic invertebrate species have been reported for the routes of the transmission corridors (Section 2.4.2.2). Operation of the transmission system will not result in adverse impact to any important species or to aquatic ecosystems. All maintenance vehicles will cross streams and other water bodies utilizing existing bridges. Vegetation control procedures will be limited to nonchemical means. Maintenance of ground cover vegetation will minimize erosion and siltation into water bodies crossed by the transmission corridors.

5.6.3 Impacts to Man

The transmission lines for River Bend Station will be visible; however, the visual impact is expected to be minimal since most viewing times will be of short duration. In those areas where new lines are being added to existing corridors, the addition of new lines will not appreciably change the overall visual character.

The visual character of the area around Route II, Segment P to Q, in Baker, LA, may be somewhat altered by the introduction of new transmission lines and towers. However, the problem of incompatibility with the surrounding area is minimized since this route is immediately adjacent to existing transportation facilities, as discussed in Section 5.1.2.

The corridors and rights-of-way will be maintained as described in Section 5.6.1.

GSU has experienced no significant environmental problems associated with the electromagnetic or electrostatic effects

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References - 5.6

1. Weir, R. D. Annotated Bibliography of Bird Kills at Man-made Obstacles: A Review of the State of the Art and Solutions. Department of Fisheries and the Environment, Canadian Wildlife Series, Ontario Region, Ottawa, Canada, 1976.

2. Avery, M. L.; Springer, P. F.; and Dailey, N. S. Avian Mortality at Man--made Structures: An Annotated Bibliography. U.S. Fish and Wildlife Services, Office of Biological Services, 1978.

3. Lee, J. M., Jr. Effects of Transmission Lines on Bird Flights: Studies of Bonneville Power Administration Lines. Paper Presented at the Workshop on Impact of Transmission Lines on Migratory Birds, Oak Ridge, TN, 1978.

4. Willdam Associates Impact of the Ashe-Slatt 500-kV Transmission Line on Birds at Crow Butte Island: Postconstruction Study Final Report. Paper prepared for Bonneville Power Administration, U.S. Department of Energy, Portland, OR, 1982.

Tables 5.8-1 and 5.8-2 represent the calculated sound levels from the major noise sources only. The winter condition represents the worst case when the ambient sound levels are at their lowest and plant noise is more noticeable. The calculated level without tree attenuation represents the intruding noise level from the plant and does not include ambient noise.

The maximum expected increase in the ambient levels is 12 dB or less during the winter months when the noise flanks over the trees. When the noise does not flank over the trees but is attenuated through the trees, there should be no significant noise increase at the ambient survey locations.

Sound level measurements will be made when Unit 1 is in operation, to confirm estimated sound levels at the property line and at the measurement locations. The data acquisition will be similar to the two previous site noise surveys (Section 6.7).

5.8.2 Social and Economic

5.8.2.1 Direct Impact of Station Operation

The state of Louisiana exempts industrial plant structures from ad valorem taxes for a period of 10 yr after the plant is placed in service when the exemption is applied for and approved by the Louisiana Board of Commerce and Industry and the governor. An exemption has been approved for River Bend Station. This exemption does not include the property on which the plant is situated. In order to obtain this exemption, GSU agreed to give preference to material, equipment, and labor obtained in Louisiana or from Louisiana vendors, as discussed in Section 4.4.

Ad valorem taxes for River Bend Station - Unit 1, which become available to the parish after the exemption period expires, have been estimated for the first 5 yr following the exemption period. The estimated payments appear in Table 5.8-5 and apply only to River Bend Station and do not include taxes on other facilities or property, such as a substation or 500-kV line. 2

Estimated tax payments range from $11.968 million in the eleventh year of station operation to $7.204 million in the fifteenth year. These estimates are based on an estimated tax rate and a GSU assessment of 25 percent of fair market value while Cajun Electric Power Cooperative is assessed on 15 percent of fair market value. The tax rate will be determined by the parish. For the purpose of 2

estimating, the tax rate was set at 27 mills for the eleventh year of operation and reduced annually to a level of 19 mills in the fifteenth year because of the magnitude of revenue to the parish.

Effects of these revenues on West Feliciana Parish will depend on local planning of capital expenditures. The potential exists for the parish to gain significant benefits from the taxes generated by the operation of River Bend Station.

Estimated sales taxes to be paid during the first 5 yr of operation of Unit 1 are given in Table 5.8-6.

2 In addition to taxes, it is estimated that approximately one million (1985 dollars) of materials and supplies will be purchased annually within an 80-km radius of the site.

6 Because River Bend Station is essentially self-contained and isolated during normal facility operations, there will be no direct impacts to community facilities and services.

5.8.2.2 Impacts Associated with Operating Staff

2 Permanent local operating staff for River Bend Station Unit 1 is expected to number approximately 300. To the extent possible, operating personnel will be drawn from the local area. Other personnel are expected to settle in communities throughout the parishes surrounding River Bend Station, including the city of Baton Rouge and adjacent communities which are a 30- to 45-minute commute by automobile from the River Bend site. Highway improvements in progress on US Highway 61 sections between Baton Rouge and the site are expected to shorten the driving time for commuters. A 6.7 mi segment between Allson and Port Hudson is complete. Construction south of Thompson Creek is expected to be completed by 1983[12].

At the present time (as of the end of 1981), 50 operating employees are already on staff (Table 5.8-7 shows residence distribution for these employees); the remainder will be hired over the next 3 yr until a total staff of 300 is reached in 1985. This staggered hiring of personnel avoids 2 problems associated with typical relocation scenarios when a high demand for housing occurs in a short-time frame. Instead it allows for gradual assimilation of workers into regional communities.

Because small numbers of workers will be relocating at any one point in time, it is unlikely that workers will settle

in areas where housing is unavailable. Therefore, workers will be located throughout the region and will choose residential locations based on housing availability, property values, income levels, and amenities. The result is that the gradual influx of workers will conform to normal housing market turnover, rather than creating an artificial stress which must respond to their housing demands.

The resident locations of the present operating staff are primarily in Baton Rouge and suburban communities surrounding Baton Rouge (Baker, Zachary). These communities are of sufficient population size that they could easily absorb additional growth should the remainder of the operating staff settle into the area in similar proportions.

Some personnel and their families will probably settle in West Feliciana Parish, but no significant impacts are anticipated from their relocation. Although the town of St. Francisville does not have vacant housing stock, several areas in the parish are undergoing subdivision[13,14,15].

Existing public services in West Feliciana Parish, including police, fire, medical, and schools are able to absorb some growth. The West Feliciana Parish Hospital, with 22 beds, is located in St. Francisville. Specialized medical services are available in the city of Baton Rouge. Local fire fighters and police can call for assistance from the Baton Rouge Mutual Aid Society or for reassignment of state troopers from Troop A Headquarters in Baton Rouge. The Consolidated Water District which serves the parish and the sewage treatment plant for St. Francisville both have excess capacity.

As discussed in Section 2.5.2, recreational opportunities are available throughout the parish. Additional facilities for baseball and tennis are being constructed at the West Feliciana Parish Family Recreation area. Elementary, junior high, and senior high schools are located along US Highway 61 at Bains. Distribution of resident population

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CHAPTER 5

QUESTIONS AND RESPONSES

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QUESTION E290.10

Page 5.6-2 - The ER-OL discusses in general terms the potential hazards of transmission lines to birds. However, no mention is made of the special circumstance that Route I crosses the Mississippi River, an important flyway for migratory waterfowl. Evaluate the potential for bird kills created by this transmission line crossing the Mississippi River.

RESPONSE

The response to this request is provided in revised Section 5.6.1.

QUESTION E290.11

Page 5.6-1 states that vegetation will be encouraged that provides low ground cover, erosion control, improves appearance, wildlife habitat. Since no herbicides will be used, how will such vegetation be encouraged?

RESPONSE

The response to this request is provided in revised Section 5.6.1.

QUESTION E310.2 (5.8)

Identify the likely residential location (i.e., names of communities, counties) of the workers, by percent of total workers.

RESPONSE

The response to this question is provided in revised Section 5.8.2.2 and Table 5.8-7.

QUESTION E310.3 (5.8)

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 requirements of workers and their dependents. List facilities and services that would require expansion or additions to capacity. Provide the same information for any direct demands of the River Bend Station on the community services.

RESPONSE

6 The response to this request is provided in revised Sections 5.8.2.1 and 5.8.2.2.

QUESTION E310.4 (5.8)

Provide an estimate of the average annual workers payroll for Unit 1 (give the year in which the dollars are stated).

RESPONSE

The response to this request will be provided in a future supplement.

QUESTION E310.5 (5.8)

Provide an estimate of the average annual dollar amount of local purchases of materials and supplies resulting from the operation of Unit 1. 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 response to this request is provided in revised Section 5.8.2.1.

CHAPTER 6

ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

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6.2 RADIOLOGICAL

Parts 20 and 50 of 10CFR require that radiological environmental monitoring programs be established to provide data on measurable levels of radiation and radioactive materials in the site area. In addition, Appendix I to 10CFR50 requires the evaluation of the relationship between the quantities of radioactive material released in effluents during normal operation, including anticipated operational occurrences, and the resultant radiation doses to individuals from principal pathways of exposure. The River Bend Station environmental monitoring program will be conducted to determine the effectiveness of in-plant measures used for controlling the release of radioactive materials. Surveillance will be established to identify changes in the use of unrestricted areas (e.g., for agricultural purposes), to provide a basis for modifications in the monitoring programs for evaluating doses to individuals from principal pathways of exposure (identified in Section 5.4), and to better ensure that resulting radiation doses to the public will be minimal.

The results of the environmental radiological monitoring program are intended to confirm that the measured concentrations of radioactive materials and levels of radiation are not greater than federal limitations. The program provides measurements of radiation and radioactive materials in those pathways which lead to the highest potential radiation exposures of individuals, resulting from station operation.

The radiological monitoring program for the station will be conducted in two phases: the preoperational phase and the operational phase. The preoperational phase will be conducted during the 2-yr period prior to commercial operation. This phase is designed to determine background levels of radioactivity and to identify important pathways of exposure to man and biota. Following this period, modifications to the preoperational phase, resulting from experiences with procedures and equipment, will be incorporated into the operational phase to establish a more efficient monitoring program.

Guidelines for the radiological monitoring program are outlined in: 1) Regulatory Guide 4.1, 2) A Branch Technical Position on Radiological Environmental Monitoring Program Requirements, and 3) Radiological Effluent Technical Specification (RETS) for conformance to the provisions of 10CFR50, Appendix I.The radiological surveillance program at

the River Bend site will be based on these recommended programs[1,2,3].

6.2.1 Preoperational Monitoring

The preoperational environmental monitoring program will be instituted 2 yr prior to commercial operation. The purposes of this program are: 1) to measure background radiation levels and their variations along the anticipated critical pathways near the station; 2) to train personnel, and 3) to evaluate procedures, equipment, and techniques. The elements (sampling medium and type of analysis) of both the preoperational and operational programs will be essentially the same. The duration of the preoperational program and specific mediums sampled are as follows:

6 months	1 yr	2 yr
Airborne iodine	Airborne particulates	Direct radiation
Iodine in milk (while animals are on pasture)	Milk	Fish and invertebrates
	Surface water	Food products
	Drinking water	Shoreline sediment

The preoperational radiological monitoring program is summarized in Table 6.2-1. A map showing locations of monitoring stations and nearest receptors is provided in Figure 6.2-1. Figure 6.2-2 shows monitor locations within a 10 km radius of the station.

6.2.1.1 Sampling Locations, Techniques, and Frequencies

6.2.1.1.1 Atmospheric Discharges

Particulates

Locations for 8 indicator and 1 control continuous air monitoring stations have been selected. Three samples will be collected near site property boundaries (in different directional sectors) with the highest calculated annual average ground-level D/Q, i.e, north-northeast, north, north-northwest directions. Special interest samples will be collected from the following 5 locations:

1. Near the station meteorological tower, approximately 1 km west of the Unit 1 reactor containment.

Airborne particulate samples will be collected by drawing air at 3 x 10^{-2} cu m/min through a filter. After passing through the filter, the air passes through an iodine cartridge. The dust filters will be changed weekly or as required by dust loading, whichever is more frequent. After standing for 3 or 4 days to allow the daughter isotopes of radon and thoron to decay, the filters will be assayed weekly for gross beta activity and examined quarterly for gamma isotopes.

Airborne Iodine

The indicator and control sampling stations will utilize iodine cartridges, which will be replaced and assayed weekly for radioactive iodine-131.

6.2.1.1.2 Direct Radiation

Forty-five thermoluminescent dosimeter (TLD) stations will be established to measure offsite exposure due to direct radiation. An indicator station will be located in each of 16 compass directions surrounding the plant near the restricted area boundary. Another set of indicator stations will be located within a 6- to 10-km range of the site in each of the 16 compass directions. Ten stations will be located in areas of special interest, such as local population centers, schools, or hospitals. These special locations are listed in Table 6.2-2. Three other stations will be maintained as control stations located at a distance of 16, 18, and 20 km in the east, north, and southwest directions, respectively.

The indicator stations will contain two TLDs. One TLD will be replaced and read monthly, the other quarterly. The background stations will contain four TLDs. Two will be replaced and read monthly, the other two quarterly.

6.2.1.1.3 Ingestion

Milk

Milk appears to be the most direct and sensitive means for monitoring iodine-131 (the limiting isotope) in terrestrial pathways. The known locations of milk animals within a 5-km radius of the plant in 1980 are listed in Table 2.7-115 for dose assessment purposes. These locations, specifically 1,600 m NW, 1,400 m N, and 1,300 m N-NW, were identified in the Livestock Survey for Radiation Exposure Pathways within a 3 1/10 mi (5-km) Radius of GSU's River Bend Nuclear Power Plant, as prepared by Gulf South Research Institute (GSRI),

March 1980. In a subsequent effort to establish milk sampling stations for the monitoring program at these locations, it was determined that the milking animals no longer existed. According to the referenced Branch Technical Position on Radiological Environmental Monitoring Program Requirements, the maximum organ dose to the individual at the 5-km distance in the highest dose potential areas (W, WNW, NW, and NNW) was determined and found to be 0.30 (from cow milk) and 0.75 mrem (from goat milk) in the WNW location. Although this value is significantly less than 1 mrem/year, a milk surveillance program will be implemented. The number of sampling sites selected and their respective locations, and the location of the control sample site, differs from those recommended in the referenced Branch Technical Position. Justification for these alternates is provided.

4

Samples from the McKowen Dairy, located 6 km ESE from the station, will be obtained for gamma isotropic and iodine-131 analysis semimonthly when animals are on pasture, and monthly at other times. This sampling site is the only known location within the 5- to 8-km distance from which milk samples can be readily obtained.

A control sample from milking animals at the Louisiana State Penitentiary, located approximately 35 km (21.7 mi) NW of the station, will also be analyzed at the same frequency. This site, 35-km distant, is the most practical location from which to obtain control samples.

The milking animal locations used in the Appendix I analysis to evaluate the radiation dose to individuals from the cow-milk-man pathway (Section 5.4) differs from that used in this sampling program. The Appendix I analysis is based on the milking animal locations identified in the GSRI survey. The analysis remains applicable however, since these milking animals were present at the time the analysis was being performed and are the most conservative (highest dose potential) from the cow-milk-man pathway.

Food Products

Because of the limited availability of milk samples from within a 5-km radius, broadleaf vegetation (leafy vegetables, e.g., spinach) will be sampled monthly when crops are available from a 40-sq m onsite garden near the area of the highest calculated annual average ground-level D/Q, 1 km WNW from the station.

5

Similar vegetation will be sampled monthly as available from at least two additional gardens located offsite in the highest calculated D/Q areas (N, NW, and WNW sectors). Edible portions of the vegetables will be analyzed for gamma isotopic and radioiodine activity. Vegetables will be analyzed for gamma isotopic and radioiodine activity. Vegetables will also be sampled from a control location, the Louisiana State Penitentiary at Angola, 35 km northwest, at the same frequency. 6 5

The potential radiological impact of station operation on nearby vegetable crops, including the sweet potato, was reviewed. No waterborne pathway to man exists via the sweet potato. Irrigation and surface and ground waters in the station vicinity do not reach the vegetable croplands, since there is no use of Mississippi River water for sweet potato or other vegetable crop. 5

6.2.1.1.4 Liquid Discharges

Surface Water

River water will be collected at a control station approximately 4 km upriver from the plant liquid outfall, near the Louisiana Highway 10 ferry crossing. Samples will also be taken at a point about 4 km downstream, near Crown-Zellerback papermill, where the plant effluent is completely mixed with river water. Weekly grab samples will be composited monthly for gross beta and gamma isotopic analyses and quarterly for tritium analysis. 5

Drinking Water

A monthly composite sample of the raw intake at the first downriver water supply (Peoples Water Service Company - Bayou Lafourche, River Mile 175.5) will be collected and analyzed on the same schedule as that of surface water. Anslysis of gross beta and isotopic gamma activity will be performed. Since the calculated dose for the consumption of

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water is less than 1 mrem per year, composite analysis of iodine-131 will not be performed (Section 5.4). A composite analysis for tritium will be performed quarterly. Similar analyses of a sample from the upstream control station at the Louisiana Highway 10 ferry crossing, approximately 4 km upriver from the plant, will be performed. 5

Groundwater

Preoperational groundwater radioactivity data will be collected on a quarterly basis for one year from samples obtained from a downgradient Upland Terrace Aquifer well on site property. Control samples will be taken at the same frequency from an upgradient well in the Upland Terrace Aquifer. Gross beta, gamma isotopic, and tritium analyses will be performed on groundwater samples. 1 5

Shoreline Sediment

One sample of shoreline sediment will be selected for semiannual gamma analysis from the east bank of the Mississippi River near the Crown-Zellerbach papermill. This is upstream of shoreline areas with existing or potential recreational value and public access.

Fish and Invertebrates

One sample of each of the following commercially and/or recreationally important species will be taken semiannually or in season from a location downstream of the plant liquid discharge outfall for gamma isotopic analysis in edible portions: river shrimp (Macrobrachium ohione), blue catfish (Ictalurus furcatus); and freshwater drum (Aplodinotus grunniens). One sample of each of the same species from a control area upstream of the plant discharge will be taken and analyzed at the same frequency. 5

6.2.1.2 Radiological Sample Analyses

The radiological monitoring program will adhere to the standards outlined in Regulatory Guide 4.15, Revision 1, February 1979, for quality assurance of the surveillance methods used. Results will be confirmed through participation in the Environmental Protection Agency's Environmental Radioactivity Laboratory Intercomparisons Studies Program.

Typical detection capabilities for the environmental sample analyses are provided in Table 6.2-3.

6.2.2 Operational Monitoring

The purpose of the operational monitoring program is to monitor for radiological releases along pathways identified in the preoperational program. The operational program will begin when commercial operation begins and will continue throughout the life of the plant. Following the preoperational monitoring phase, program adjustments will be made to establish a more efficient operational monitoring program.

TABLE 6.2-1

PREOPERATIONAL AND OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Samples and Locations[1]	Sampling and Collection Frequency[1]	Type, Frequency, and Analysis
AIRBORNE			
Radioiodine and Particulates	Samples from 9 locations: 3 samples from locations near property boundaries (in different directional sectors) with the highest calculated annual average ground-level D/Q (NNE, N, NNW)	Continuous air sampler operation with filter collection weekly or as required by dust loading, whichever is more frequent	Radioiodine cannister: analysis weekly for I-131
	1 sample from the vicinity of station meteorological tower (approximately 1 km W)		Particulate sampler: gross beta activity following filter change[2], composite (by location) for gamma isotopic[3] quarterly
	1 sample from between the station and the river (near intake embayment) (2.8 km SSW)		
	1 sample from the community having the highest calculated annual average ground-level D/Q (St. Francisville, 5 km WNW)		
	2 samples from major communities 17 km ESE (Zachary) and 40 km SSE (Baton Rouge)		
	1 sample from a control location 20 km SW, in the least prevalent wind direction (Parlange Substation)		
DIRECT RADIATION	Measurements from 45 locations: 32 stations with two or more dosimeters to be placed in an inner ring near the restricted area boundary (in each of 16 directional sectors) and an outer ring in the 6- to 10-km range (16 sectors)	Thermoluminescent dosimeters (TLDs) changed monthly or quarterly	Gamma dose monthly or quarterly

TABLE 6.2-1 (Cont)

Exposure Pathway and/or Sample	Number of Samples and Locations[1]	Sampling and Collection Frequency[1]	Type, Frequency, and Analysis
	3 stations to serve as control locations, 16, 18, and 20 km distant in the E, N, and SW sectors, respectively		
	10 special interest locations designated in Table 6.2-2		
WATERBORNE			
Surface[4]	1 sample from about 4 km upstream of the plant liquid discharge outfall, near LA Hwy. 10 ferry crossing[5]	Weekly grabs composited over 1-month periods	Gross beta and gamma isotopic analyses monthly; composite for tritium analysis quarterly
	1 sample from about 4 km downstream of the plant liquid discharge outfall, near Crown-Zellerbach paper mill		
Drinking	1 sample from nearest downstream water supply (People's Water Service Co., River Mile 175.5)[5]	Weekly grabs composited over 1-month periods	Gross beta and gamma isotopic analyses monthly; composite for tritium analysis quarterly
Ground	1 sample from Upland Terrace Aquifer well upgradient from site	Quarterly grab	Gross beta, gamma isotopic, and tritium analyses quarterly
	1 sample from Upland Terrace Aquifer well downgradient on site property		
Sediment from River Shoreline	1 sample from along east shore of river near Crown-Zellerbach papermill	Semi-annual grabs (spring and autumn quarters)	Gamma isotopic analysis semi-annually
INGESTION			
Milk	1 sample from McKowen Dairy, 6 km ESE (nearest source of milk for consumption)[6]	Semi-monthly when animals are on pasture monthly at other times	Gamma isotopic and I-131 analyses semi-monthly when animals are on pasture; monthly at other times
	1 sample from animals at a control location (Louisiana State Penitentiary at Angola), 35 km NW		

TABLE 6.2-1 (Cont)

Exposure Pathway and/or Sample	Number of Samples and Locations[1]	Sampling and Collection Frequency[1]	Type, Frequency, and Analysis
Produce	1 sample of leafy vegetables grown in onsite garden near the site of the highest calculated annual average ground-level D/Q (1 km WNW)	Monthly when available	Gamma isotopic and I-131 analysis on edible portions monthly when available
	2 samples of leafy vegetables grown in offsite gardens in areas of the highest dose potential (N, NW, WNW sectors)[6]		
	1 sample of leafy vegetables grown at a control location (Louisiana State Penitentiary at Angola), 35 km NW		
Fish and Shellfish	1 sample from downstream of plant liquid discharge outfall, near River Mile 260.8, of each of the following: river shrimp, blue catfish, freshwater drum	Seasonally (e.g., summer for shrimp) when available or semi-annually	Gamma isotopic analysis on edible portions seasonally or semi-annually
	1 sample of the same species from an upstream control location		

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(1) The number, medium, frequency, and location of sampling may vary. At times it may not be possible or practical to obtain samples of the medium of choice at the desired location or time. In such cases, suitable alternative media and/or locations will be chosen for the particular pathway in question.

(2) Particulate sample filters will be analyzed for gross beta activity 24 hrs or more after sampling to allow for radon and thoran daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis will be performed on the individual samples.

(3) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility or from weapons testing fallout.

(4) The upstream sample will be taken at a distance beyond influence of the plant discharge. The downstream sample will be taken in an area beyond but near the mixing zone.

(5) The upstream surface water sampling location (near LA Hwy. 10 ferry crossing) will be used as a control for drinking water sampling.

(6) If milk-producing animals become available within a 5-km radius of the plant, up to 3 samples from these animals will be analyzed in lieu of the leafy vegetable samples from offsite gardens in high dose-potential areas.

In addition, flow and temperature instrumentation is provided for the continuous monitoring and recording of those parameters where required by NPDES permit.

Analysis parameters were selected on the basis of complying with NPDES Permit Nos. LA0042731 and LA0063886 for River Bend Station and River Bend Training Center, discharge limitations of current federal new-source effluent standards for the steam electric power generating point source category (40CFR423, dated October 8, 1974), and federal standards for secondary treatment (40CFR133, dated September 2, 1976). 6

The sampling program takes into account the intermittent nature of some of the chemical waste sources and the sampling frequencies required by the present NPDES permit. For example, sampling for residual chlorine in the cooling tower blowdown will be representative of periods of chlorination. Average and maximum free available chlorine will not exceed 0.2 mg/l and 0.5 mg/l, respectively, and discharge duration of either free available or total residual chlorine will not exceed 2 hr per unit per day. Also, only one unit will discharge at any given time. One cycle per week will be sampled for free available residual chlorine in compliance with the NPDES permit. The sample will be obtained when the injection cycle is complete, adding allowance for system residence time from the application points to the sampling point. The concentration of residual chlorine will be determined by analysis using approved methods. The daily average concentration during a calendar month will be computed by mathematically averaging the weekly determinations of concentration, weighted by flow value for each of the parameters having a measurement frequency of once per week.

The data for continuously measured flow and temperature will be time weighted and averaged to arrive at a daily average value. The daily average temperature will be computed and recorded on a daily basis as the average in a 24-hr period of temperatures at intervals not greater than 2 hr. The daily average flow during a calendar month will be computed by averaging the total flow recorded for each 24-hr period.

A composite (flow-weighted) sample from individual sources will be used for analysis and reporting of nonradioactive floor drains. 5

References - 6.6

1. Picking, L. and Smith, P. Report on Groundwater Investigations River Bend Station - Units 1 and 2: for Gulf States Utilities, Beaumont, TX. Stone & Webster Engineering Corporation, 1975.

2. Standard Methods for the Examination of Water and Wastewater. American Public Health Association, American Water Works Association, Water Pollution Control Federation, 13th edition, 1971.

TABLE 6.6-2 (Cont)

Effluent Stream	Parameter	Measurement Frequency	Sample Type	Monitoring Location
	pH	1/week	Grab	At treated liquid radioactive waste effluent discharge prior to entering cooling tower blowdown pipe
Excess Well Water	Flow	Continuous	Record	Before discharge to lined portion of West Creek
	Total suspended solids	1/week	Grab	At well water storage tank
	pH	1/week	Grab	At well water storage tank
Nonradioactive Floor Drain Waste	Flow	Daily	Estimate	Before combining with other sources for discharge to East and West Creeks
	Total suspended solids	1/week	Grab	Before combining with other sources for discharge to East and West Creeks
	Oil and grease	1/week	Grab	Before combining with other sources for discharge to East and West Creeks
	pH	1/week	Grab	Before combining with other sources for discharge to East and West Creeks
Treated Sanitary Waste (Station)	Flow	Daily	Estimate	In the effluent line before mixing with any other sources
	BOD (5 day)	1/week	Grab	In the effluent line before mixing with any other sources
	Total suspended solids	1/week	Grab	In the effluent line before mixing with any other sources

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TABLE 6.6-2 (Cont)

Effluent Stream	Parameter	Measurement Frequency	Sample Type	Monitoring Location
	pH	1/week	Grab	In the effluent line before mixing with any other sources
Noncontaminated Storm Water Runoff - East or West Creek	Flow	Daily	Estimate	At various pipeline discharge points to East or West Creek
Treated Sanitary Waste (Training Center)	Flow	Daily	Estimate	At discharge pipe to oxidation pond
	BOD (5 day)	1/month	Grab	At discharge pipe to oxidation pond
	Total suspended solids	1/month	Grab	At discharge pipe to oxidation pond
	Free available chlorine	2/month	Grab	At discharge pipe to oxidation pond
	pH	1/week	Grab	At discharge pipe to oxidation pond

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CHAPTER 7

ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS INVOLVING RADIOACTIVE MATERIALS

7.1 PLANT ACCIDENTS

This section discusses the radiological environmental impact of River Bend Station as required by 10CFR51, and as based on the accident assumptions provided in Environmental Standard Review Plan, Section 7.1 [1,2]. For each accident the following is provided:

1. A description of a representative type of accident appropriate for each accident class together with its basic assumptions

2. A determination of the radiological doses for each accident classification as it applies to River Bend Station. 2

Table 7.1-1 identifies the accidents considered.

Table 7.1-2 gives a summary of the radiological doses of each accident to a hypothetical maximum exposed individual at the exclusion area boundary, as defined in 10CFR100[3]

Table 7.1-3 summarizes the population doses for each accident at an 80-km radius utilizing the projected demography for the year 2000.

The demographic data and CHI/Q values at the 50 percent probability level that were used in these analyses can be found in Sections 2.5.1 and 2.7, respectively. Both the demographic data and CHI/Q values were based on the most recently available information at the time of analyses performance, thus providing more representative individual and population doses. 4

Calculations of doses to individuals and population are performed in accordance with the methods of NRC Regulatory Guide 1.3 and Regulatory Guide 1.145[4,5]. Population doses result from adjusting the individual dose by a factor incorporating population density and CHI/Q values for each specific sector.

7.1.1 Design Basis Accidents

7.1.1.1 Trivial Incidents Class

These incidents are included and evaluated under routine release in accordance with Appendix I to 10CFR50 in Section 5.4. 2

7.1.1.2 Small Releases Outside Containment Class

These releases include releases from small spills or leaks of radioactive materials outside the containment. These releases are included and evaluated under routine releases in accordance with Appendix I to 10CFR50 in Section 5.4. 2

7.1.1.3 Radwaste System Failures Class

7.1.1.3.1 Equipment Leakage or Malfunction

The source for this event is the largest radioactive storage tank which would be a rupture of an off gas system charcoal delay bed. This would cause the release of 25 percent of the average inventory on the bed. The source of activity for a bed is based upon the expected reactor coolant steam activities. The effective charcoal delay bed holdup time for krypton is 9.2 hr and for xenon is 211 hr. The duration of the accident is assumed to be 2 hr.

The calculated dose at the exclusion area boundary is given in Table 7.1-2. The integrated dose to the population is given in Table 7.1-3.

7.1.1.3.2 Release of Waste Gas Storage Tank Contents

This event is similar to the previous accident with the exception that 100 percent of the bed inventory is released to the atmosphere.

The calculated dose at the exclusion area boundary is given in Table 7.1-2. The integrated dose to the population is given in Table 7.1-3.

CHAPTER 10

QUESTIONS AND RESPONSES

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QUESTION E320.6 (10.4.2)

Provide the following:

A production cost analysis which shows the difference in system production costs associated with the availability vs unavailability of the proposed nuclear addition. Note the resulting cost differential should be limited solely to the variable or incremental costs associated with generating electricity from the proposed nuclear addition and the sources of replacement energy. If, in your analysis, other factors influence the cost differential, explain in detail.

a. The analysis should provide results on an annual basis covering the period from initial operation of the first unit through 5 full years of operation of the last unit.

b. Where more than one utility shares ownership in the proposed nuclear addition, the analysis should include results for the aggregate of all participants.

c. The analysis should assume electrical energy requirements grow at (1) the system's latest official forecasted growth rate, and (2) zero growth from latest actual annual energy requirements.

d. All underlying assumptions should be explicitly identified and explained.

e. For each year (and for each growth rate scenario) the following results should be clearly stated: (1) system production costs with the proposed nuclear addition available as scheduled; (2) system production costs without the proposed nuclear addition available; (3) the capacity factor assumed for the nuclear addition; (4) the average fuel cost and variable O&M for the nuclear addition and the sources of replacement energy (by fuel type) both expressed in mills per kWh; and, (5) the proportion of replacement energy assumed to be provided by coal, oil, gas, etc.

RESPONSE

The NRC, in a March 31, 1982, notice in the Federal Register, finalized a rule change to eliminate unnecessary litigation of issues from operating license proceedings. This rule eliminates consideration of the need for power and economics for NEPA purposes at the operating license proceedings, and applies to ongoing proceedings.