DOE/EA-0419

Environmental Assessment

UTILITY RETROFIT DEMONSTRATION USING CHIYODA THOROUGHBRED-121 FLUE GAS DESULFURIZATION TECHNOLOGY

A Project Proposed by
Southern Company Services, Inc.

August 1990

U.S. Department of Energy
Assistant Secretary for Fossil Energy

ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared by the U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act (NEPA), for a demonstration project that will be cost-shared by DOE and private industry under the Innovative Clean Coal Technology (ICCT) program. The proposed action is a flue gas desulfurization (FGD) project to be conducted at the Georgia Power Company's Plant Yates site in Newnan, Georgia.

1.1 BACKGROUND

In December 1987, Congress made funds available for the DOE ICCT Program by Public Law No. 100-202. This act provided funds for the purpose of supporting projects to demonstrate emerging coal utilization technologies that are capable of reducing atmospheric emissions of sulfur dioxide and oxides of nitrogen, and authorized DOE to conduct the program. On February 22, 1988, DOE issued a Program Opportunity Notice (PON) to solicit proposals for the conduct of cost-shared ICCT projects. The Southern Company Services (SCS) proposal for a retrofitted FGD system was selected for federal funding (along with 15 other proposals) from among 55 proposals received in response to the PON.

1.2 PURPOSE OF AND NEED FOR THE ACTION

This demonstration project is a fundamental contributor to achievement of the objectives of the Clean Coal Technology Demonstration Program (CCTDP). The CCTDP is a multi-phase effort consisting of five separate solicitations for clean coal technology projects intended to provide the U.S. energy marketplace with advanced, more efficient, reliable, and environmentally sound coal utilization and pollution control technologies. The ICCT program is the second solicitation of the CCTDP.

1.3 NEPA STRATEGY

An overall strategy for compliance with NEPA was developed for the ICCT program, consistent with the Council on Environmental Quality (CEQ) regulations (40 CFR Pt. 1500 et seq.) and DOE guidelines for compliance with NEPA (52 FR

47662). The strategy has three major elements, with the third element consisting of this environmental assessment.

The first element involves the preparation of a comparative programmatic environmental impact analysis (PEIA), based on information provided by the offerers and supplemented by DOE, as necessary. The PEIA was issued by DOE as a public document (DOE/PEIA-0002) in September 1988. This document analyzes the environmental consequences of the ICCT program and the technologies supported by the program compared with the "No Action" alternative. In the PEIA, the Regional Emission Database and Evaluation System was used to estimate the environmental impacts that are expected to occur in the year 2010 if each technology reaches full commercialization and captures 100% of its applicable market. The environmental impacts are compared with the "No Action" alternative under which it is assumed that the use of conventional coal technologies would continue through 2010 with new plants using conventional flue gas desulfurization controls as needed to meet the New Source Performance Standards promulgated by EPA (40 CFR Pt. 60) pursuant to the Clean Air Act. In addition, analyses were made of the following: (1) the areas where environmental information was incomplete or unavailable; (2) the trade-offs between short-term uses and long-term productivity of the environment; and (3) the irreversible and irretrievable commitment of resources.

The second element of DOE's strategy for NEPA compliance involves the preparation of a pre-selection, project specific environmental review based on environmental data and analyses that offerers supplied to DOE as a part of each proposal. This analysis contains a discussion of the site specific environmental, health, safety, and socioeconomic issues associated with the demonstration project. It includes a discussion of the advantages and disadvantages of the preferred and alternative sites and/or processes reasonably available to the offerer. A discussion of the environmental impacts of the proposed project and a list of permits that must be obtained to implement the proposal are included. The document describes options for controlling project discharges and for the management of solid and liquid wastes and assesses the risks and impacts of implementing the proposed project. Because this pre-selection, project specific environmental review contains proprietary and/or confidential business information provided to DOE in the proposal, this document is not publicly available.

1.4 SCOPE OF THIS EA

The technology proposed for demonstration is the Chiyoda Thoroughbred (CT-121) FGD process. The CT-121 process has been previously tested in both the United States and Japan. The process involves conventional limestone FGD chemistry, forced oxidation and gypsum crystallization in one vessel. The CT-121 technology will be operated for a period of approximately 24 months.

Site specific impacts associated with the project include the following: changes in air quality due to reduced levels of SO_2 and particulate matter in the treated flue gas which is emitted through a temporary stack, and the production of a new gypsum solid waste.

2.0 THE PROPOSED ACTION AND ITS ALTERNATIVES

2.1 THE PROPOSED ACTION

The proposed action involves the design, installation and operation of the CT-121 process using medium sulfur coal at Georgia Power Company's Plant Yates site in Newnan, Georgia. The purpose of the project is to demonstrate that significant reductions in SO_2 emissions from coal-fired power plants can be achieved through use of the CT-121 technology. Also, the project will assess numerous factors associated with CT-121 operation. The project has been proposed by SCS, the engineering branch of the Southern electric system. The Southern electric system consists of SCS and five operating companies serving Alabama, Georgia, Mississippi and Florida.

2.1.1 Site Description

2.1.1.1 Site Location

The project will be undertaken at Plant Yates which is located in a rural area approximately 10 miles northwest of the city of Newnan in Coweta County, northwestern Georgia (see Figure 2-1). The plant site consists of 2,333 total acres. The active portion of Plant Yates lies along the eastern bank of the Chattahoochee River. Land use in the vicinity of the plant is primarily rural and scattered residential in nature. Commercial and light industrial (textile) facilities are situated within a five mile radius of the plant, together with agricultural lands.

Vehicle access to the plant is provided by a 2-lane roadway, U.S. Alternate 27. Traffic count data (1989) obtained from the Georgia Department of Transportation shows approximately 6,000 vehicles use this roadway daily in both directions within the site vicinity.

2.1.1.2 Existing Plant Operation

Plant Yates is part of the Georgia Power Company system which provides electrical power throughout the state of Georgia. Approximately 450 employees

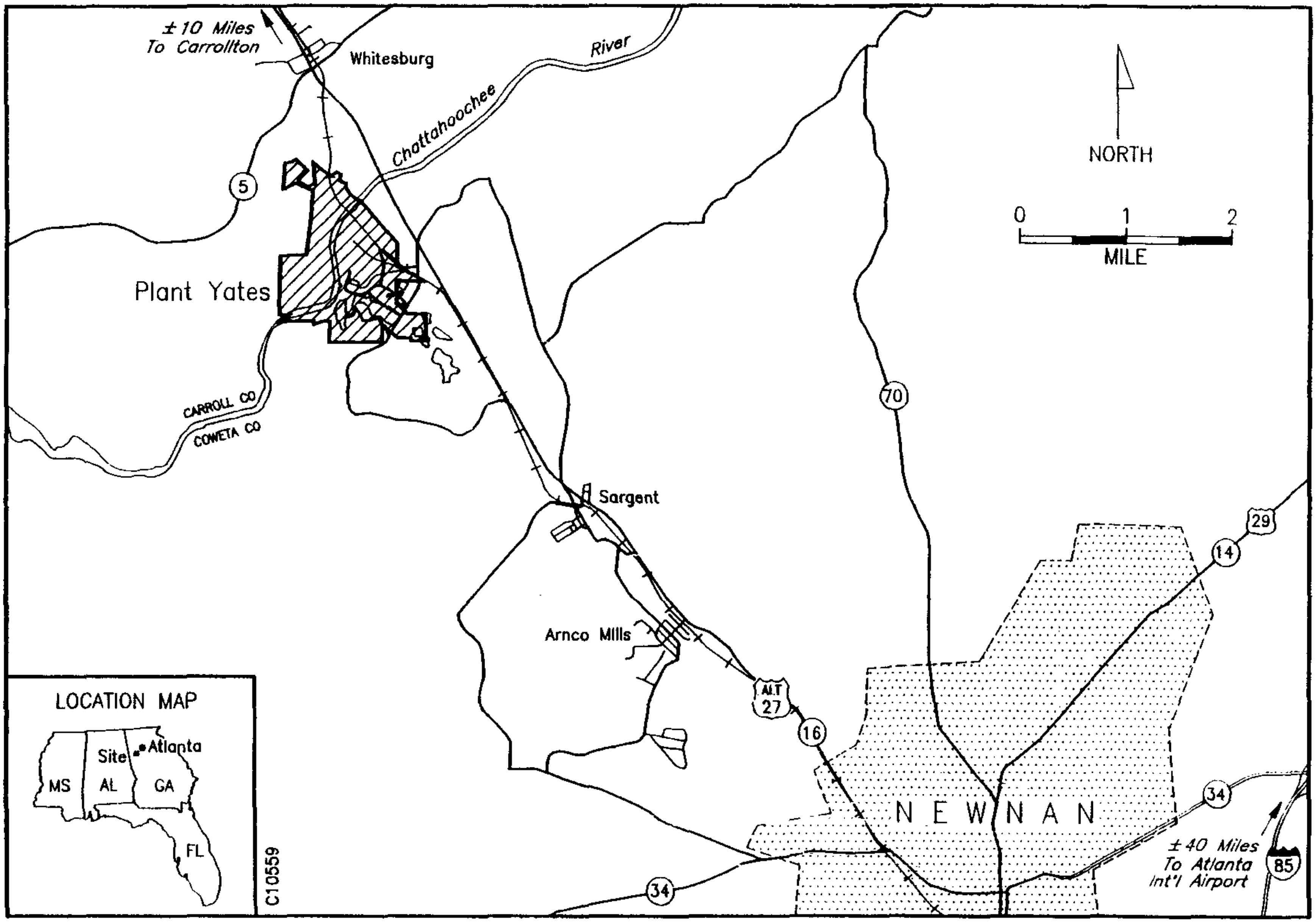

Figure 2-1. Location Map: Plant Yates

work at the site. The plant has seven generating units in operation with a total installed capacity of 1,250,000 kilowatts (kW). Figure 2-2 presents a general site layout of the plant. Units 1 through 5 are located in one building that features a common 825-foot stack from all five units. These units, which use cooling water from the Chattahoochee River, are operated as intermediate load units. Units 6 and 7 are housed in a separate building from Units 1 through 5 and are operated as base load units. A common 800-foot stack is used for Units 6 and 7; mechanical draft cooling towers are also in operation. All units at the plant are equipped with electrostatic precipitators.

Coal utilized by Plant Yates is typically a 50-50 blend of Arch Mineral and Old Ben coals from the Illinois Basin. Coal burn analyses during the first ten months of 1988 indicate an average coal sulfur content of 2.04 percent. (The target coal sulfur content for the demonstration project will be 2.5%.) Raw water for process needs is drawn from the Chattahoochee River at two intake structures. In 1988, the facility diverted an average volume of 481 million gallons per day (MGD) of surface water. Process water is discharged via permitted outfalls to the Chattahoochee River, and no changes in process water composition are expected from this project. Plant Yates has been issued a NPDES Permit by the Environmental Protection Division of the Georgia Department of Natural Resources (DNR) which authorizes the following outfalls: intake screen backwash, condenser cooling water discharge, ash transport water discharge, sump emergency overflows, cooling tower blowdown, and the final plant discharge. Effluent quality requirements are summarized in Table 2-1. There are four water wells on-site for potable water purposes.

Solid waste, in the form of bottom ash and fly ash, is generated at approximately 35,000 tons and 140,000 tons per year, respectively. The ash is sluiced to a series of wet disposal ponds. Some ash is continually removed from the ponds and either sold for off-site uses or disposed of in an on-site ash landfill. Permit conditions imposed by Georgia DNR for this ash landfill prohibit the disposal of hazardous or putrescible wastes and require typical engineering controls such as compacting of material, utilizing clean earth cover monthly, grading and drainage to minimize run-on, etc. The permit stipulates

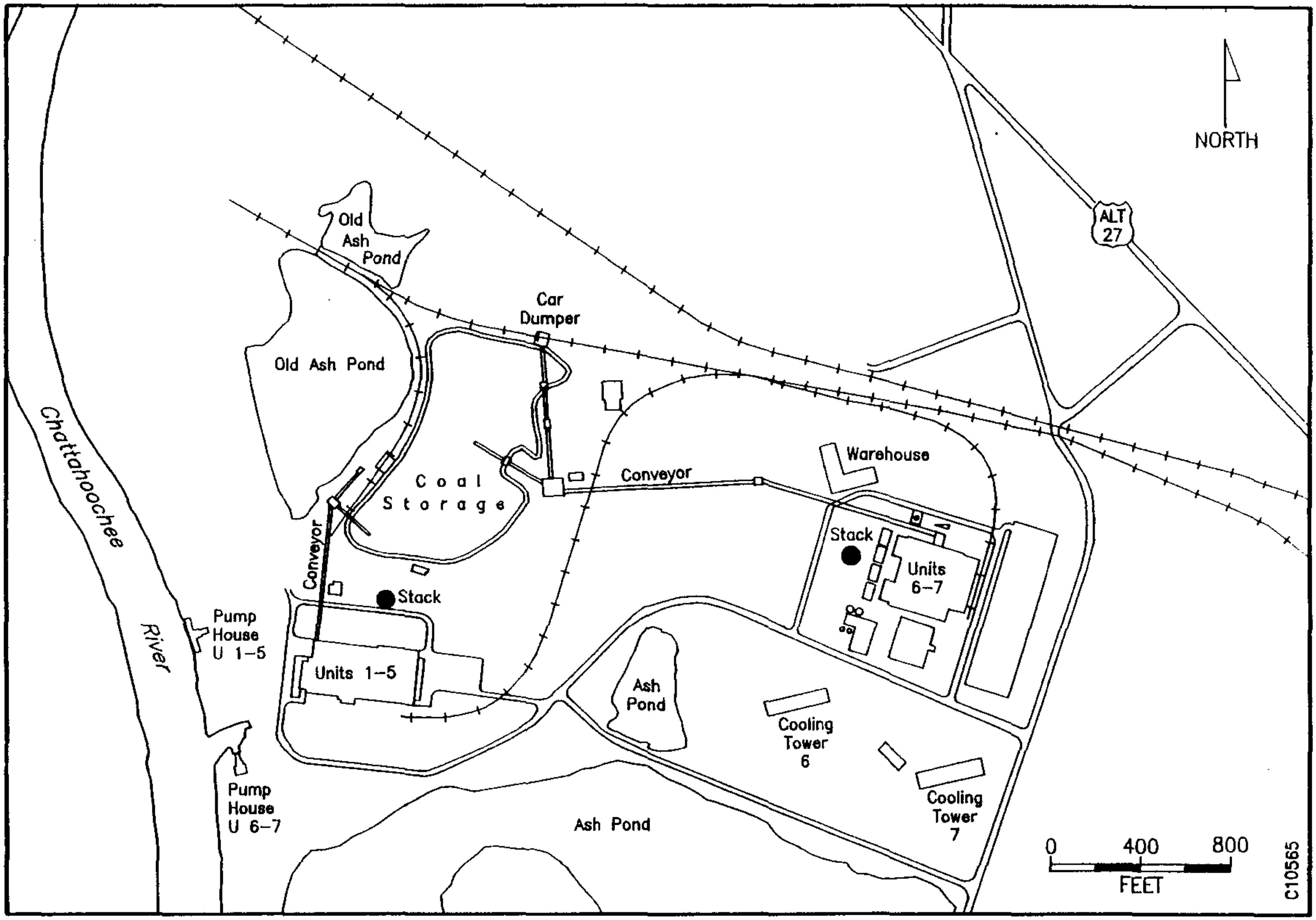

Figure 2-2. Plant Yates Site Layout

TABLE 2-1

PLANT YATES NPDES PERMIT LIMITATIONS (SUMMARY)

Outfall/Parameter	Limitations (mg/L)
Condenser Cooling Water	
Total Residual Chlorine	0.20
Flow	NA
Ash Transport Water	
Total Suspended Solids (TSS)	30 (daily average)/ 100 (daily maximum)
Oil and Grease	15/20
Flow	NA
Building Sump Overflow	
TSS	30/100
Oil and Grease	15/100
Flow	NA
Cooling Tower Blowdown	
Free Available Chlorine	0.20 (average)
Total Chromium	0.2 (daily maximum)
Total Zinc	1.0 (daily maximum)
Flow	NA
Final Plant Discharge	
pH, S.U.	6-9/monthly grab
Flow	NA

NA = Not Applicable (although there is an annual reporting requirement).
S.U. = Standard Unit.

closure methods; and requires the ash landfill be operated in a manner to prevent air, land, or water pollution and public health hazards or nuisances.

2.1.2 Engineering Description of the Proposed Action

The CT-121 process utilizes an absorber, the Jet Bubbling Reactor (JBR), to combine conventional FGD chemistry, forced oxidation and gypsum crystallization in one vessel. One advantage CT-121 operation offers over conventional FGD is that it is a less complicated process that offers the benefits of reduced capital and maintenance costs. This project will provide a technology demonstration that involves utilization of a large scale fiberglass reinforced plastic (FRP) vessel and process operation with high fly ash loading at a coal-fired power plant.

The flue gas from Unit 1 of the powerplant will be treated by the CT-121 system. Unit 1 has a 100 MW capacity and generates approximately 12% of the total flue gas at the plant. Project requirements will include the following components: construction of the FRP reactor vessel, construction of a new stack for venting emissions from the JBR, construction of limestone stacking and processing facilities, and management of the gypsum solid waste produced by CT-121 operation.

Six commercial systems of the CT-121 process have been installed in Japan. JBR modules capable of treating flue gas from a 225 megawatt (MW) plant have been built by Chiyoda. A 23 MW CT-121 prototype was operated at Gulf Power Company's Plant Scholz in Florida in the late 1970's. This technology is also being used at the Abbott Plant in Illinois with a JBR sized for a 45 MW throughput of flue gas. Operation of plants in both the United States and Japan have shown that SO_2 emissions removal of 90% is achievable, and that significant removal of particulates occurs in the JBR.

The key element of the proposed action will be treatment of flue gases through the CT-121 JBR to effect SO_2 removal. The entire flue gas stream from Unit 1 will be treated. Implementation of the process will require modifications to Plant Yates to direct flue gas through the JBR. A process flow diagram and a preliminary site plan showing the locations of process equipment are included as Figures 2-3 and 2-4. The JBR to be used at Plant Yates will be a 42-foot tall by 42-foot diameter fiberglass, agitated tank. The flue gas from Unit 1 will enter the JBR in a plenum chamber. The gas will then be forced into the jet bubbling (froth) zone of the tank, where it will bubble through a limestone slurry which will absorb the SO_2. The gas will then flow upward through the risers, where most of the entrained liquid in the gas will disengage from the stream in a second plenum. The cleaned gas will exit the JBR through a mist eliminator to a temporary 250 foot tall fiberglass stack. Within the reaction zone, injected air will oxidize SO_2 absorbed by the limestone to form calcium sulfate (gypsum). Slurry density in the tank will be controlled by pumping slurry from the bottom of the JBR to a remote gypsum slurry (surge) station and then to the gypsum stacks (piles).

Particulate removal efficiency measured at demonstration and commercial Chiyoda Thoroughbred-121 coal-fired units has been better than 99 percent. In all but one case (Toyama), the electrostatic precipitators were either absent or out of service at the time of testing. Prescrubbers, both venturi and non-venturi types, were included in all of the processes, primarily to reduce the chloride content of the gas entering the JBR.

The prescrubber (precooler) at Plant Yates will be a spray column, and in two of the four proposed test periods, the prescrubber will not be in service. Significant removal of particulates occurs in prescrubbers, and these devices are most effective in removing the larger particulates (Radian, 1980). The JBR has been shown to be more efficient than the prescrubber (venturi) in removing the smaller particles (Radian, 1980) and also is very effective in removing larger particles (Gilbert et al., 1988). The estimated particulate loading in the flue gas to the CT-121 unit at Plant Yates will range from 11,000-12,000 mg/Nm^3 (milligrams per normal cubic meter conditions) during the high particulate loading tests without pre-scrubbing to 80 mg/Nm^3 for the low particulate loading case. Design material balances indicate that the particulate loading in the inlet to the JBR will range from 0.1 lb/MMBtu during the low fly ash loading Test Period 1 (ESP and pre-scrubber) to 11.6 lb/MMBtu during the high fly ash loading Test Period 4 (no ESP, no prescrubber). When the prescrubber is operational,

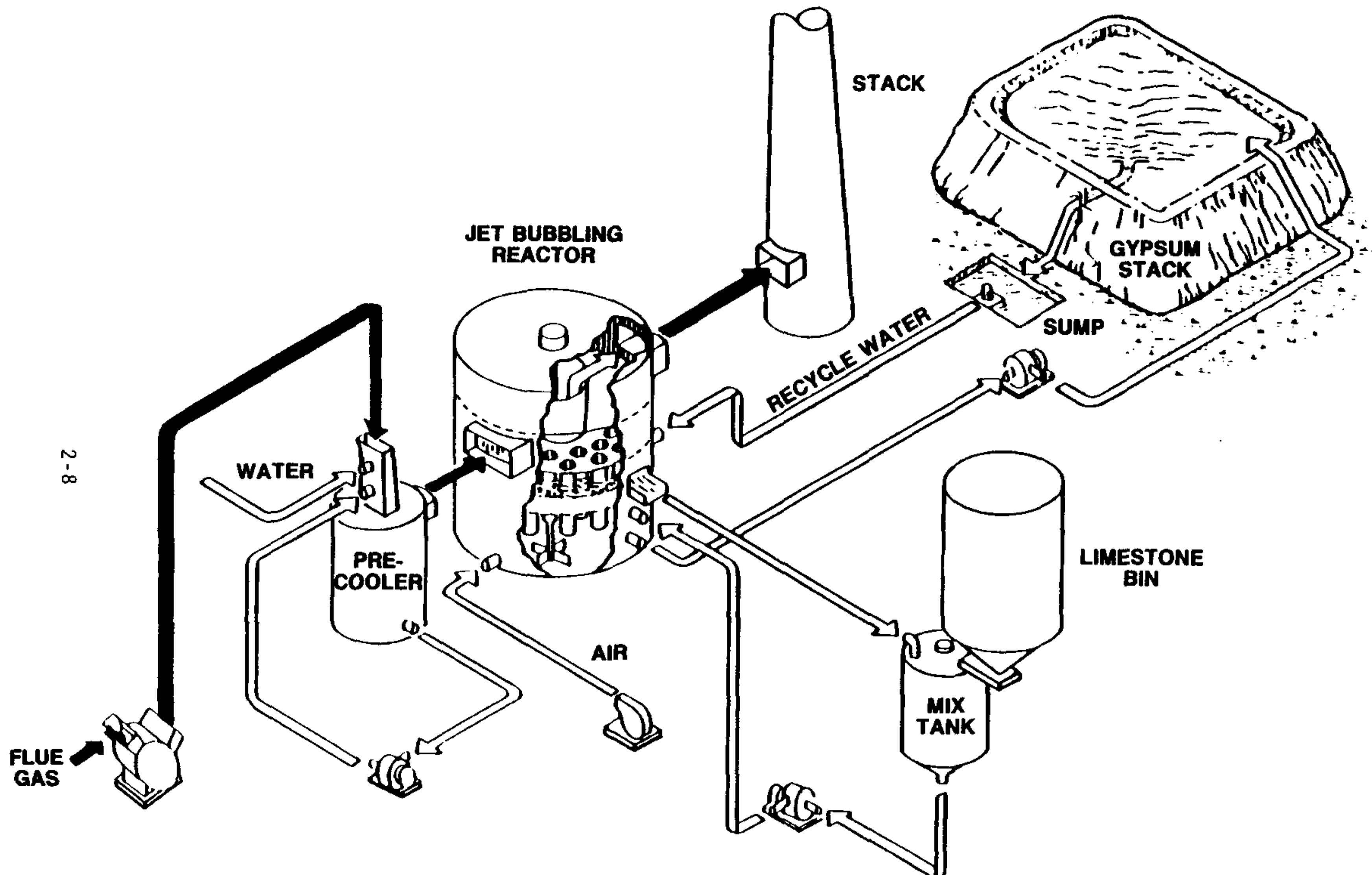

FIGURE 2-3

PROCESS FLOW DIAGRAM OF COMMERCIAL CT-121 PROCESS

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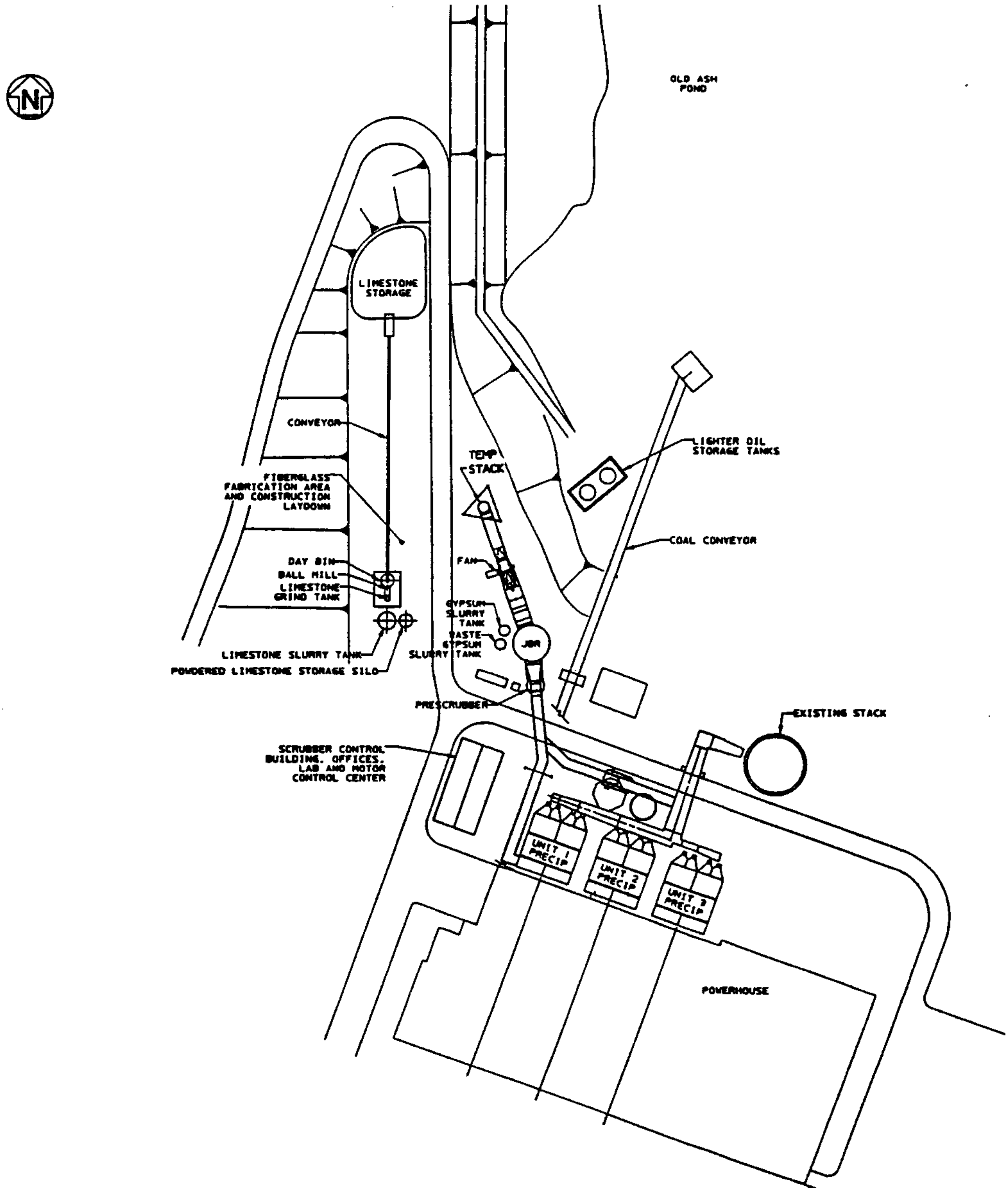

Figure 2-4. Plant Yates CT-121 Proposed Layout

chlorides and particulates collected by this unit will be directed to the JBR with eventual disposition to the gypsum stacks.

The CT-121 process will require a limestone feed system to be constructed on-site. Limestone from available suppliers will be transported into Plant Yates by truck and/or rail, and delivered to a 30-day storage pile. If trucks are used, approximately 5 per day will be required. Runoff from the limestone storage area will be collected and piped to a waste gypsum tank, and then directed to the gypsum stacks. Conveyors for limestone transport will be covered. An 18 inch wide by 1 foot deep concrete trench will be located at grade around the limestone process area to collect stormwater and any limestone spills. Containment structures will be placed around all process equipment, and spills or runoff will be routed to the gypsum stacking area via the waste gypsum tank.

On-site solids disposal will be utilized for the gypsum material produced during the CT-121 process. Two types of slurries will require management. A gypsum slurry will be generated when the ESP is in operation, while a gypsum/fly ash slurry will be produced when the ESP is removed from service to test the particulate removal ability of the JBR. Separate stacks will be constructed for the gypsum and the gypsum/fly ash solids and each area will be constructed with a liner for groundwater protection. It is estimated that the gypsum stack will occupy a three acre area approximately 20 feet high, while the gypsum/fly ash stack will occupy a five acre area approximately 30 feet high. Gypsum generation during the project is estimated at 28,600 tons with gypsum/fly ash generation estimated at 92,600 tons (dry weights). Supernatant liquor and accumulated rainfall from the stacks will be collected for reuse in the CT-121 process.

A waste characterization study will be conducted for both the gypsum and the gypsum/fly ash mixture produced during the demonstration program. The results of the characterization study will be evaluated and compared with results previously reported for FGD gypsum and FGD gypsum/fly ash characterized during previous studies at Plant Scholz (Radian, 1980). Recommended properties for use in design of full-scale facilities, as well as implications with regard to material and water balances, sizing and layout, and seepage and stability analyses will also be addressed in this gypsum characterization study. Process liquor will also be analyzed for compositional purposes. A waste utilization study will be performed to ascertain the marketability of the solid waste produced by CT-121 operation.

2.1.2.1 Description of Project Phases

Six months are required for project design activities, with construction and installation time estimated at twenty-two months. Operation of the CT-121 system will span an approximately twenty-four month period. Continuous process evaluation for various operational and environmental parameters will be conducted throughout the operational phase. During the operational phase, variations in the process involving use of the ESP and prescrubber will be implemented to assess the particulate removal capabilities of the CT-121. These test phases along with estimated time frames are shown below:

Test Period	Operation Duration (Months)	Major Test Items	ESP In Service	Prescrubber In Service
1	3	Startup, baseline	Yes	Yes
2	6	Baseline w/o pre-scrubber	Yes	No
3	6	High particulate test baseline	No	Yes
4	9	High particulate	No	No

Air emissions from the project site are expected to remain within permit limits during all test periods. Air quality impacts are discussed in Section 4.1.

Upon completion of the twenty-four month operational period, SCS may maintain the equipment for further testing or will decommission the project. Closure of the solid waste management area will include grading and planting of vegetation over the closed area. Decommissioning activities are estimated to require a four month time period.

2.1.2.2 Description of Installation Activities

Approximately 120 construction workers will be required at the peak of the twenty-two month construction period. The following activities will take place: erection of fiberglass manufacturing equipment for subsequent on-site construction of the JBR; earthwork for the process area and waste management area; and erection of the demonstration project equipment and control facilities. The fiberglass stack and the FRP flue gas duct will be manufactured off-site. Ershigs, Inc., a national fiberglass contractor, will manufacture the JBR on-site in approximately eight to ten weeks.

2.1.2.3 Project Source Terms

Source terms for the project include those aspects of the proposed action that may affect the natural, physical, and socio-economic environment. The major CT-121 process source terms identified include the following: SO_2, particulate matter, and halogen (chloride and fluoride) emissions from Unit 1; erection of a new stack for process emissions; air emissions from a wet scrubbing system with the potential for acidic liquid fallout and a visible plume; and on-site disposal of gypsum waste generated. Each of these issues will be studied throughout the project. This environmental assessment will focus primarily on the above listed source terms. Other source terms associated with the project are described below.

The CT-121 project will be implemented at an existing power plant, thereby limiting impacts from source terms associated with land use, labor, utilities and fuel. The land requirements to demonstrate the project encompass approximately five acres for the process equipment and limestone storage area, and approximately eight acres for gypsum stacking. This land is readily available on the 2,300+ acre site. Coal supply, storage and handling requirements during the project will not change from existing conditions described previously. Current cooling and process (makeup) water requirements drawn from the Chattahoochee River are estimated at 481 MGD. An addition of 0.14 MGD will be required during the CT-121 project. Additional process power requirements for the demonstration project will total 10.6 million kilowatt hours per year, or approximately 1.8% of Unit 1 capacity. The use of limestone will be a new resource requirement at Plant Yates. Project sponsors estimate that over the two year operating period for the demonstration project, 23,300 tons of limestone will be used per year, for a total of 46,600 tons over the life of the project.

2.2 ALTERNATIVES TO THE PROPOSED ACTION

The alternatives discussed in the following sections were considered through all three elements of the NEPA strategy presented earlier in Section 1.3. No action was considered in the programmatic analysis, as well as in the preparation of this document. Alternative sites and alternative technologies for the CCTDP in general were incorporated in the pre-selection review. Alternative sites and technologies for this particular proposed action were considered in the preparation of this document. A brief summary of the alternatives is provided below.

2.2.1 No Action

No action with regard to the proposed project would be equivalent to a decision by DOE to not follow through on its selection of the SCS proposal for cost-shared funding. It is likely that this promising environmental control technology would not be tested as currently proposed. Therefore, the project would not contribute to the accomplishment of the objective of the ICCT - to demonstrate the economic feasibility and environmental acceptability of technologies exhibiting the potential to reduce emissions of sulfur dioxide and oxides of nitrogen from coal combustion when commercialized.

2.2.2 Alternative Sites

In its selection of proposals for funding by the ICCT program, DOE considered the technical and environmental merit of the proposals. In the PON, DOE did not define limits for the location of the proposed demonstrations; therefore, proposals were received for projects located across the United States.

The available population of SCS coal-fired electric utility plants throughout Alabama, Georgia, Mississippi, and Florida having the appropriate characteristics and boiler configuration to be suitable for retrofit with CT-121 technology were surveyed. The result of the survey indicated that there were 29 operational fossil-fired generating stations under SCS purview. After applying several selection criteria, including minimal environmental impact, avoidance of floodplain and wetland disturbances, economic reasonableness, and other operational factors such as retrofit requirements, Plant Yates was selected. The 100 MW Unit 1 at Plant Yates will allow a commercial-scale demonstration test which will also be cost effective. This unit is currently authorized to burn up to 3% sulfur coal which exceeds the demonstration target coal concentration of 2.5% sulfur content. There is ample space present within the plant to accommodate the new process equipment and the waste generated. No environmental factors are associated with the site that would preclude project implementation.

2.2.3 Alternative Technologies

The proposed action is to demonstrate the CT-121, a wet FGD process that removes SO_2 and particulates, and produces a salable by-product. Other FGD technologies could be installed at Plant Yates to achieve similar environmental objectives. The proposed process was selected because of its potential for economic and environmental improvements over existing technology.

Commercially available FGD processes for use with high-sulfur coals include conventional wet limestone, forced oxidation limestone, Wellman-Lord, Saarberg-Holter, dual alkali and wet lime. These systems are generally comparable in sulfur removal performance; the major differences are in the areas of costs, sludge characteristics, system reliability and chemical utilization.

In the conventional wet limestone process, a limestone slurry solution is used in a spray tower to absorb SO_2, forming a calcium sulfite/sulfate sludge. The advantages of this system are its demonstrated performance in a wide range of applications and in its use of an abundant and low-cost absorbent. The system can generally meet the SO_2 reduction requirement for all types of coals, but is subject to problems of equipment scaling, plugging, corrosion and erosion during operation.

Another second-generation, wet FGD system was selected for demonstration at another site by the ICCT Program. This system, proposed by Pure Air and developed by Mitsubishi Heavy Industries, uses a co-current spray tower instead of a JBR. In the system proposed by Pure Air, oxidation of the $CaSO_3$ takes place in the enlarged base of the spray tower.

The Pure Air project and many commercial wet FGD systems have features similar to the CT-121 process. However, the JBR-FRP construction and combined SO_2 and particulate removal system are unique to the CT-121 process.

3.0 EXISTING ENVIRONMENT

3.1 ATMOSPHERIC RESOURCES

3.1.1 Local Climate

Plant Yates is located approximately 40 miles southwest of Atlanta, Georgia. The plant's location results in a moderate summer and winter climate. Measurable snowfall occurs during less than one-half of the winter and is relatively insignificant. Climatological data is presented in the Environmental Information Volume (Ref. 9).

3.1.2 Ambient Air Quality

Plant Yates is in the Metropolitan Atlanta Intrastate Air Quality Control Region (AQCR). This area is in attainment under the National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide, and lead. The Atlanta AQCR (predominantly the City of Atlanta area) has been designated a nonattainment area for ozone. Table 3-1 compares air quality monitoring results in the Atlanta AQCR with the federal and state standards for each of the criteria pollutants.

The air quality monitoring data most closely associated with Plant Yates comes from an ambient air monitoring station near Newnan which was established by the Georgia Department of Natural Resources (DNR) and operated from 1982 through 1985. Table 3-1 includes the highest concentrations of particulates and SO_2 measured during 1985 at the Newnan location, and the most recent data available for other stations. Concentrations measured at the Newnan station were well within the allowable federal and state standards.

3.2 LAND RESOURCES

Land use in the vicinity of the plant is primarily rural and scattered residential in nature. Commercial and light industrial (textile) facilities are

TABLE 3-1
COMPARISON OF AIR QUALITY MONITORING RESULTS
IN THE ATLANTA AQCR WITH FEDERAL AND GEORGIA AIR QUALITY STANDARDS

Pollutant	Averaging Times	Standard: Federal	Standard: Georgia	Highest[a,b] Concentration
Sulfur Dioxide	3 hour	1,300 ug/m³[c]	1,300 ug/m³	608 ug/m³[d]
	24 hour	365 ug/m³	365 ug/m³	165 ug/m³[d]
	Annual	80 ug/m³	80 ug/m³	24 ug/m³[d]
Nitrogen Dioxide	Annual	100 ug/m³	100 ug/m³	56 ug/m³[e]
Ozone	1 hour	235 ug/m³	235 ug/m³	398 ug/m³[f]
Carbon Monoxide	1 hour	40,000 ug/m³	40,000 ug/m³	12,939 ug/m³[g]
	8 hour	10,000 ug/m³	10,000 ug/m³	6,870 ug/m³[g]
Particulates (below 10 microns)	24 hour	150 ug/m³	150 ug/m³	86 ug/m³[d]
	Annual	50 ug/m³	50 ug/m³	39 ug/m³[d]
Lead	Month	1.5 ug/m³	1.5 ug/m³	0.08 ug/m³[h]

[a]Source: 1985 Air Pollution Measurements of the Georgia Air Quality Surveillance Network. Environmental Pollution Division, Air Protection Branch, Georgia Department of Natural Resources.

[b]Source: 1988 Air Pollution Measurements of the Georgia Air Quality Surveillance Network. Environmental Protection Division, Air Protection Branch, Georgia Department of Natural Resources. (Assuming 25°C for parts per million to ug/m³ conversion factor.)

[c]Secondary standard.

[d]Newnan Station, Newnan, Georgia (1985).

[e]Georgia Tech Power Substation, Atlanta, Georgia (1988).

[f]S. DeKalb College, Decatur, Georgia (1988).

[g]Brookwood, Atlanta, Georgia (1988).

[h]Geography Building, Carrollton (1988).

situated within a five-mile radius of the plant in the small towns of Whitesburg and Sargent.

3.2.1 Soils

Surface soils and subsoils are tan and white silty sands, sandy clays, and gray-brown sandy micaceous silts. The upland soils that are weathered from the granite, gneiss, and mica schist are from the Pacolet-Wedowee Association. The lowland soils in the northern part of the Plant and along the river contain alluvial sediment, are more gently sloping, and contain more loam. Soil thicknesses at the site range from approximately 7 to 63 feet and average approximately 31 feet.

The Soil Conservation Service describes two soil series in the Plant Yates area; the Cecil series and the Pacolet series. The Cecil series is characterized by a deep, well drained, moderately permeable soil, formed on material from granite, gneiss, and mica schist bedrock. The soil is described as a sandy loam, which is clayey and kaolinitic. It has a moderate rate of water transmission and its available water capacity is medium. Because the soils are clayey, they have an infiltration rate that is a limiting factor for septic tank systems. Soil borings from the Plant Yates area indicate that the weathered bedrock is not found until depths of 7 to 63 feet, giving much thicker soils than the typical Cecil soils.

The Pacolet series is commonly found in the same landscapes as the Cecil series. It is also a deep, well drained, moderately permeable soil that has formed in place on granites, gneisses, and mica schists. The Pacolet series has the same moderate water capacity and transmission as the Cecil series, and is also called a clayey, kaolinitic soil. Infiltration rates are slow, and this is a limiting factor for septic systems. Again, soil borings in the area show that soil thicknesses may be as much as 7 to 63 feet, giving much thicker soils than the typical Pacolet series.

3.2.2 Geology

Plant Yates is located in the southern Piedmont region of Georgia, immediately south of the Brevard Fault Zone. None of the plant property actually lies on the Brevard Zone, an inactive fault. The Plant Yates site has a seismicity index of 1, based on National Earthquake Hazard Reduction Program (NEHRP) criterion. Based on both the New Madrid and Charleston eathquakes the plant site would fall in an area between contours VI and VII on the Modified Mercalli scale. High-grade crystalline metamorphic and igneous rocks underlie the plant site; typical rock types include mica schist, biotite gneiss, and amphibolite. The bedrock of mica schists, granitic gneisses, and quartzites lies at depths ranging from 12 to 87 feet. The igneous and metamorphic units in the area are fairly well fractured. Fractures will concentrate in zones 30 to 200 feet wide. These zones extend in straight or slightly curved lines extending from less than a mile to several miles long (Cressler et al., 1983).

3.3 WATER RESOURCES

3.3.1 Surface Water

Plant Yates is located along the Chattahoochee River, which supplies most of the water used at the plant. The Chattahoochee supplies water for approximately one-third of Georgia's population, primarily in the metropolitan Atlanta area. There are few other surface water bodies in the Plant Yates area. Several ash ponds are located on site, and a small water pond is located approximately one-half mile away. The Chattahoochee River is classified for fishing use under the Georgia water quality standards. According to the 1988 Georgia water quality report to the U.S. Environmental Protection Agency (USEPA), this segment of the Chattahoochee River meets state water quality standards.

3.3.2 Groundwater

As is typical of the Piedmont region, groundwater at Plant Yates is concentrated in the weathered rock zone along the soil-rock interface or in fracture zones in the rock mass itself. There is an upper water bearing zone with the water table ranging from 10 to 28 feet beneath the plant in the unconsolidated materials. This zone occurs from the top of the unweathered bedrock to the water table. The water occupies joints and fractures in the weathered rock and pore spaces in the overlying material. Groundwater flow in this upper unit is expected to be towards the Chattahoochee River. An approximate lateral flow rate for the plant site was calculated to be 3.8×10^{-5} cm/sec. As described previously, the unconsolidated material consists generally of fine and coarse micaceous sands and silts. Permeability values of these soils range from 1.4×10^{-3} cm/sec to 4.2×10^{-4} cm/sec. These values are moderate, about average for a silty sand to silt. Infiltration rates for the soils are slow. Clays have also been identified in the soils.

An inventory of water wells located within a one mile radius from the plant site was performed in December 1988 by searching public records. Four operational wells were identified, all owned by Plant Yates, with three of the wells providing potable water. The plant's water supply wells are located in deep (approximately 500 feet) bedrock. This aquifer supplies water through the extensive fracture systems present in the rocks. Groundwater quality analyses for the plant's four deep supply wells reveal the waters to be relatively high in iron and manganese. This is probably due to the mafic nature of the subsurface rocks which contain minerals rich in iron and manganese such as biotite, hornblende, and garnet.

3.4 ECOLOGICAL RESOURCES

The flora and fauna that typify the area surrounding Plant Yates can be grouped into six habitat categories, none of which contain unique ecological or sensitive communities. Existing habitat categories can be generally labelled as follows: upland hardwoods, bottomland hardwoods, pinewoods, mixed pine hardwoods, fields and abandoned farmland, and ponds. Fauna associated with these habitats include: deer, squirrels, songbirds, turkeys, reptiles, owls, raccoons, amphibians, small rodents, quail, foxes, hawks, waterfowl and furbearers.

A field survey was conducted of the plant area that includes the proposed gypsum stacking location. The field survey covered an area south and east of the 230 KV transmission line, west of the plant entrance road, and north of the

Norfolk Southern railway line through the plant. The 43-acre area contains pines, a previously cleared field and firing range, and mixed hardwoods (water oak, red oak, hickory, red maple, cherry, sweetgum and poplar). Approximately one-half of the proposed stacking area will be located on the old field and firing range, which is disturbed property. The remainder of the acreage is predominantly a young growth of planted pinewoods.

It has been determined that no plant or animal species or habitat for species, designated as endangered or threatened under the federal or Georgia Endangered Species Act, are present in the area or are likely to be impacted by the proposed project. This determination is based on a review of the Georgia Department of Natural Resources Natural Heritage Inventory, correspondence with the U.S. Fish and Wildlife Service and the site specific survey.

3.5 AESTHETIC/CULTURAL RESOURCES

3.5.1 Archaeological/Historical Resources

Since site construction activities will disturb approximately 13 acres of land, a Phase I cultural resource survey was conducted to assess the site's existing archaeological/ historical properties. The Phase I survey consisted of a literature review of available studies at the Georgia State Historic Preservation Office (SHPO) and an on-site inspection of the areas potentially affected by the project. The literature review revealed that various archaeological properties have been located in the area surrounding the plant site, but that no formal resource inventory of the plant itself has been previously undertaken. No cultural properties currently listed on the National Register of Historic Places are located within the plant site. The on-site inspection identified one previous, domestic cultural property (i.e., evidence of a residence from dishes, a refuse site and a privy) located in the proposed gypsum stacking area. Other lands within the proposed facility locations exhibit significant, previous land disturbance.

Georgia Power Company's Phase I inventory of the site identified one cultural property and the potential for additional resources. A Phase II study, consisting of shovel cuts and formal excavation units, was conducted in February 1989. This study revealed a mixed archaeological and stratigraphic context at the house site domicile and an area west of the domicile. The majority of the artifacts recovered from the domicile date from the 1940s and 1950s. Interpretation of courthouse documents suggest that this was a tenant house, and not a house occupied by the landowner. Other cultural features examined include a root cellar depression, privy, and a well. No artifacts were recovered from these areas.

3.5.2 Native American Resources

According to the Public Information Division of the National Bureau of Indian Affairs, there are no federally-recognized Native American tribes in the State of Georgia; therefore, there are no current tribal practices at or near the proposed project.

3.5.3 Scenic or Visual Resources

There is no state program for designating and listing scenic highways or vistas. Neither Coweta nor Carroll counties, nor local communities in the vicinity of Plant Yates have established programs for designating and listing scenic highways or vistas. The stretch of the Chattahoochee River along which Plant Yates is located has not been designated as a national scenic waterway under the National Wild and Scenic Rivers Act, according to the National park Service, U.S. Department of Interior. There are no state parks or recreational areas adjacent to the plant. The nearest state parks are: (a) John Tanner State Park near the City of Carrollton, which is approximately 20 miles northeast of the plant and (b) Warm Springs State Park at the City of Warm Springs, which is approximately 30 miles south, south-east of the plant. Carroll County owns and operates the MacIntosh Preserve, a nature area, approximately 15 miles west of the plant. The cities of Newnan and Carrollton have municipal recreational parks.

4.0 CONSEQUENCES OF THE PROJECT

4.1 ATMOSPHERIC IMPACTS

Unit 1 of the powerplant will be modified by retrofitting with the CT-121 process. Estimated emissions during the demonstration process are compared to existing conditions in Table 4-1, and discussed below.

4.1.1 Conventional Power Plant Pollutants

SO_2 emission estimates for the demonstration project were derived using the following assumptions: (a) coal used during the CT-121 evaluation will contain a target of 2.5 percent sulfur, and (b) sulfur removal efficiency of the CT-121 system at Unit 1 is expected to average at least 90 percent. In the context of total plant emissions, the SO_2 percentage reduction is not significant, since the remaining six units in the plant will not have similar SO_2 controls. It is estimated that total plant atmospheric emissions of sulfur dioxide (SO_2) will decrease by approximately 10% during operation of the project.

The combination of prescrubber and JBR technologies have the potential to achieve particulate emission rates that are relatively independent of inlet particulate loading. Removal efficiencies of 99 percent and above are indicated for the technology with higher inlet loadings. From the results of tests discussed previously, a potential particulate emission rate of 0.03 lb/MMBtu, or 36 lb/hr is estimated to be achievable by this technology under all test conditions.

Air quality impacts of the demonstration project were analyzed using the U.S. EPA Industrial Source Complex Long Term Model (ISCLT) and the PTPLU (UNAMAP Version 5) Model. Since the PTPLU Model estimates the maximum concentration and its location only for individual stacks, the U.S. EPA PTMTP Multi-Source Model was applied to those worst case meteorological conditions that produced the highest concentrations in PTPLU. Stacks were assumed to be co-located, and the 1-hour average predicted concentrations were adjusted to 3-hour and 24-hour concentrations using factors of 0.9 and 0.4 respectively. Results of the

TABLE 4-1

COMPARISON OF EXISTING AND POTENTIAL FLUE GAS EMISSIONS EXPECTED THROUGH USE OF THE CT-121 TECHNOLOGY ON UNIT 1

Parameter	Existing Source		Proposed CT-121		Reduction
	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	(%)
Air Emissions					
SO_2	5500	4.54	550	0.45	90
NO_x (as NO_2)	1452	1.2	1452	1.2	NC
Particulate Matter	127	0.105	36	0.03	72
Chloride	98	0.081	7.8	0.0065	92
Fluoride	6.7	0.0055	0.5	0.004	92
Arsenic	0.82	6.8×10^{-4}	0.5	0.0004	39
Beryllium	0.10	8.1×10^{-5}	<0.0006	$<5.0 \times 10^{-7}$	99
Lead	0.68	5.6×10^{-4}	0.005	4×10^{-6}	99
Mercury	0.02	1.6×10^{-5}	0.02	1.6×10^{-5}	NC

NC = No Change

Source: Southern Company Services, Inc. 100 MW Demonstration of Innovative Applications of Technology for Cost Reductions to the Chiyoda Thoroughbred-121 Flue Gas Desulfurization Process on High-Sulfur, Coal-Fired Boilers, Technical Proposal to U.S. Department of Energy, Volume II, p. II.3-39.

modeling performed are shown in Table 4-2. The model results indicate that the worst case 3-hour and 24-hour average SO_2 concentrations, and the worst case 24-hour average particulate matter concentration will decrease during operation of the demonstration project. The worst case annual average SO_2 and particulate matter emissions will increase insignificantly.

Even though the flue gas pollutant emissions from Unit 1 are significantly decreased by use of the CT-121 technology, there is an increase in predicted annual average concentration of SO_2 and particulate matter. This results from use of the new 250-foot stack for Unit 1 instead of the existing 825-foot stack. As a plume moves away from the source the plume expands and the concentration of pollutants decrease. A tall stack allows the pollutants in a plume to be diluted before the plume contacts the ground. The use of the 250-foot stack results in decreased dilution of pollutants before the plume reaches the ground and the resultant increase in maximum ground level concentrations. The distance to the maximum ground level concentration from the stack will decrease slightly for the same reasons.

NO_x emissions are not predicted as being impacted by the CT-121 process. The atmospheric emissions of halogen and trace elements depend heavily on the concentrations of these species in the coal, as well as the control systems present in the plant. Chloride emissions from the CT-121 process were estimated from results obtained during the prototype testing at Plant Scholz (Radian, 1980). The chloride removal efficiency expected from the demonstration program (92%) is assumed to be equivalent to that measured during the Plant Scholz tests. Fluoride emissions were not measured during the Plant Scholz tests; the removal efficiency was assumed to be equal to the chloride removal efficiency since both halogens are highly soluble in aqueous solutions.

The CT-121 system's removal effectiveness for trace elements in the fly ash was also assessed during the Plant Scholz demonstrations. A 99 percent removal efficiency was demonstrated for 10 trace metals (calcium, magnesium, titanium, chromium, copper, lead, nickel, vanadium, beryllium, and zinc) (Radian, 1980). Approximately 90 percent of four volatile metals was removed (arsenic, antimony,

TABLE 4-2

AIR QUALITY MODELING
RESULTS FOR UNITS 1-5
(EXISTING AND PROPOSED CONDITIONS)

Pollutant Averaging Time	Existing Source and Stack [a] (ug/m^3)	Distance from Stack to Maximum Concentration (km)	Proposed Source With New Stack (ug/m^3)
SO_2			
3-hour	720	1.3	618
24-hour	320	1.3	275
Annual	1.32	6	1.67
Particulate Matter			
24-hour	17	1.3	15
Annual	0.07	6	0.10

a = Maximum values obtained in modeling

cadmium, and selenium) (Radian, 1980). In the same study, 50 to 70 percent of the mercury was removed by the CT-121 process. Table 4-1 indicates more conservative reductions in metal removal efficiency than described above. Metals removed by the CT-121 process are eventually deposited in the gypsum stacks in compliance with a permit to be issued by Georgia Department of Natural Resources (DNR).

4.1.2 Fugitive Emissions

Low levels of fugitive particulate emissions will be generated during the operational phase of the CT-121 demonstration project. Potential sources of these fugitive emissions include the gypsum stacking area and the limestone receiving, storage, and processing areas. Approximately 110 tons of limestone will be used daily during normal operation. Particulate emissions from limestone can occur from the storage area, during conveying, and from the working silo. Directly applicable emission factors are not available, so particulate emission factors from similar operations were used to estimate particulate emissions. Estimates were derived primarily from the U.S. EPA document entitled "Compilation of Air Pollution Emission Factors, AP-42" (1985 and 1988 Supplement). The total uncontrolled emissions of limestone particulates are estimated to be approximately 10 to 12 lb/day. Spraying storage piles with water to minimize dusting will be undertaken to reduce these fugitive particulate emissions.

Gypsum by-product will be transported as a slurry by enclosed pipeline to the stacking area. During some of the test periods, fly ash will be incorporated with the gypsum. At the stacking area, the solids will be allowed to settle and will then be stacked using a dragline. Further dewatering, settling, and drying will then occur. Since the material is initially wet and then crusts over, minimal amounts of fugitive dust are expected. A study of this stacking technique as applied to gypsum was conducted by the Electric Power Research Institute (EPRI) (Radian, 1980). This study showed that the gypsum stacks from the CT-121 process developed a thin, hard crust. Dissolution of gypsum crystals from rainfall, and subsequent recrystallization and drying also results in a crust being formed. The sides of the stacks were essentially free of erosion from rainfall. The study found that fugitive dust emissions were not a problem.

4.1.3 <u>Potential Plume Impacts Associated With Scrubbing Systems</u>

Utilization of scrubbing systems in general may impact the composition and characteristics of stack plumes. Two potential effects are possible from operating a wet FGD process: (a) localized acidic liquid fallout from the stack plume, and (b) a visible plume caused by sulfuric acid mist in the flue gas. Both of these potential impacts involve sulfuric acid; however, the acid is generated by two different phenomena, with differing impacts. These potential impacts are associated with wet scrubbing systems in general and are not unique to the CT-121 process.

Acidic liquid, which may result in fallout, is formed when residual SO_2 in the flue gas is absorbed on condensed liquid present after the mist eliminator or on water which has condensed on the ductwork and chimney liner. This condensed liquid is present in power plant operations without flue gas reheat. The potential for localized acidic liquid fallout can be minimized through proper design of the mist eliminators, ductwork, and chimney liner, including the use of properly placed collectors in the ductwork and chimney liner. Acidic liquid fallout from the CT-121 process should be even less than from other wet FGD processes. Compared to these other processes, the CT-121 process reduces the number of liquid droplets in the ductwork downstream of the mist eliminator because of both the lower gas velocity in the gas-liquid contact zone and the better reliability of the mist eliminator. Based on the success of other projects, acidic liquid fallout should not be present at the demonstration program.

The potential for creation of acid mist in the flue gas is due to the formation of a small amount of sulfur trioxide (SO_3) during combustion. When the SO_3 combines with water vapor it forms submicron sulfuric acid droplets or mist that increases plume visibility. The CT-121 plume leaving the stack will dissipate from view with distance from the stack.

Based upon the literature on existing wet scrubbers, and the similar operation of the CT-121 process, plume visibility is unlikely to be a problem during the demonstration. The expected opacity will be less than the State of

Georgia regulations which impose a state-wide limit of not greater than 40%. Visual monitoring of opacity will be conducted during the demonstration project using EPA Method 9.

4.1.4 Noise

The additional 4 or 5 limestone transport vehicles and equipment needed for the demonstration project will contribute to the noise level in the area. These sources are expected to have minimal impacts. The nearest off-site receptors to the plant are approximately one mile away and consist of scattered residences.

4.1.5 Construction Phase

The potential for atmospheric impacts during the construction stage includes emissions from general construction activities and emissions from on-site manufacturing of the JBR. Small amounts of nitrogen oxides (NO_x), hydrocarbons, and carbon monoxide (CO) will be generated by construction vehicles and trucks transporting equipment and supplies. The limited duration of construction (22 months), the size of the project and the peak construction workforce (120 workers), and the staggered delivery of supplies throughout construction are expected to have minimal impacts in comparison to existing traffic on U.S. Alternate 27.

Fugitive emissions from general construction activities may result from equipment installation, increased daytime vehicular traffic on internal roads, and construction of the stacking area. The state's "no nuisance" requirements will require implementation of reasonable precautions to minimize or prevent airborne particulates. Management practices, such as covering trucks and wetting roads will be employed to prevent or minimize the generation of fugitive construction emissions.

Ershigs, Inc., a national fiberglass contractor, will manufacture the JBR on-site (with the duct and stack manufactured off-site). Reasonably available control technology will be used in accordance with Georgia DNR regulations. According to U.S. EPA Publication AP-42, "Compilation of Air Pollution Emission Factors", the significant volatile organic compound emissions from fabrication operations using fiberglass reinforced plastic (FRP) are the monomer (usually styrene) associated with the resin and the solvent (usually acetone) used to clean equipment. Preliminary design estimates indicate that the FRP in the JBR will weigh about 400,000 to 500,000 pounds. A monomer content of 43 wt% in the resin was assumed, and 11 percent of the monomer was assumed to be emitted (USEPA Publication AP-42). Under these conditions, total styrene emissions will be approximately 6 to 8 tons over the duration of the fabrication period (approximately 8 to 10 weeks). It was also assumed for estimating emissions, that 1,000 to 2,000 pounds of acetone will be needed for cleaning purposes, and that 20 percent of this material will volatilize. Therefore, the total volatile organic compound (VOC) emissions from the on-site FRP equipment fabrication are estimated to be between 6 and 8 tons for the construction period.

4.2 LAND IMPACTS

The CT-121 project will require utilization of the following acreage at Plant Yates: (a) 5 acres for the JBR, reactant receiving/feed system, and the temporary stack adjacent to Unit 1; and (b) 8 acres for the gypsum stacking area. In addition, a double pipeline of approximately 2,500 feet in length will be installed to transport gypsum slurry from the JBR to the stacking area and to recycle water back to the process area for reuse. There will also be a pipeline of approximately 2,000 feet in length to direct stacking area overflow, if any, to the ash pond. The 13-acre area that will be utilized for the demonstration project is readily available at the existing 2,300+ acre plant site. Approximately 5 acres of the land required for process equipment has already been disturbed or was primarily used for other purposes. One half of the 8-acre gypsum stacking area has already been disturbed. Other impacted land consists primarily of a young growth of planted pinewoods. Impacts to flora and fauna should be minimal. Endangered species or critical habitats are not found in this area. A significant amount of undisturbed land will remain adjacent to the gypsum stacking area. The infrastructure requirements to support the project--river, rail, road, coal handling--already exist at Plant Yates; no modifications will be required, no additional land will be needed, and minimal impacts are expected due to additional material handling requirements. Off-site roadway impacts are only expected during the construction phase of the project due to the construction workforce and material deliveries. U.S. Alternate 27 has sufficient vehicle carrying capacity so that these impacts will be minimal.

Stacking of FGD gypsum has been successfully demonstrated at the Plant Scholz project on a relatively small scale (one-half acre and 12 feet high). The phosphate fertilizer industry in the Southeast has utilized stacking for its waste gypsum for at least twenty years. The gypsum stack is estimated to accommodate 28,600 tons of waste in a minimum 20 foot high stack with a base of 1.2 acres and a top area of 0.5 acres. The gypsum/fly ash stack is estimated to accommodate 92,600 tons of waste in a minimum 30 foot high stack with a base of 2.8 acres and a top area of 1.2 acres. On-site aesthetic impacts, in addition to permanent utilization of this acreage, will result from the project.

4.3 WATER QUALITY IMPACTS

4.3.1. <u>Construction Activities</u>

Nonpoint source pollution relating to CT-121 construction activities are expected to be minimal because of the small area of land that will be affected. The state erosion and sedimentation statute requires a permit for "land-disturbing" activities and utilization of runoff controls. Although public utilities, such as Georgia Power Company, are expressly exempted from permitting requirements under the statute, the utility will conform with the conservation practices established for this program.

On-site construction of the JBR is necessary due to the large size of the vessel (42' tall x 42' in diameter). Fabrication will require the use of fiberglass, styrene based resin, methyl ethyl ketone peroxide and other solvents. Appropriate construction methods will be utilized to minimize potential impacts to surface water and groundwater from fabrication activities. The Georgia DNR will be notified of the process description prior to construction to identify all applicable requirements.

4.3.2 <u>Operation</u>

Most of the wastewater sources and discharges within the Plant Yates boundaries will be unaffected by the demonstration project. There will be no change in the quantity and quality of coal being used and associated coal pile runoff will remain unchanged. The quantity of ash produced and the required volume of ash sluice water will be unaffected by the demonstration program (except for the reduction of flue gas fly ash from Unit 1 during the last two test phases). The composition of the bottom ash, economizer ash, fly ash and the associated ash-sluice water will be unchanged as a result of the demonstration project. No routine process blowdown stream is anticipated from the CT-121 process. CT-121 operation consists of a closed system; effluent is recycled within the process and is not discharged.

Potential impacts on surface water would be a result of runoff from the limestone storage area, limestone process area wash water and runoff, and/or overflow from the gypsum stacking area. Runoff from the 0.2 acre limestone storage area will occur during periods of significant rainfall. This runoff, which will be routed to the gypsum stack via the waste gypsum tank, can be expected to have a high solids content and also have elevated levels of alkalinity (up to 60 ppm). Wash water, spills, and runoff water from the limestone process area will also be routed to the waste gypsum tank and then to the gypsum stack and will likely be more dilute than the limestone storage area runoff. The water that accumulates in the gypsum stacking area as a result of gypsum dewatering (and rainfall) will be recycled to the process.

Potential overflow from the gypsum stacking area would occur as a result of a very heavy rainfall. This area will be designed with dikes to accommodate a 10-year, 24-hour rain event. In the case of this exceptional storm event, overflow will be routed to the existing ash pond, which may discharge to the Chattahoochee River. Vegetation will be planted in the solid waste management area at the end of the project to mitigate potential run-off impacts to surface water.

Groundwater

Available data from the Plant Scholz CT-121 project (Gulf Power Company plant in Florida) provide insight into the composition that might be expected for the gypsum at Plant Yates (Radian, 1980). Table 4-3 presents the average

TABLE 4-3 AVERAGE COMPOSITION OF GYPSUM RETURN WATER: SCHOLZ POWER PLANT TEST

	Average (ppm)
Major Constituents:	
Calcium	0.13[a]
Magnesium	650
Chloride	1,900
Sulfate	900
Trace Elements:	
Arsenic	0.15
Beryllium	0.021
Cadmium	<0.002[b]
Chromium	0.22
Copper	<0.005[b]
Mercury	0.015
Nickel	0.94
Lead	<0.002[b]
Antimony	0.011
Selenium	0.20
Silver	0.07
Titanium	0.065
Thallium	<0.001[b]
Vanadium	1.1
Zinc	0.67

[a]Percent by weight.

[b]Element may or may not have been detected. If detected, concentration was less than detection limit for quantifiable value.

Source: (Ref. 1).

composition of the gypsum stack return water, with all constituent concentrations less than U.S. EPA hazardous waste standards for leachates. These data provide a reference for the types and concentrations of elements expected to be present in the leachates. During high particulate loading tests, trace elements in the fly ash may add to the concentration of these elements already present in the gypsum and gypsum return water, but are expected to remain below hazardous waste standards. The gypsum and gypsum/fly ash mixture produced in the CT-121 process will be categorized as a solid waste under U.S. EPA definitions and disposed in accordance with applicable regulations. There will be no hazardous waste generated in this process.

To minimize the potential for adverse impacts on groundwater, the gypsum and gypsum/fly ash stacking areas will be lined with a synthetic or low-permeability clay liner, and a leachate collection system will be installed. The solid waste landfill permit issued by the State of Georgia DNR will contain the specific component (i.e., liner, leachate collection system, and groundwater monitoring plan) design requirements for the stacking area. In addition, impacts on groundwater are not anticipated because (1) the leachate collection system should detect and capture any liquid leaking through the liner, and (2) the composition of the gypsum and gypsum/fly ash mixture is such that the constituents of concern should not leach appreciably from the material. Furthermore, even if a leak develops in the liner, and is not contained in the leachate collection system, the impact on the groundwater should be slight because of the favorable hydrogeologic conditions at this site. These conditions include relatively low permeability of both the soil and the underlying unweathered rock mass, and the relatively thick unsaturated zone between the stacking area and the upper water-bearing zone which lies at a depth of between 10 and 28 feet.

A groundwater monitoring system will be installed at the disposal area consisting of at least 4 wells (1 upgradient and 3 downgradient). The monitoring frequency before, during, and after the demonstration project will be defined in the solid waste landfill permit issued by the State of Georgia. Monitoring will consist of analyses for a number of inorganic and trace metal parameters.

The solid waste management area will be constructed in accordance with the solid waste regulations of the Georgia DNR and will require a permit from the Department. As part of the permit application; soil borings, grain size analyses and permeability analyses on undisturbed soil will be conducted. Additional hydrogeological investigations will also be conducted consisting of a literature survey, photogeology, geophysical survey and other field testing and mapping methods. All of this information will be incorporated into the permit application to the State of Georgia DNR.

During the project, an extensive characterization of the process water and the solid waste generated will be implemented. This will include laboratory analyses by the Extraction Procedure (E.P.) Toxicity Test and the Toxicity Characteristic Leaching Procedure (TCLP). This information, in conjunction with groundwater monitoring results, will allow mitigating measures to be taken, as required, as the project proceeds. If significant trends in the groundwater monitoring data indicate that concentrations of relevant contaminants are increasing, the State will be notified and appropriate action taken. The stacking area will be graded (and possibly capped) and vegetated at the conclusion of the project in accordance with the approved closure plan which will be part of the solid waste landfill permit.

4.4 ECOLOGICAL IMPACTS

The CT-121 demonstration project will be located and operated at an existing power plant. Further, of the 13 acres required for the project, the 5 acres required for the process area are already in a disturbed condition resulting from the original plant construction. Additionally, over half of the gypsum stacking area will be situated on an already disturbed area consisting of a firing range. The rest of the area to be disturbed primarily consists of planted pinewoods. Consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act is complete and indicates that the project will not affect any threatened or endangered species or any critical habitat.

4.5 SOCIOECONOMIC IMPACTS

The CT-121 project should result in a slightly beneficial impact on the local economy due to the need for additional labor. Construction of the demonstration project is anticipated to require approximately 120 workers at the height of activity. The labor pool geographical source for these temporary workers is expected to be Coweta and/or Carroll counties. Engineering and construction supervisory services will draw upon existing staff of Southern Company Services, Inc. and Georgia Power Company, as well as a number of support contractors. During operation of the project, approximately 15 additional employees will be utilized to operate the demonstration process. There are no significant, adverse impacts expected in relation to area housing or local public services, such as fire protection or road maintenance.

4.6 AESTHETIC/CULTURAL RESOURCE IMPACTS

Aesthetic impacts will be limited as the project will take place at an existing industrial facility. Aesthetic impacts may arise from plume opacity and solid waste stacking, both discussed previously. Aesthetic impacts may also occur from construction of the new temporary 250-foot stack.

Georgia Power Company's Phase I inventory of the site identified one cultural property and the potential for additional resources. A Phase II study, consisting of shovel cuts and formal excavation units revealed a mixed archaeological and stratigraphic context at the house site domicile and an area west of the domicile. The majority of the artifacts recovered from the domicile date from the 1940s and 1950s. Based on this information, this property does not meet the 50-year age eligibility requirement established by the National Historic Preservation Act of 1966 (Sec. 106). Correspondence with the Georgia SHPO in Atlanta confirms these findings and the conclusion that the property is not eligible for listing in the National Register of Historic Places.

4.7 ENERGY AND MATERIALS RESOURCES

The demonstration project will require only minimal additional quantities of electrical power and water in comparison to existing operations. Electrical power requirements consist of 10.6×10^6 kWh to be supplied by Plant Yates.

Plant water usage will increase by 0.02%. A new resource requirement will consist of the need for approximately 23,000 tons of limestone yearly. An abundant supply of crushed limestone is available at competitive prices in Georgia and Alabama to satisfy project needs.

4.8 IMPACTS OF ALTERNATIVES TO THE PROPOSED ACTION

Before a cost-shared demonstration project can receive federal funds for detailed design, construction, operation and/or dismantlement, DOE must comply with the requirement of the National Environmental Policy Act of 1969 (NEPA) to assess the impact of the proposed action and its alternatives. As part of its overall NEPA strategy for the ICCT Program, DOE conducted a comparative environmental review of alternative sites and alternative technologies. The results of this review were factored into the evaluation of the proposals and the selection of demonstration projects for negotiation.

This specific project represents a demonstration of an innovative technology. Unlike other projects which undergo NEPA analysis, alternative means of accomplishing the same goal are rather limited.

4.8.1 No Action Alternative

The No Action alternative would result in a comprehensive evaluation of the CT-121 process not being performed. This would have negative effects with regard to assessing innovative environmental control methods for coal burning technologies. Project data would be unavailable for utility and regulatory authorities, and the limited data available from Japan and smaller scale demonstrations of the CT-121 process would not be supplemented.

4.8.2 Alternative Technologies

The U.S. DOE has evaluated a number of technologies for funding under the ICCT Program. The CT-121 process has been deemed sufficiently promising and innovative to qualify for funding under this program.

The project sponsors have designed the demonstration and project elements to assess the commercial feasibility of the CT-121 process. The project as proposed will provide information required to assess the economic viability of CT-121 implementation on a commercial scale throughout the country.

4.8.3 Alternative Sites

Plant Yates provides the desired retrofit conditions for the project including the ability to implement the process on a limited scale (i.e. on 12% of the plant's total flue gas). Plant Yates also provides ample space for the solid waste management area and presents no environmental conditions which would limit or preclude implementation of the proposed project. Further discussion is contained in Section 2.2.2.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resources committed to the project will include construction materials, limestone, the eight acre gypsum stacking area and the monetary resources to implement the project. Under terms of the cost-shared agreement with DOE, future commercial success of the process is expected to result in a payback of federal funds committed by DOE to the project. Resource commitments are limited in scope, and should have negligible adverse effects.

5.0 REGULATORY COMPLIANCE

5.1 ANTICIPATED PERMIT MODIFICATIONS/REQUIREMENTS

5.1.1 Air Quality

Since the temporary 250 foot stack to be constructed and operated for exhaust of the CT-121 treated flue gas is a new point source, a temporary construction and operation permit will be required from the Air Quality Division of the Georgia DNR. The permitting requirements have been generally discussed with appropriate agency staff. Issuance of the authorization is expected to be administrative in nature and is estimated to require a two to three month period. This permitting process will not trigger new source review under the federal or state New Source Performance Standards or under the Prevention of Significant Deterioration regulations. National emission standards for hazardous air pollutants do not apply to the project. The project's effect on the unit is not expected to cause or contribute to a failure to attain or maintain ambient air quality standards as set forth under the Georgia air quality rules for sulfur dioxide, particulate matter, carbon monoxide, ozone, lead, and nitrogen dioxide.

On-site fabrication of the fiberglass-reinforced plastic JBR by Ershigs, Inc. will last approximately 8 to 10 weeks. Total volatile organic compound (VOC) emissions during this period are estimated at between 6 and 8 tons. The Georgia DNR's VOC rules require: (a) state approval for any source in Coweta County that emits greater than 25 tons per year of VOCs; and (b) use of reasonably available control technology. Based upon the emission estimates presented above, it does not appear that a state permit will be required for the temporary fabrication activities. However, the Georgia DNR will be notified of the temporary fabrication activities and supplied with the emission estimates, material safety data sheets, and a process description to verify applicable requirements prior to commencement of construction. Any permitting activity, if required, will be handled by Ershigs, Inc.

5.1.2 Solid Waste/Water

A permit will be required for construction and operation of the new gypsum stacking area under the solid waste management rules of the Land Protection Branch of the Georgia DNR.

Plant Yates has been issued a NPDES permit by the Environmental Protection Division of the Georgia DNR. An amendment to this permit will not be required for the CT-121 project. There may be nonroutine discharges from the gypsum stacking area; however, a discharge would only occur during an exceptional rainfall event and the discharge would be routed via an overflow line to the existing ash pond. The Environmental Protection Division of the Georgia DNR has been notified of this internal, intermittent discharge.

5.1.3 Other Permits/Regulatory Requirements

Hazardous Waste

Operation of the proposed CT-121 project will not result in the generation of hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) and the Georgia Hazardous Waste Management Act. No RCRA permitting will be required. It is possible that Ershigs will generate small quantities of hazardous waste (spent solvent) during its FRP construction activities. Ershigs, Inc. will secure a U.S. EPA identification number as a generator and will temporarily accumulate (less than 90 days) the waste on site prior to off-site disposal at an authorized facility.

Federal Aviation Administration

The CT-121 project will entail construction of a 250-foot tall temporary stack for emission of the treated flue gas. It is possible that erection of the stack will require compliance with the Federal Aviation Administration (FAA) rules of 14 CFR Part 77 relating to objects which may affect navigable airspace. The FAA rules would require a 30-day preconstruction notice to the regional office in Atlanta and lighting or marking of the stack pursuant to FAA standards.

Health and Safety

Plant employees are already instructed in worker protection and safety procedures under the existing plant operations manual. It is believed that current procedures are adequate to ensure that federal and state standards are met. During construction, the contractor will comply with the site rules and regulations concerning health and safety procedures. It is possible that Ershigs will temporarily store substances designated by the U.S. EPA as "extremely hazardous substances" (solvents) on site during the fiberglass reinforced plastic fabrication phase of construction activities, estimated to be 8 to 10 weeks. If so, Ershigs, Inc. will provide the SARA emergency planning notice to the appropriate emergency planning committee. Appropriate health and safety requirements will be followed regarding storage and handling of flammable materials used for on-site JBR manufacture.

Floodplain

The appendix to this document presents a floodplain map of Plant Yates. Although portions of the plant are located in floodplain areas, none of the elements of the CT-121 demonstration project will be situated in these areas. Thus, no impacts to floodplain values are expected, and no state/local floodplain protection programs will be applicable to the demonstration project.

Wetlands

Although wetland areas may potentially be present in close proximity to the Chattahoochee River, project elements are sufficiently removed from this location so that impacts to wetlands will not occur.

6.0 REFERENCES AND AGENCY CONTACTS

6.1 REFERENCES

1. Radian Corporation. Evaluation of Chiyoda Thoroughbred-121 FGD Process and Gypsum Stacking. Volume 1: Chiyoda Evaluation, prepared for Southern Company Services, Inc. Electric Power Research Institute (EPRI). Report CS-1579, October 1980.

2. Radian Corporation. Results of 30-Day Performance Test and Baseline Characterization Study of Abbott Plant Chiyoda Thoroughbred-121 FGD Process. Prepared for Electric Power Research Institute (EPRI). Research Project 2865-1, Final Report, January 1989.

3. Gilbert, B. R., et al. "Simultaneous SO_2 and Particulate Removal in a Jet Bubbling Reactor." Presented at the EPA/EPRI Combined FGD and Dry SO_2 Control Symposium, St. Louis, Missouri, October 25-28, 1988.

4. U.S. Environmental Protection Agency. Compilation of Air Pollution Emission Factors, AP-42, Fourth Edition, September 1985; Supplement B, September 1988.

5. Radian Corporation. Evaluation of Chiyoda Thoroughbred-121 FGD Process and Gypsum Stacking. Volume 3: Testing the Feasibility of Stacking FGD Gypsum, prepared for Southern Company Services, Inc. Electric Power Research Institute (EPRI) Report CS-1579, Volume 3, November 1980.

6. Damle, A. S., D. S. Ensor, and L. E. Sparks. Options for Controlling Condensation Aerosols to Meet Opacity Standards. Journal of the Air Pollution Control Association, 37(8), 925-933 (1987).

7. McConnell, K. I., and Charlotte E. Abrams. Geology of the Greater Atlanta Region. Georgia Geological Survey Bulletin 96, 1984.

8. Cressler, C. W., C. J. Thurmond, and W. G. Hester. Ground Water in the Greater Atlanta Region. Georgia Geologic Survey Information Circular 63, 1983.

9. Radian Corporation. Draft Final, Environmental Information Volume, SCS CT-121 FGD Project at Plant Yates; Newnan, Georgia. Prepared for Southern Company Services; March 2, 1989.

6.2 AGENCY CONTACTS

Georgia Department of Transportation
Public Information Division
Atlanta, Georgia
(404) 656-5267

Newnan-Coweta Chamber of Commerce
Post Office Box 1103
Newnan, Georgia 30264
(404) 253-2270

National Bureau of Indian Affairs
Washington, DC
(202) 343-1710

National Park Service
U.S. Department of Interior
Washington, DC
(202) 343-3761

Georgia Department of Natural Resources
Air Quality Division and Environmental
Protection Division
Atlanta, Georgia
(404) 656-0772

Georgia State Historic Preservation Office
Atlanta, Georgia
(404) 656-2840

U.S. Fish and Wildlife Service
Brunswick, Georgia
(912) 265-9336

APPENDIX

Plant Yates Site 100-Year Flood Map

LEGEND:

——	100-YEAR FLOOD BOUNDARY
FLOOD ZONE A	AREAS OF 100-YEAR FLOOD. BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED
FLOOD ZONE C	AREAS OF MINIMAL FLOODING

NOTES:
1. FLOOD INFORMATION TRANSFERRED FROM LESS-DETAILED FLOOD MAP TO MORE DETAILED SITE MAP; FLOOD INFORMATION INTERPOLATED IN SOME AREAS.
2. TOPOGRAPHIC CONTOURS APPROXIMATE.

NOTE: CONTOURS APPROXIMATE

REFERENCES:

HPS3054-14 PROPOSED 100 MW CT-121 PROJECT EQUIPMENT LAYOUT - PLAN VIEW

EPS 3054 H PLANT YATES SITE PROPOSED 100 MW FGD DEMONSTRATION PROJECT (UNIT 1) GYPSUM STORAGE AND GYPSUM ASH STORAGE

FEDERAL EMERGENCY MANAGEMENT AGENCY 1986, FLOOD INSURANCE RATE MAP (FIRM) COWETA COUNTY GEORGIA (UNINCORPORATED AREAS) PANEL 100 OF 350.

PRELIMINARY

Southern Company Services, Inc.

Georgia Power Company

PLANT YATES SITE
100-YEAR FLOOD MAP

FOR INFORMATION ONLY

1" = 200'

EPS3054-