United States Environmental Protection Agency
Region 4
345 Courtland St., N.E.
Atlanta, GA 30365
EPA 904/9-90-003a
May 1990

EPA Environmental Impact Statement

FDER State Analysis Report

DRAFT

Cedar Bay Cogeneration Project
Jacksonville, Florida

EPA
NPDES Application Number:
FL 0041173

Florida Power Plant Siting
Application Number:
PA 88-25

Draft
Environmental Impact Statement
for
Proposed Issuance of a New Source National
Pollutant Discharge Elimination System Permit

Florida State Analysis Report
for
Proposed Certification by the Governor and Cabinet

to

Applied Energy Services, Inc
Cedar Bay Cogeneration Project

Jointly Prepared by:

U.S. Environmental Protection Agency Region IV
and
Florida Department of Environmental Regulation

Applied Energy Services, Inc. propose to construct and operate a New Source cogeneration facility on an existing industrial site within the North District of Duval County, approximately eight miles north of Jacksonville, Florida. The plant will produce 225 megawatts of electricity for sale to the Florida Power and Light Company. In addition, steam will be sold to the adjacent Seminole Kraft Corporation paper mill. This document assesses the proposed project and alternatives with respect to impacts on the natural and man-made environments. Potential mitigative measures are also evaluated.

The comment period will end on or about July 23, 1990.

Comments or inquiries should be directed to:

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5/21/90
Date

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT STATEMENT AND STATE ANALYSIS REPORT

Cedar Bay Cogeneration Project
AES/Cedar Bay, Incorporated
Jacksonville, Florida

(X) Draft
( ) Final

U.S. Environmental Protection Agency, Region IV
345 Courtland Street, NE
Atlanta, Georgia 30365

Florida Department of Environmental Regulation
Power Plant Siting Section
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1. Type of Action: Administrative (X) Legislative ( )

2. Description of Action

Applied Energy Services/Cedar Bay, Inc. (AES-CB) proposes to construct and operate a new source cogeneration facility known as the Cedar Bay Cogeneration Project (CBCP). This facility will consist of three circulating fluidized bed (CFB) boilers which will produce 225 megawatts (MW) of electricity for sale to Florida Power and Light Company (FPL) and 640,000 pounds per hour of process steam for sale to the Seminole Kraft (SK) paper mill. These facilities will be located on a 35 acre site adjacent to the existing SK paper mill in northern Duval County, Florida. AES-CB has applied to the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation (FDER) for permits necessary to operate and construct the proposed facility.

This joint document has been prepared to satisfy both the requirements of USEPA under the National Environmental Policy Act (NEPA) and of FDER under the Florida Power Plant Siting Act. The USEPA Region IV Administrator has determined that CBCP discharges of wastewater from construction and operation will be a New Source as defined by Section 306 of the Clean Water Act. The CBCP will require a National Pollutant Discharge Elimination System (NPDES) Permit. Issuance of this Permit would be a major Federal action significantly affecting the quality of the human environment and subject to the provisions of NEPA.

Consequently, the USEPA decided that an Environmental Impact Statement (EIS) should be prepared. Because under the Power Plant Siting Act FDER is required to prepare a State Analysis Report (SAR) containing information similar to that required in an EIS, USEPA and FDER have entered into a Memorandum of Understanding agreeing to prepare a single document. This joint document, referred to as the SAR/EIS, will meet the responsibilities of both agencies.

The determination of need for a new steam electric generating facility in Florida is the responsibility of the Florida Public Service Commission (FPSC). On June 30, 1989, the FPSC granted AES-CB and SK their petition for Determination of Need in the FPSC Order No. 21491. The order stated that the CBCP was a qualifying facility pursuant to the Public Utility Regulatory Policies Act of 1978 (PURPA) regulations and that AES-CB has negotiated a contract with FPL for the sale of capacity and energy at less than the statewide avoided cost. This being the case, the FPSC determined that CBCP is the most cost-effective alternative. The discussion of the conservation criterion concluded that, since cogeneration is not necessarily a conservation method, conservation and other demand-side alternatives as envisioned by Florida Energy Efficiency and Conservation Act are not germane to qualifying facility needs determination.

It is recognized that the FPSC order satisfies their own responsibilities in evaluating the need for the CBCP. However, this does not preclude the EIS process, which requires a clear definition of need for a project in order to evaluate a No-Action alternative and the alternative means of satisfying the need. After evaluating relevant documents prepared by the FPSC and the Florida Electric Power Coordinating Group (FCG), it has been determined that for this SAR/EIS the need for the project will be based on the following: 1) need for additional base load capacity of 225 MW for increased reliability in service, 2) need for displacement of the future consumption of 2.2 million barrels of oil per year or equivalent volume of natural gas, and 3) need for 640,000 pounds per hour (pounds/hour) of process steam for use by the SK paper mill.

It is proposed that the CBCP be constructed on the site of the existing SK paper mill in northern Duval County. The site is owned by SK. The total existing paper mill site consists of 425 acres. The new cogeneration facilities will occupy approximately 35 acres at the site and is to be located west of the existing mill and east of the Broward River and the mill lime settling ponds. The area to be occupied by the cogeneration plant is currently used for storage of lime mud from the mill and construction debris. A rail yard is located to the north and west of the proposed plant site. Due to previous disturbances, there is little vegetation on site. The existing vegetation is mostly grasses, weeds, and shrubs.

The proposed plant will consist of three 75 MW CFB boilers, a single steam turbine driven electrical generator, steam pipelines to supply the SK paper mill, mechanical draft cooling tower, coal handling facilities, coal and limestone storage facilities, stormwater runoff control ponds and a 138 kilovolt (KV) transmission line to transfer the power from the plant to the JEA and FPL power network systems. An interconnection from the CBCP to the JEA electric power grid will be made by constructing the transmission line from the cogeneration plant to the JEA's Eastport substation, which is located directly southeast and adjacent to the paper mill.

Initial site preparation will require the relocation of an estimated 230,000 cubic yards of the lime mud which has been stored on the plant site. The lime mud will be placed in a lime mud storage area in the northwestern portion of the SK property. Construction of the storage area will include a geomembrane cap and seeded earth cover.

Construction of the proposed plant and its associated disposal areas will disturb or eliminate approximately 30 acres of poor quality, previously disturbed wildlife habitat. Since paper mill operations have cleared most of the area already, and thereby reduced the value of this community as a habitat for wildlife, additional destruction of these areas will certainly hasten the demise of the biota associated with these areas.

The units are planned for coal-fired operation; however, provisions are being made in the design to allow for burning of wood waste as well. Based on a study of availability of coal sources east of the Mississippi River, there are practical sources of coal adequate to meet the plant's needs over the anticipated life of the project (approximately 1,105,000 tons per year). Coal is to be delivered to the site by train using the existing CSX railroad lines. The rail spur runs northwest to southeast on the site.

The air quality control system is designed on a "worst case" basis assuming the maximum sulfur (3.3 percent) and ash (18 percent) content in the coal and a minimum heating value (10,500 BTU/pound). The emission of air pollutants from the CBCP site are limited by Chapter 17-2, FAC, and by the New Source Performance Standards as imposed by the USEPA. In order to comply with these regulations, AES-CB proposes to utilize washed coal with a fluidized limestone bed to control emission of sulfur oxides. Particulate matter will be controlled by a fabric filter. It is estimated that approximately 354,000 tons per year of fly ash and 88,000 tons per year of bed ash could be generated. This material is to be disposed of by the coal supplier at an approved disposal location outside the State of Florida or sold to the building materials industry.

When all of the units are operating at 100% of rated capacity, the plant will consume 145 tons per hour of coal and will emit 1,913 pounds per hour of nitrogen oxides. The stack height of 425 feet will assist the control equipment in reducing ambient air quality impacts by insuring dispersion and dilution of air pollutants before the pollutants reach ground level at some distance from the site. Only during rare meteorological conditions will stack emissions reach the ground close to the plant.

The primary source of water for the plant will be groundwater from the Floridan aquifer. Fresh groundwater or reclaimed water from Jacksonville sewage treatment plants will be used as makeup to the recirculating cooling water system. Cooling towers will be located at the south end of the CBCP plant area. The maximum discharge temperature of cooling tower blowdown is expected to be 95 degrees Fahrenheit.

Wastewater from the construction and operation of the CBCP will originate from a number of sources such as cooling tower blowdown, boiler blowdown, metal cleaning wastes, sanitary wastes, site runoff, construction dewatering, and low volume wastes such as demineralizer blowdown, floor drains and laboratory wastes. All of the wastewater, except excess stormwater runoff, will be disposed of, after necessary treatment or pretreatment, via existing paper mill treatment and discharge facilities. An erosion and sediment control plan has been developed to minimize construction related runoff impacts.

3. Major Plant Systems Alternatives

Alternative Sites

AES-CB stated in their Site Certification Application (SCA) that the proposed site for the CBCP was an ideal construction site because of its proximity to the steam customer, the SK paper mill, and because the industrial nature of the proposed site (an IH, heavy industrial, zone) has been extensively disturbed by previous industrial use over the last 35 years. Even though the CBCP is in compliance with local zoning ordinances, it must also be found to be consistent with the North District Plan (NDP), prepared by the planning department of the City of Jacksonville. Assuming that the project conforms to the NDP and acknowledging that an alternative site would lengthen the steam delivery line, thereby increasing heat loss and reducing plant fuel use efficiency, further evaluation of alternative sites was determined not to be necessary.

Air Pollution Control Systems

Air emissions control system alternatives were evaluated considering the state of the art of emission control technology, environmental impacts,and economics. Major sulfur dioxide (SO_2) control alternatives included proper CFB boiler design and operation in conjunction with low sulfur coal, a pulverized coal (PC) boiler followed by a wet limestone scrubber system, and a PC boiler followed by a lime spray dryer system. Based on economics, energy, and environmental considerations, a CFB boiler system designed to meet a 90 percent removal requirement appears to represent Best Available Control Technology (BACT). Particulate control alternatives included fabric filters and electrostatic precipitators. The fabric filters were chosen because of the high particulate control rate. Alternatives to controlling nitrogen oxides (NO_x) emissions include proper boiler design and operation, selective catalytic reduction (SCR), and selective noncatalytic reduction (SNRC, or Thermal $DeNO_x$) control technologies. SNRC is the preferable alternative for NO_x control unless it can be shown clearly that it does not represent BACT.

Cooling Systems

Cooling systems alternatives included the heat dissipation system, the water source, and the discharge receiving body. The primary use of water at the CBCP will be for evaporation in the heat dissipation system. Alternatives examined for the heat dissipation system include once-through cooling, dry and wet-dry cooling towers, wet natural draft cooling towers, and mechanical draft cooling towers. Based on energy and economic considerations, rectangular mechanical draft cooling towers were chosen. Use of surface water, groundwater, recycled wastewater, and reclaimed water (municipal wastewater treatment plant effluent) were the alternatives examined for the cooling water source. The CBCP will use groundwater from the Floridan aquifer as its primary water source and draw from existing SK wells. At the time the City of Jacksonville can provide treated wastewater of sufficient quality, the CBCP will use reclaimed water in the cooling towers, with groundwater used only as a backup. AES-CB has agreed to the St. Johns River Water Management District's (SJRWMD) condition that calls for the use of reclaimed water. Cooling water discharge alternatives include discharge to the Broward River, recycling of treated cooling water, or discharge via SK's existing outfall into the St. Johns River. Discharge through the existing outfall is the chosen alternative.

Water/Wastewater Systems

Because of the high quality and low volume of water needed for potable water uses, no alternative to groundwater use is proposed for secondary water uses. The primary use of water will be for make-up to the cooling system, as described above. Cooling tower blowdown will be routed directly to the existing SK St. Johns River outfall. Surface runoff and yard drains during both construction and operation will be directed to retention ponds after which it will be routed to the existing SK treatment system or directly to the St. Johns River outfall.

One recommended alternative is addition of sand/gravel filters in the retention ponds for improved removal of silt. All other wastewater will be routed to the existing SK wastewater treatment facilities. Wastewater from construction dewatering will be treated by AES before discharge to the existing SK once-through cooling system. Excess runoff from storms exceeding the 10-year, 24-hour rainfall event may be discharged to the Broward River.

Solid Waste Systems

Alternatives were considered for disposal of high volume solid wastes, which for the CBCP include bed ash and fly ash. Alternatives to disposal of bed ash include wet sluicing to a lined ash pond, wet sluicing to dewatering bins with landfill disposal, mechanical ash removal with landfill disposal, and pelletizing with disposal by the coal supplier outside of Florida (or sold within the building industry). Alternatives to disposal of fly ash include wet sluicing to an ash pond for disposal, vacuum conveyance with landfill disposal, and pelletizing with disposal by the coal supplier. Disposal outside the State of Florida by the coal supplier (or sold within the building industry) is the chosen alternative for both types of ash.

4. Alternative Means of Satisfying the Need for the Project

Part 1502.14, Title 40 of the Code of Federal Regulations (40 CFR 1502.14) of the implementation regulations for NEPA require that all reasonable alternatives to the proposed action be considered in the EIS process. The determination of need for the CBCP is based on the need for additional electricity generating capacity and for the displacement of future oil consumption. Analyses of alternative means of satisfying the need for the project are to determine if the proposed project represents the lowest cost and most environmentally sound alternative available to provide electric power to FPL, to displace future oil and/or natural gas consumption, and to provide process steam for use by the SK paper mill. The FPSC did not consider any alternatives to fulfill these requirements during their evaluation of need for this project. Subsequently, the FCG's 1989 Generation Expansion Planning Studies document was used as the basis for alternative development for this SAR/EIS. The alternatives were selected based on their ability to meet the following objectives:

* the alternative must supply at least 225 MW of electric power;

* the alternative must displace at least 2.2 million barrels of oil consumption or natural gas equivalent; and

* need for 640,000 pounds/hour of process steam for use by the SK paper mill.

Based on these criteria, the following five alternative power systems plus the No Action Alternative were developed for evaluation in the SAR/EIS.

Alternative 1 - Purchase of Power

The purchase of power is dependent on the availability of power from an outside utility and the availability of power transmission. As documented in the FCG's 1989 Generation Planning Studies, in September 1985, a detailed study of the economic viability of additional transmission capacity into the state of Florida was completed. This study evaluated the cost-effectiveness of constructing additional transmission facilities in order to raise the transfer capability above the current 3,200 MW level. The study reaches the conclusion that it is unlikely that additional transfers from either the Southern Company or the Tennessee Valley Authority (TVA) above the existing 3,200 MW transfer capability would be economical given the current fuel price outlook. Also, a sensitivity analysis showed minimal reliability benefit from an increase in transfer capability.

Alternative 2 - Residential Solar Hot Water Heaters

Under this alternative, it is assumed that FPL would sponsor a retrofitting of solar water heaters for 50% of all new and 10% of all existing customers in its service areas. Each solar water heater unit is expected to replace the use of approximately 2,100 kilowatt-hour (KWH) of electricity per year at the end of the installation period. This replacement would save FPL approximately 2.4 million barrels of oil per year. The solar water heaters would displace oil-fired generating capacity, and would generate no air pollutants, wastewater discharges, or solid wastes. In addition, they would require no increase in groundwater consumption. The implementation of the solar water heater program would also be expected to boost employment by about 1,650 new jobs for each year of the program in the area of manufacturing and installation of these units. The use of these units, however, would require provision for backup power sufficient to meet peak demand in case weather conditions render them ineffective for an extended period of time. Other disadvantages of this alternative include the complexity of coordination and implementation efforts, the questionable reliability of the heaters, and the large amount of maintenance required.

Alternative 3 - Construction of a Combustion Turbine Power Plant with Coal Gasification

FPL or the applicant would build a combustion turbine power facility with a capacity of 225 MW at the proposed project site. The facility would be comprised of three 75 MW gas turbine generators with Heat Recovery Steam Generators (HRSG). Fuel for the facility would be generated in a fully integrated coal gasification system. Gasification is the process by which coal is converted into a combustible gaseous fuel for consumption. The coal gasification process generates a low BTU gas to be burned in the gas turbines. This is considered a "clean coal technology" in that coal is gasified, the gas generated is then scrubbed of particulates and ammonia and then the sulfur is removed. The coal gas can be a substitute fuel for natural gas. This type of power plant has the ability to meet air emissions restrictions. The installation of a combustion turbine would not be economically feasible unless the low pressure steam produced by the HRSG is utilized in some process. Disadvantages of this alternative include: it involves a highly complex refining process; the technology is just starting to come out of the demonstration stage to commercial viability; it may have problems with high CO_2 emissions; and it requires a high level of maintenance.

Alternative 4 - Construction of a Combined Cycle Coal Gasification Power Plant

FPL or the applicant would build a combined cycle coal gasification power facility with a capacity of 225 MW at the proposed project site. Gasification is the process by which coal is converted into a combustible gaseous fuel for consumption. The facility would be comprised of a gasification combined cycle plant with two 114 MW combined cycle units and a gasification unit. Each combined cycle unit would consist of two gas turbines with associated HRSGs and one steam turbine. The condenser cooling system would require a freshwater source to cool through evaporation and heat transfer. Primary plant stack emissions would be SO_2 and NO_2. The combined cycle technology has many advantages: relatively low investment requirements, phased construction, high operating efficiency and fuel flexibility (natural gas, fuel oil, or gas derived from coal), and ability to meet air emissions restrictions. Disadvantages of this alternative include: it involves a highly complex refining process; the technology is just starting to come out of the demonstration stage to commercial viability; it may have problems with high CO_2 emissions; and it requires a high level of maintenance.

Alternative 5 - Construction of a Conventional Coal-Fired Power Plant

FPL or the applicant would build a conventional coal-fired power plant with a capacity of 225 MW at the same site as the proposed project. The facility would comprise a single pulverized coal/high pressure boiler with a steam turbine generator set. Current design practices relative to NO_x would need to be incorporated in the boiler and burner designs. These units are highly efficient and are capable of burning low-cost widely available coal. However, operation of such a plant would require expensive pollution control facilities to avoid major environmental impacts on air quality.

5. Summary of the Major Environmental Impacts of the Proposed Project and the Alternatives

Proposed Project

The construction of the rail spur and new lime mud disposal area will affect some of the resident gopher tortoise (*Gopherus polyphemus*) population. It should be noted that the den of a gopher tortoise is extremely important as a retreat or hibernaculum to no less than 30 vertebrate and invertebrate species, and many of these organisms rely exclusively on the tortoise burrow for shelter. It may be necessary to relocate gopher tortoise populations as well as some of the associated species.

During plant construction, Class III water quality standards will be met in the discharge of dewatering effluent during construction of the CBCP, except for copper. With respect to copper, the effluent will be treated to achieve a quality at least as good as existing ambient water quality in the Broward River and will be better than the existing copper concentrations in the St. Johns River. Accordingly, FDER has recommended that a two year variance be granted for copper.

Runoff from unusable spoil material and lime mud which is to be stockpiled on the north end of the SK site could potentially affect surface water quality and/or groundwater quality. Details on how and where this runoff will be directed has not as yet been provided by AES-CB.

The major operation impacts of the proposed project primarily affect air resources, the water quality of the St. Johns and Broward Rivers, and groundwater resources in the area. No violation of National Ambient Air Quality Standards or Prevention of Significant Deterioration (PSD) increments is projected for the Jacksonville area or the Okeefenokee Swamp in response to operation of the CBCP. In fact, the project as proposed will result in overall reductions in ambient air quality impacts.

Operation of CBCP will increase emissions of carbon dioxide. Carbon dioxide is one of several "greenhouse" gases which collectively function to retain heat energy, effectively warming the earth's surface.

During operation of CBCP, pollutant concentrations in the wastewater discharge to the St. Johns River are projected to comply with Class III water quality criteria, except for iron. With respect to iron, the cooling tower will concentrate iron present in well water since iron concentrations occur naturally in the Floridan aquifer. The background level of iron in the St. Johns River frequently is above the Class III standard of 0.3 milligrams per liter. The iron proposed to be discharged is essentially equivalent to concentrations which presently exist in the St. Johns River. Accordingly, a variance for iron has been recommended by FDER.

Some drawdown of the Floridan Aquifer and increased long-term potential for chloride intrusion in the Aquifer would result from groundwater withdrawals at CBCP. Due to existing drought conditions the water pressure in artesian wells has dropped significantly. Artesian and pumped wells close to the site could experience slight reductions in flow or yield. The SJRWMD has reviewed the proposed groundwater withdrawals and concluded that the withdrawals would not cause saline water intrusion or aggravate any of the existing saline water intrusions. SJRWMD also stipulated that at the time the City of Jacksonville can provide treated wastewater of sufficient quality, the CBCP will use reclaimed water in the cooling towers, with groundwater used only as a backup. AES-CB has agreed to the SJRWMD's condition that calls for the use of reclaimed water.

<u>Alternatives</u>

The No Action Alternative, the Purchase Power Alternative, and Alternative 2 (Residential Solar Water Heaters) appear to have little to no environmental impacts during construction and operation. This is misleading for the Purchase Power Alternative because the evaluation only addressed local impacts and not impacts at the site of purchase power generation which in turn could be as significant as those impacts created by the proposed project.

Alternative 2 appears to have a positive impact during construction because of the creation of jobs. Construction and installation would create localized noise and traffic problems at the individual residences for this alternative but thse impacts would be extremely minor in comparison to the power plant alternatives. Although not environmental considerations, the complexity of coordination and implementation efforts and the questionable reliability of the heaters must be considered in the evaluation of this alternative.

Impacts for the power plant alternatives (Alternatives 3, 4, and 5) during construction and operation are similar to those expected for the CBCP.

6. Mitigation Measures for the Proposed Project

Several measures which would be employed to mitigate the potential impacts of the proposed project on the surrounding environment were identified during the environmental review process. The relocation of affected animals (gopher tortoises) will be done in consultation and conformance with the Game and Freshwater Fish Commission requirements. Construction- related impacts on air resources will be mitigated by employing suitable fugitive dust and burning emission controls. Impacts of construction on water resources can be mitigated by implementation of a comprehensive erosion and sediment control plan and effective treatment of wastewater discharges. Addition of sand/gravel filter systems to the retention ponds for improved removal of silt is recommended. A sedimentation pond will be provided for construction impacted runoff. A physical/chemical treatment system will be required for plant dewatering wastes. Treatment by this system is needed to reduce copper, iron, zinc, and other metals.

Operation-related impacts will be controlled to the best extent practicable. Recirculating cooling towers (with dechlorination) will be used to treat waste heat; sedimentation for stormwater runoff; reuse for boiler blowdown; neutralization and/or oil removal as pretreatment followed by further treatment in the SK industrial waste treatment system (IWTS) for low volume wastes; offsite disposal and/or physical/chemical treatment for metal cleaning wastes; and sedimentation followed by further treatment in the SK IWTS for coal, limestone, and ash storage area runoff. CBCP will use high quality treated wastewater in the cooling towers when it becomes available, in lieu of groundwater. Air emissions will be controlled with fabric filters and boiler design. Fugitive coal dust, limestone dust, fly ash, and spent limestone will be controlled with water spray dust suppression systems, enclosed conveyors, and fabric filters (filters for coal dust only at conveyor transfer points). Total suspended particulates in the cooling tower drift will be controlled by the use of drift eliminators and by limiting the cycles of concentration in the cooling system. AES has set aside money as part of the CBCP to plant trees in order to mitigate carbon dioxide "greenhouse" effects.

7. Unresolved Issues

Numerous changes to the project scope and the SK mill processes have occurred during the preparation of this EIS. The following unresolved issues need to be addressed before completion of the FEIS and issuance of the NPDES permit.

Air Quality

It is unclear at this time whether SNCR should represent BACT for the AES boilers. Therefore, it is important that all available information concerning the proposed level of BACT and the SNCR alternative be submitted by AES prior to the issuance of the FEIS. This information should include, among other things, a comparative analysis between the AES boilers and other CFB's which have been required to install SNCR. This analysis should document any differences in energy, environmental, or economic concerns, between the facilities so that a final BACT recommendation can be made.

Erosion and Sediment Control Plan

Revisions to the Erosion and Sediment Control Plan submitted by AES-CB will be necessary before it is consistent with requirements of Part III.D of the draft NPDES permit and can be considered an acceptable Plan. Specific concerns include: absence of inspection, monitoring and reporting requirements; potential runoff from the lime mud storage area; potential runoff from unusable material which is to be stockpiled on the north end of the SK site; and apparently inadequate size of the Yard Area Runoff Pond.

SK Conversion to Recycled Paperboard

SK is planning to convert their facilities to accommodate recycled paperboard, replacing wood as a raw material in their operations. SK conversion to recycled paperboard will significantly reduce the SK waste flow and will change the characteristics of the combined SK/CBCP effluent from that which has presently been provided in the SCA. Reevaluation of the waste flow is needed in the FEIS. In addition, it is unclear whether or not wood wastes will be burned at CBCP after conversion to recycled paperboard. This could affect air quality evaluations. Clarification is needed before issuance of the FEIS.

Toxicity of CBCP Waste Stream

Some agreement will have to be established between AES-CB and SK as to how resolution of future toxicity problems will be effected, should they occur, if CBCP wastes discharged into the SK system prove to be more toxic than presently anticipated and result in the SK effluent being acutely toxic. Present evaluation indicates that additional treatment and/or dilution in the SK treatment system may render the combined waste not acutely toxic. However, the SK manufacturing process is being modified and dilution flow will decrease in the future. SK is (and will remain) subject to toxicity monitoring of the total effluent exiting its treatment system. In addition, facilities at SK (some of which may have been in operation for 10 to 20 years or more) may be approaching useful life expectancy. EPA has no assurance that SK will be in operation over the useful lifetime of the CBCP. Assurances on these points prior to FEIS issuance are desirable.

Waste Effluent Treatment Systems

Details on treatment systems proposed for dewatering wastes and metal cleaning wastes (both chemical and nonchemical) have not been provided by AES-CB and therefore cannot be evaluated to determine if adequate treatment can be provided to meet NPDES requirements. A thorough description of these treatment systems is needed prior to FEIS issuance.

Groundwater

The SJRWMD required AES-CB to use the USGS groundwater flow and transport models to perform a hydrologic investigation to determine the impacts of the proposed withdrawals on existing legal users and the impacts to the groundwater resources itself. Concerns relating to the limitations of this modeling effort include the following: 1) large grid size used may have masked significant localized effects; 2) normal faults neglected in the model could possibly, on a smaller scale, allow chloride contamination to increase in the upper water bearing zone; 3) apparently existing pumpage rates were used rather than the full permitted pumpage rates for the existing permitted uses; and 4) assumption of constant head boundary conditions could bias the piezometric head in the upper water bearing zone. It is recommended that sensitivity analyses be conducted to evaluate the effects of these concerns. Results of these analyses need to be included in the FEIS. In addition, if estimates of anticipated future applications for groundwater withdrawals are available, it is recommended that this information be included in the analysis described above.

8. USEPA's Preferred Alternative and Recommended Action

It is anticipated that AES-CB and SK will resolve the outstanding environmental issues associated with the CBCP. Based on preliminary findings, USEPA tentatively proposes to issue the NPDES Permit with conditions (See Appendix B, Draft NPDES Permit). CBCP appears to be an economically advantageous project for Jacksonville, its citizens, and FPL and it customers. Not only does it displace oil and/or natural gas, but by providing steam to the SK paper mill, it allows for removal of old boilers, thereby producing a net decrease in emissions of air pollutants. In addition, it provides additional generating capacity for the utilities which would have to be constructed at a later time as system demand rises and older units are phased out of use. Given the advantages offered by CBCP and pending resolution of the outstanding issues, USEPA finds the proposed project, CBCP, to be the preferred alternative. The environmentally preferable components of CBCP are:

* Ambient air quality will be improved in the Jacksonville area and in the Okeefenokee Swamp area.

* Thermal water discharges as a result of the existing SK once-through cooling system will be significantly reduced. Elimination of this system will also eliminate entrainment and impingement of aquatic species into the SK cooling system.

* Existing contamination near the site will be cleaned up, or monitored for potential remedial actions, as appropriate.

* Utilizing a previously impacted industrial site makes impacts on wildlife and wildlife habitat from the project minimal.

It must be noted that based on the initial findings of this SAR/EIS, various system alternatives to the proposed project are available which appear to be environmentally sound as well as economically feasible. These are:

* SNRC is the preferable alternative for NO_x control unless it can be shown clearly that it does not represent BACT.

* At the time the City of Jacksonville can provide treated wastewater of sufficient quality, the CBCP will use reclaimed water in the cooling towers, with groundwater used only as a backup. AES-CB has agreed to the SJRWMD's condition that calls for the use of reclaimed water.

* The addition of sand/gravel filters in the retention ponds for improved removal of silt is a viable alternative.

9. FDER's Recommendations

FDER has recommended certification of the Cedar Bay Project. This recommendation is based on the following rationale:

1. Replacement of old pulp mill facilities by the CBCP will reduce existing ambient air quality impacts.

2. Relocation of old lime mud piles to a proper area could alleviate an existing situation causing a violation of groundwater quality standards and reduce an additional loading of heavy metals to the St. Johns Estuary.

3. Discharges from the SK wastewater treatment system can contribute contaminants to the St. Johns River which already contains excessive amounts of those contaminants. Proper operation of the wastewater treatment facility, use of mixing zones and approval of variances for some metals would allow certification to be granted.

If the Cedar Bay Cogeneration Project should receive State of Florida Certification, FDER recommends that the Conditions of Certification (Appendix D) be imposed to ensure that the construction and operation of the CBCP is in conformance with the applicable standards, regulations and laws of this State and that the facility have minimal adverse impact on the environment.

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

TABLE OF CONTENTS
(Cont'd.)

<u>TABLE OF CONTENTS</u>
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LIST OF TABLES

LIST OF TABLES
(Cont'd)

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
AES-CB	Applied Energy Services Cedar Bay, Inc.
AREA	American Railroad Engineering Association
As	Arsenic
B	Boron
BACT	Best Available Control Technology
Be	Beryllium
BOD	Biochemical Oxygen Demand
Btu	British thermal unit
Btu/h	British thermal unit per hour
Btu/KWh	British thermal unit of energy required to produce 1 kilowatt-hour of electricity
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CBCP	Cedar Bay Cogeneration Project
Cd	Cadmium
CFB	Circulating Fluidized Bed
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
COM	Coal-Oil Mixture
CWA	Clean Water Act
dBA	Decibels (A-weighted)
ECFRPC	The Eastern Central Florida Regional Planning Commission
EID	Environmental Information Document
EIS	Environmental Impact Statement
ERA	The Economic Regulatory Administration
ESP	Electrostatic Precipitator
F	Degrees Fahrenheit
FAA	The Federal Aviation Administration
FAC	Florida Administrative Code
FAWPCA	The Florida Air and Water Pollution Control Act
FCG	The Florida Electric Power Coordinating Group
FCREPA	The Florida Committee on Rare & Endangered Plants & Animals
FDA	The Florida Department of Agriculture

LIST OF ACRONYMS AND ABBREVIATIONS

(Cont'd.)

FDS DHR	The Florida Department of State, Division of Historical Resources
FDAHR	The Florida Division of Archives, History and Records
FDCA	The Florida Department of Community Affairs
FDER	The Florida Department of Environmental Regulation
FDOT	The Florida Department of Transportation
FECL	The Florida East Coast Line
FEECA	Florida Energy Efficiency and Conservation Act
FEPPSA	Florida Electrical Power Plant Siting Act (also referred to as the the Siting Act)
FERC	The Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
FGFWFC	The Florida Game and Fresh Water Fish Commission
Fl	Fluoride
FPC	The Florida Power Corporation
FP&L	The Florida Power & Light Company
FPSC	The Florida Public Service Commission
F.S.	Florida Statutes
Fuel Use Act	Federal Power Plant and Industrial Fuel Use Act of 1978
g	Grams
GEP	Good Engineering Practice
GU	Government Use
gpd	Gallons per day
gpm	Gallons per minute
GWh	Gigawatts - hours = one billion watt-hours
HC	Hydrocarbons
HCl	Hydrochloric acid
Hg	Mercury
HRSG	Heat recovery steam generators
H_2SO_4	Sulfuric Acid
IH	Industrial Heavy Zone
ISCST	Industrial Source Complex Short Term air pollutant dispersion model
IW	Industrial Waterfront Zone
IWTS	Industrial Wastewater Treatment System

LIST OF ACRONYMS AND ABBREVIATIONS

(Cont'd.)

JAPB	The Jacksonville Area Planning Board
JPD	The Jacksonville Planning Department
JEA	The Jacksonville Electric Authority
Km	Kilometers (1 Km = 0.6214 mile)
KRB	Kraft Recovery Boiler
kV	Kilovolt = one thousand volts
KWh	Kilowatt hours = one thousand watt-hours
lb/hr	Pounds per hour
lb/MBtu	Pounds per million British thermal units
LC50	Lethal concentration of a pollutant at which 50% of the test population die in 96 hours
LWBZ	Lower water bearing zone, refers to the Oldsmar Limestone Stratigraphic Unit of the Floridan Aquifer System
mgd	Million gallons per day
mg/l	Milligrams per liter ($\simeq$ parts per million)
mg/m^3	Milligrams per cubic meter
Mo	Molybdenum
MW	Megawatts
MWh	Megawatt hour = one million watt-hours
NAAQS	National Ambient Air Quality Standards
NDP	North District Plan
NEA	National Energy Act of 1978
NEPA	National Environmental Policy Act of 1969
NOx, NO_2	Nitrogen Oxides, Nitrogen Dioxide
NPDES	National Pollution Discharge Elimination System
NSPS	New Source Performance Standards
OSN	NPDES Outfall Serial Number
Pb	Lead
POD	Point of Discharge
ppm	Parts per million ($\simeq$ milligrams per liter)
PSD	Prevention of Significant Deterioration
psig	Pounds per square inch gauge
PURPA	Public Utility Regulatory Policies Act of 1978
RDF	Refuse Derived Fuel

LIST OF ACRONYMS AND ABBREVIATIONS

(Cont'd.)

SAR	State Analysis Report
SAR/EIS	State Analysis Report/Environmental Impact Statement
SCA/EID	Site Certification Application/Environmental Information Document prepared by AES-CB
SCR	Selective Catalytic Reduction
SERC	Southeastern Electric Reliability Council
SHPO	State Historic Preservation Officier
SJRPP	The St. Johns River Power Park
SJRWMD	The St. Johns River Water Management District
SK	The Seminole-Kraft Corporation
Siting Act	Florida Electrical Power Plant Siting Act (see FEPPSA)
SNCR	Selective Non-Catalytic Reduction
SO_2, SO_x	Sulfur dioxide, Sulfur Oxides
SOU	The Southern Company
TDS	Total Dissolved Solids
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TVA	The Tennessee Valley Authority
ug	Microgram
ug/m^3	Micrograms per cubic meter
USCG	The U.S. Coast Guard
USCOE	The U.S. Corps of Engineers
USDOE	The U.S. Department of Energy
USFWS	The U.S. Fish and Wildlife Service
USGS	The U.S. Geological Survey
USEPA (or EPA)	The U.S. Environmental Protection Agency
USSCS	The U.S. Department of Agriculture Soil Conservation Service
UWBZ	Upper water bearing zone, refers to the Ocala Group Stratigraphic Unit of the Florida Aquifer System
VOC	Volatile Organic Compounds
WTP	Wastewater Treatment Plant

CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

Applied Energy Services Cedar Bay, Inc. (AES-CB) proposes to construct and operate a new source cogeneration facility known as the Cedar Bay Cogeneration Project (CBCP). This facility will consist of three circulating fluidized bed (CFB) boilers burning coal and woodwaste, which will produce 225 MW of electricity for sale to Florida Power and Light Company (FP&L) and 640,000 lbs/hr of process steam for sale to the SK paper mill. These facilities will be located on a 35 acre site adjacent to the existing SK paper mill in northern Duval County, Florida. AES-CB has applied to the U.S. Environmental Protection Agency (USEPA), the Florida Department of Environmental Regulation (FDER), and other federal agencies for permits necessary to operate and construct the proposed facility.

This document constitutes both the FDER Staff Analysis Report (SAR) and the USEPA Environmental Impact Statement (EIS) prepared jointly by USEPA and FDER for the proposed project. This chapter provides an introduction to the project including: (1) a summary of USEPA and FDER responsibilities for the SAR/EIS; (2) a discussion of other federal requirements relevant to the proposed project; (3) a summary of the coordination conducted between the USEPA and FDER during preparation of the SAR/EIS; (4) a description of the background and need for the proposed project; and (5) a summary of the issues to be addressed in the SAR/EIS.

1.1 USEPA AND FDER RESPONSIBILITY FOR THE SAR/EIS

1.1.1 USEPA Responsibility for the EIS

Under Section 511(c) of the Clean Water Act (CWA), USEPA must comply with the National Environmental Policy Act of 1969 (NEPA) prior to issuance of a New Source National Pollution Discharge Elimination System (NPDES) permit (Note: A new source under the CAA is not subject to independent NEPA review). NEPA requires federal agencies to prepare an EIS on every major Federal action significantly affecting the quality of the human environment. In this particular case, USEPA has determined that the CBCP proposed by AES-CB is a new source for which new source performance standards have been promulgated (40 CFR 423.15) and that an EIS must be prepared.

1.1.2 FDER's Responsibility for the SAR

Under provisions of the Florida Electrical Power Plant Siting Act (Siting Act, Chapter 403.501-519, F.S.), FDER must prepare an SAR upon which the State's decision to license any new steam electric power plant will be made. The purpose of the power plant siting program is to provide an efficient, comprehensive, coordinated, one-stop permitting approach to the State evaluation of electric power plant location and operation. In accordance with the Siting Act, no construction or expansion of a new electrical power plant may be initiated without site certification by the State. Following submittal of FDER's recommendations regarding site certification, the final site certification for all activities requiring State permits must be issued by the Governor and the State Cabinet.

1.1.3 Memorandum of Understanding for Preparation of a Joint SAR/EIS Document

In previous years, USEPA and FDER published separate reports to meet their responsibilities under NEPA and the Siting Act. In 1980, a Memorandum of Understanding was executed between USEPA and FDER whereby it was agreed that a single document would be produced to serve both as the SAR and EIS and that the two agencies would take steps to minimize duplication of effort and to maximize cooperation of effort in the licensing of new power plants in Florida. This joint document will meet the responsibilities of both agencies and will be known as the Cedar Bay Cogeneration Project State Analysis Report/Environmental Impact Statement (SAR/EIS).

The objectives of the SAR/EIS are as follows:

- to describe the need for the new generating station as determined by the Florida Public Service Commission (FPSC);

- to develop and evaluate all reasonable alternatives to the project;
- to fully describe the selected project and its resulting impacts; and
- to investigate and describe measures that could be taken to eliminate or minimize identified adverse impacts.

1.2 OTHER FEDERAL REQUIREMENTS

Several other Federal and State requirements must also be met for the complete licensing of the CBCP. These include Prevention of Significant Deterioration (PSD) under the Clean Air Act (CAA); compliance with the Endangered Species Act of 1973 (as amended); compliance with Executive Order No. 11990 for protection of wetlands and Executive Order No. 11988 concerning development in flood prone areas; and Federal Aviation Administration (FAA) approval for emission stack heights.

1.3 COORDINATION BETWEEN USEPA AND FDER

Extensive coordination between the USEPA and FDER occurred during the preparation of the SAR/EIS. This coordination consisted primarily of several preliminary planning sessions and formal meetings between USEPA, its consultants, and FDER. USEPA and FDER jointly sponsored the public scoping meeting on January 24, 1989, in order to obtain input on key issues for determining the scope of the project. Both agencies will also conduct public hearings on the SAR/EIS. Additional coordination was also conducted via an exchange of technical information concerning the proposed project. In general, FDER took the responsibility of evaluating the environmental impacts of the proposed project while USEPA was responsible for defining and evaluating the alternatives to the project and preparing the SAR/EIS. Through mutual review of each output, FDER and USEPA satisfied the goals of the Memorandum of Understanding by complying with each agency's responsibilities for permitting while avoiding duplication of effort.

1.4 BACKGROUND OF THE PROJECT

This section provides an overview of the proposed CBCP. Included are an identification of the applicants and a history of the project.

1.4.1 Identification of the Applicants

The proposed project is a joint effort of AES-CB and SK. AES-CB is the lead applicant for the necessary permits.

1.4.1.1 AES/Cedar Bay Incorporated

AES-CB is a wholly owned subsidiary of Applied Energy Services, Inc., a privately held corporation that builds, owns and operates cogeneration facilities that sell steam and electricity to industrial and utility customers. AES Inc. currently operates 350 MW of capacity at three facilities in California, Pennsylvania and Texas. Two more plants with a combined capacity of 500 MW are under construction in Connecticut and Oklahoma. The objective of AES-CB is to be a long-term, low cost, reliable supplier of energy concentrating on innovative coal-burning technology.

1.4.1.2 Seminole Kraft Corporation

SK is a privately held corporation which owns and operates the SK paper mill. The mill produces unbleached liner board and kraft paper and has been in operation under SK since April 1987. Stone Container Corporation, which owns 60 percent of SK common stock, has management responsibility for the mill and buys all of the mill's output. The mill was operated for 33 years prior to ceasing operation in 1985 prior to being purchased by SK. After rehabilitation and modernization the mill reopened in 1987 and now employs approximately 350 people.

1.4.2 History of the Project

The proposed project was developed after a series of extensive studies conducted by AES-CB and SK. AES-CB was searching for a suitable cogeneration site. SK was seeking to modernize the existing mill and to replace the existing chemical recovery boiler to comply with new air emission limitations on total reduced sulfur which is a significant source of odors.

1.4.3 Permit Applications

On November 14, 1988, AES-CB concurrently submitted an NPDES permit application to USEPA and a SCA to FDER for the proposed cogeneration project at the SK site. Several amendments to these documents were subsequently filed. In response to these applications, USEPA began cooperative efforts with the FDER to prepare the SCA/EIS in order to satisfy the legal responsibilities of both agencies for licensing the New Source power plant. A joint public scoping meeting was held in Jacksonville on January 24, 1989, to solicit public input to the scoping of the SAR/EIS.

1.5 NEED FOR THE PROJECT

In the case of a new power plant in Florida, the determination of need for the project is made by the Florida Public Service Commission (FPSC). According to Sections 403.508 and 403.519, Florida Statutes a formal Determination of Need must be made by the FPSC prior to certification of a power plant subject to the Siting Act. This determination serves as the report required of the PSC as part of the state power plant siting proceedings.

The FPSC received the petition for determination of need as included in the SCA on November 14, 1988, from AES-CB for the 225 MW fluidized bed cogeneration facility. The 225 MW would be sold to Florida Power and Light Company via transmission line interconnections through the Jacksonville Electric Authority system. Section 403.519, Florida Statutes requires the FPSC to consider the following criteria in making a determination of need for the project:

- Need for electric system reliability and integrity;
- Need for adequate electricity at reasonable cost;
- Whether the proposed plant is the most cost-effective alternative available;
- Conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant; and
- Other matters within its jurisdiction which the PSC deems relevant.

On April 24, 1989, the FPSC conducted a public hearing to determine the need of the proposed CBCP. On June 30, 1989, the FPSC granted AES-CB and SK their petition for Determination of Need in the FPSC Order No. 21491 (Docket No. 881472-EQ). A copy of the order is attached and included herein as Appendix E.

The order stated that the cogeneration project is a qualifying facility pursuant to FPSC Rule 25-17.083. The FPSC rules implementing the Federal Energy Regulatory Commission's (FERC) regulations adopted under the Public Utility Regulatory Policies Act (PURPA) define "qualifying facilities" as cogenerators or small power producers. The order asserted that the criterion for cost effectiveness was met without a description of alternatives and their costs. It was stated that the CBCP was a qualifying facility pursuant to their rules and that AES-CB has negotiated a contract with FP&L for the sale of firm capacity and energy at less than the statewide avoided cost. This being the case, the FPSC found the proposed facility "to be most cost-effective alternative available". The discussion of the conservation criterion concluded that, since cogeneration is not necessarily a conservation method, "conservation and other demand-side alternatives as envisioned by FEECA are not germane to qualifying facility needs determinations."

It is recognized that the FPSC order satisfies the Commission's responsibilities in evaluating the need for the CBCP. However, this does not preclude the EIS process, which requires a clear definition of need for a project in order to evaluate a No-Action alternative (refer to Section 2.5) and the alternative means of satisfying the need (refer to Section 2.8). For the purposes of demonstrating need for the project in this EIS, only the 225 MW CFB cogeneration facilities were addressed, since the generation from the chemical recovery boiler only replaces existing internal generation and the 42 MW generation is below the 75 MW threshold in the Siting Act (Section 403.506 F.S.).

The need for the cogeneration facilities was stated in the SCA in three (3) ways:

(1) additional capacity is needed to provide reliable service to utility customers by increasing Peninsular Florida's reserve margin;

(2) use of coal-fired cogeneration facilities displaces the future consumption of oil and natural gas from 1993 to 2025;

(3) process steam is needed by SK for their papermaking process.

After evaluating relevant documents prepared by the FPSC and the FCG, it has been determined that for this SAR/EIS the need for the project will be based on the following:

(1) need for additional base load capacity of 225 MW for increased reliability in service,

(2) need for displacement of the future consumption of 2.2 million barrels of oil per year or equivalent volume of natural gas, and

(3) need for 640,000 lb/hr of process steam for use by the SK paper mill.

These needs are defined to be needs to be met during the period between 1996 and the year 2025. The year 1996 is selected as the implementation year rather than the CBCP startup year (1993) because PP&L has stated in their Ten Year Power Plant Site Plan (1989-1998) a significant power need by 1996 (2,894 MW). The system alternatives as presented in Section 2.8, Alternative Means of Satisfying the Need for the Project, were developed using these needs as the basis.

1.6 ISSUES TO BE ADDRESSED IN THE SAR/EIS

Several key issues to be addressed in the SAR/EIS concerning the proposed project were identified through internal agency review by USEPA and FDER and as a result of the public scoping meeting held in Jacksonville on January 24, 1989. The following is a summary of these issues:

- Concern about the air quality impacts of plant emissions of sulfur dioxide (SO2), carbon dioxide (CO2), oxides of nitrogen (NOx), total reduced sulfur (TRS), and particulates (from coal, ash and limestone handling).
- Effect of plant operation on ambient odor and air quality.
- Local weather patterns and cumulative effects on air quality, acid rain and Greenhouse Effect.
- Concern about water quality impacts and recreational fishing in the Broward River.
- Concern about the destruction of wetlands and construction in the 100 year flood plain which might violate the local comprehensive plan.
- Concern about consumption of groundwater and drawdown impacts on private wells.
- Concern about waste disposal including disposal of lime sludge.
- Concern about the noise and vibrations caused by rail traffic, conveyor operation and plant operation and construction.
- Concern about plant discharges and operation on Manatees.
- Concern about operation of the power plant if the paper mill were too close.
- Concern about the plant's appearance, impacts of plant lighting at night including the potential annoyance of aircraft warning lights at night
- Concern about the interruption of boat traffic into the

Broward River and potential conflict with the scheduled improvements to Hecksher Drive and bridge replacement due to the proposed coal conveyor.

- Concern about the effects of increased truck, rail, and barge traffic to the site.
- Concern about the handling of coal, ash, and other dusty materials on site.
- Concern about the socioeconomic impact of the project including effects on property values and tax rates.

CHAPTER 2
ALTERNATIVES, INCLUDING THE PROPOSED PROJECT

2.0 ALTERNATIVES, INCLUDING THE PROPOSED PROJECT

2.1 REGULATORY PREROGATIVES

In order for AES-CB to construct and operate a new cogeneration electric power plant, the company must comply with a number of local, State, and Federal laws, regulations and ordinances. The agencies primarily involved in permitting activities are USEPA and FDER. The permitting alternatives available to these agencies are outlined in the following sections.

2.1.1 Alternatives Available to USEPA

The alternatives available to the USEPA in accordance with its regulatory and permitting authority pursuant to Section 402 of the CWA are to issue or to deny the New Source NPDES Permit requested by AES-CB for CBCP discharges into the St. Johns and Broward Rivers.

2.1.1.1 Issuance of the NPDES Permit

Issuance of the New Source NPDES Permit will allow the AES-CB to construct and operate the CBCP; to add its pretreated construction dewatering wastes to the SK once-through cooling water effluent; to add cooling tower and boiler blowdown discharges to the existing SK discharge to the St. Johns River; to add its industrial waste discharges after pretreatment to the SK wastewater treatment system with eventual discharge to the St. Johns River; and to discharge emergency overflows due to high rainfall runoff to the Broward River up to the limits set forth in the permit (see Appendix B, Draft NPDES Permit No. FL0041173). The issuance of the permit may be modified by certain conditions which could require that additional monitoring and reporting be undertaken during the operation of the plant in order to evaluate the effectiveness of the pollution control systems. Such conditions will be added to the permit if the environmental impacts of the construction and/or operation of the plant require special mitigation practices and additional monitoring and reporting.

2.1.1.2 Denial of the NPDES Permit

If it is determined that the proposed CBCP discharges into the St. Johns and Broward Rivers will not be in compliance with New Source Performance Standards or water quality standards, USEPA would deny the New Source NPDES permit. Furthermore, USEPA could deny the permit if environmental resources such as endangered species, historic or archeological sites, wetlands, or floodplains are significantly impacted and measures for mitigating the impacts are unacceptable. The denial of the permit would be equivalent to the No-Action Alternative and would result in not allowing the discharge of the wastewater effluent to the St. Johns and Boward Rivers. If the permit is denied by USEPA, AES-CB would have the options of redesigning the project, including the pollution control facilities, to meet the water quality standards and resubmitting the application; locating and evaluating another site; or pursuing the No-Action Alternative.

2.1.2 Alternatives Available to FDER

The FDER administers the PSD permit program pursuant to the CAA and a State wastewater discharge permit program under the Florida Air and Water Pollution Control Act (FAWPCA) and also provides State 401 Certification (under Section 401 of the CWA) of all Federally issued permits in Florida. In the case of new power generating facilities, review and permitting under these and other environmental programs in Florida have been coordinated into a one-stop process pursuant to the Siting Act. Under the Siting Act, FDER conducts a coordinated review for each New Source power plant project which incorporates all State agency reviews. A final written report known as the SAR is prepared which includes FDER recommendation(s) concerning final State site certification of the project. The SAR contains: (1) reports from the Department of Community Affairs (FDCA), the Public Service Commission (FPSC), the Water Management District (SJRWMD), and other State agencies; (2) results of studies of the project conducted by FDER; (3) a statement of compliance with FDER rules; (4) Conditions of Site and 401 Certifications; and (5) a recommendation for final action.

2.1.2.1 PSD Permit

The CAAA require that a PSD permit be secured for the CBCP from the FDER before construction begins. New Source Performance Standards (NSPS) and Best Available Control Technologies (BACT) must be met for the emission of air pollutants. FDER has given tentative approval to the PSD permit application for the CBCP, but has not issued the permit and maintains the right to deny the permit based on final review. The final determination will not be made until after the site certification public hearing. Should FDER recommend denial of the permit, AES-CB would be given the opportunity to reduce facility emissions or to make efforts to reduce emissions from other facilities to reduce projected impacts and meet the goals of the CAAA which relate to PSD. Further, the PSD permit and the power plant site certification can not be issued if the National Ambient Air Quality Standards (NAAQS) are predicted to be exceeded in the impact area of the project. If the NAAQS for any criteria pollutant are exceeded or if a significant increase in the level of a pollutant in a non-attainment area should occur as a result of the operation of the facility, the applicant would be given the opportunity to mitigate those impacts.

2.1.2.2 State Site and 401 Certifications

The final State Site Certification of a power plant is issued by FDER. This certification represents the final State approval for all State permitted activities of the project and may mandate specific requirements pursuant to compliance with various State standards and regulations. Under the certification process, the alternatives available to FDER pursuant to the Siting Act are to recommend certification of the project as proposed, certification of the project with revisions, or denial of certification. The ramifications of certification or denial of certification would be similar to those described for issuance or denial of the NPDES permit described in Section 2.1.1

2.1.3 Alternatives Available to Other Permitting Agencies

The Florida Public Service Commission (FPSC), the Florida Department of Community Affairs (FDCA), and the St. Johns River Water Management District

(SJRWMD) are required by statute or rule to prepare reports on the application for site certification on matters within their jurisdiction. Copies of these reports are provided in Appendices E, F, and G. Initially AES-CB proposed the use of a coal conveyor and its construction in U.S. waters but has deleted it from the application, subsequently the U.S. Coast Guard (USCG) and the U.S. Corps of Engineers (USCOE) no longer have permitting functions for the project. Copies of the SCA were also sent to the following State, regional, and municipal agencies with a request for comments:

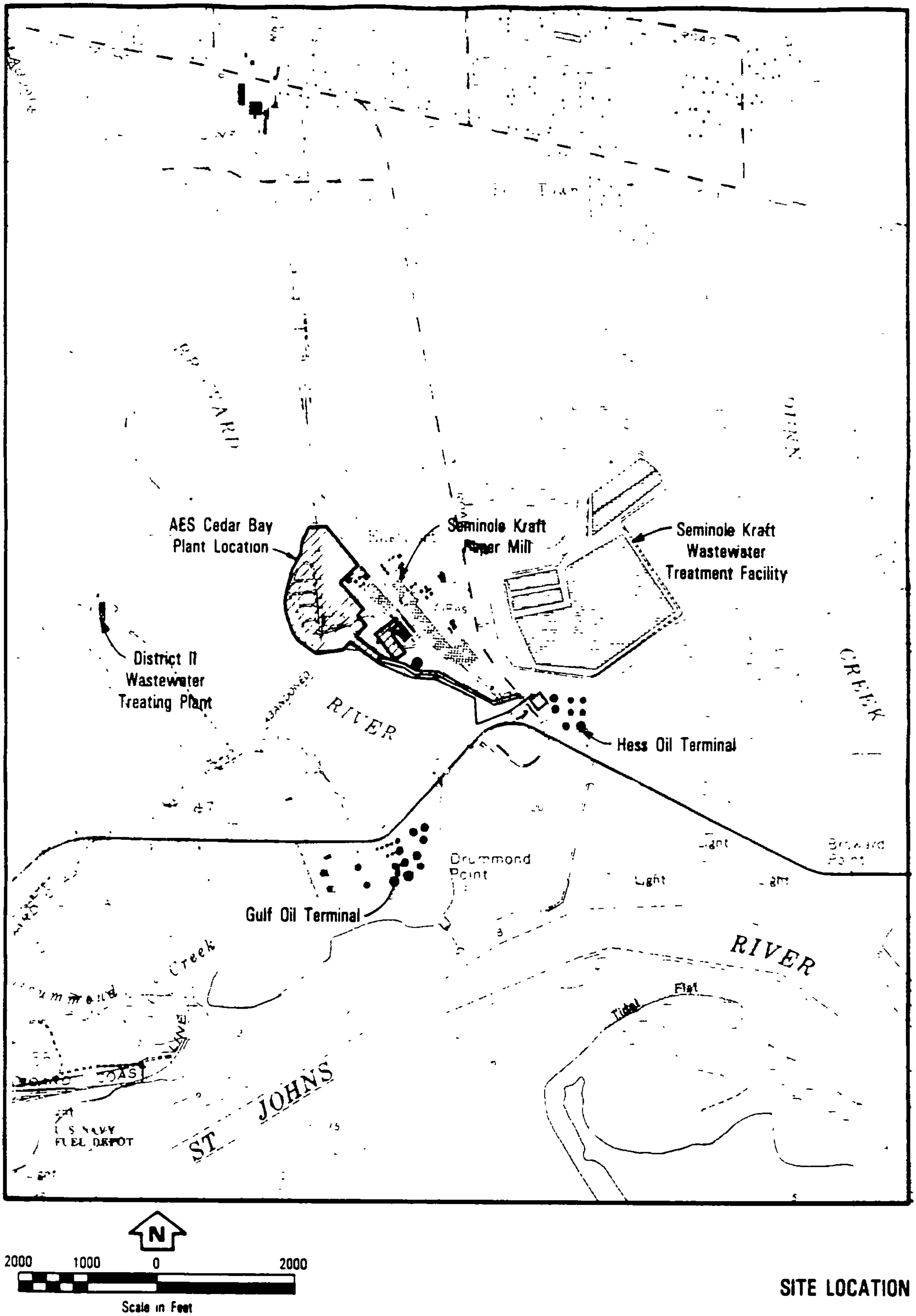
- Florida Department of Agricultural and Consumer Services
- Florida Department of Commerce
- Florida Department of Transportation
- Florida Department of Natural Resources
- Florida Department of Health and Rehabilitative Services
- Florida Department of State, Division of Historical Resources
- Florida Game and Fresh Water Fish Commission
- Northeast Florida Regional Planning Council
- Jacksonville Area Planning Board
- Jacksonville Department of Health, Welfare and Bio-Environmental Services

2.2 THE APPLICANT'S PROPOSED PROJECT

AES-CB proposes to construct and operate a new CFB 225 MW stream electric generating station, which will also produce 640,000 lb/hr of process steam, approximately seven miles north-northeast of downtown Jacksonville in Duval County, Florida. The site for the proposed power project, including its associated transmission and railroad unloading facilities, are described in this section. The reader is referred to the applicant's Site Certification Application/Environmental Information Document (SCA/EID) for more detailed information.

2.2.1 The Project Site

It is proposed that a new 225 MW coal burning, CFB steam electric power cogeneration facility be constructed on the site of the existing SK paper mill in northern Duval County (refer to Figure 2-1). The site is owned by SK. The



3

SITE LOCATION

FIGURE 2-1

total existing SK paper mill site consists of 425 acres. Heckscher Drive forms the southern boundary of the SK paper mill site. Eastport Road bisects the SK paper mill property from north to south before merging with Heckscher Drive.

The CBCP will occupy approximately 35 acres at the site and is to be located west of the existing SK paper mill power plant and east of the Broward River and the SK paper mill lime settling ponds. The area to be occupied by the CBCP is currently used for storage of lime mud from the mill and construction debris. An oil tank is located south of the CBCP site and a rail yard is located to the north and west of the CBCP site. Due to previous disturbances, there is little vegetation on site. Most of the existing vegetation is mostly grasses, weeds and shrubs.

2.2.2 Plant Orientation and Appearance

CBCP will consist of three 75 MW CFB boilers, a single steam turbine driven electrical generator, steam pipelines to supply the SK papermill, mechanical draft cooling tower, coal handling facilities, coal and limestone storage facilities, stormwater runoff control ponds and a 138 KV transmission line to transfer the power from the plant to the JEA and FPL power network systems. CBCP will blend in with the profile of the existing SK paper mill with the exception of the exhaust stacks. CBCP will be newer and more modern looking than the existing SK paper mill. CBCP will be located west of the existing SK paper mill. The mechanical draft cooling tower array will be located near the center of the CBCP plant area. Existing vegetation along the Broward River will provide a partial screen for the plant facilities.

2.2.3 Power Generation System

CBCP will employ a single steam turbine-driven electrical generator using steam produced by the three CFB boilers. The boilers will produce steam at 1800 psig for the double automatic extraction condensing turbine generator. This system will produce 225 MW for sale as well as electricity for operation of CBCP and 640,000 lb/h of 175 psig and 75 psig steam for sale to the SK paper mill.

2.2.4 Fuel Transportation and Handling

CBCP will burn approximately 1.1 million tons of coal per year. The coal is proposed to be delivered to the site by train using the existing CSX Railroad lines. Two (2) of the CFB boilers will also be designed to burn wood waste from the SK paper mill. It is estimated that 198,000 tons per year of wood waste could be burned. The railcar unloading system will employ an enclosed bottom dumping type facility.

The bottom dumping facility will unload coal by positioning slow moving cars over a receiving hopper and opening the railcar hopper doors to drop the coal. Cars will be unloaded at a rate of 6 to 15 cars per hour.

The coal stockout system for rail car unloading will consist of an automatically loaded conveyor which moves the coal from the receiving hopper to the coal storage lowering well. Mobile equipment will be used to move the coal from the lowering well to the lined storage area. The coal storage area is to be located south of the the steam generation building. It is designed to hold 105,000 tons of coal which is approximately a 30 day supply.

2.2.5 Air Emission Control System

AES-CB proposes to incorporate air pollution control equipment into their facilities to control emissions of SOx, NOx, TSP (fly ash), CO, hydrocarbons, fugitive dust, and TRS. Other trace pollutants will be removed from plant emissions along with the major criteria pollutants. All air pollution control systems are designed to meet NSPS and the BACT requirements of State and Federal regulations.

2.2.5.1 TSP and Fugitive Dust Controls

TSP from the CFB boilers will be controlled by a fabric filter system. The smelt dissolving tank emissions will be controlled by a wet scrubber. Fugitive particulates will also be generated by the dissolved and suspended solids in the cooling tower. TSP in the cooling tower drift will be controlled by the use of drift eliminators and by limiting the cycles of concentration in the cooling system. Drift, as used in this document, is defined in the Glossary (Appendix K).

2.2.5.2 SOx Controls

The coal will be burned within a fluidized bed of ash (bed ash). SOx will be controlled by adsorption or limestone injected into the CFB. Combustion within the fluidized bed places the SOx in direct contact with calcium in the limestone. The chemical reaction between SOx and calcium effectively removes the SOx from the exhaust gases.

2.2.5.3 Control of other Boiler Emissions

Emissions of NOx from the CFB boilers will be controlled by their design and operation controls. Combustion of coal in a fluidized bed occurs at temperatures low enough to reduce the amount of NOx formation significantly when compared to a conventional coal fired boiler. CO, VOC, and Toxic Organic Compounds from the CFB boilers will also be controlled by combustion controls.

2.2.5.4 Fugitive Dust

Fugitive dust will be produced by a number of sources including the coal handling, limestone handling, flyash handling and the FGD waste handling and disposal systems. Controls for these sources of particulates are planned as follows:

- o Coal Handling. Fugitive dust will be controlled by different methods at each point in the coal handling system. Wetting agents (90-99% efficient) will be used on the various coal piles; fabric filters (99.9% efficient) will be used at conveyor transfer points; water spray systems (97% efficient) will be used at the stacker reclaimer and coal unloading area. Conveying systems will be enclosed.

- Limestone Handling. Dust from unloading rail cars of limestone and for handling of limestone by mobile equipment will be suppressed with water sprays. Limestone will be transported on enclosed conveyors where fugitive dust at transfer points will be controlled by fabric filters.

- Fly Ash and Spent Limestone Handling. A covered conveyor with fabric dust collectors will be used to control fugitive dust from transporting ash from storage silos to rail cars in dry form. Water sprays will be used to control dust from loading pellets into trucks whenever rail removal of ash is not used.

2.2.6 Cooling System

CBCP waste heat from condenser and auxiliary equipment cooling will be rejected to the atmosphere by a recirculating cooling water system using mechanical draft cooling towers. The cooling towers will be rectangular, mechanical draft, counter flow towers utilizing 200,000 gpm of circulating water as a cooling fluid. A counter flow or recirculating cooling tower, as used in this document, is defined in the Glossary (Appendix K). The cooling tower will require an estimated 2,883 gpm of makeup water to replace the 2250 gpm of water lost to evaporation and the 633 gpm of cooling tower blowdown. Cooling tower blowdown will be discharged from the cold side of the cooling tower to maintain the chemical concentration of the cooling water at levels that will not cause formation of excessive scale to inhibit heat transfer efficiency. The cooling tower will recycle the cooling water approximately 4.6 times prior to blowdown which concentrates the pollutants. The maximum discharge temperature of cooling tower blowdown is expected to be 96° F.

2.2.7 Wastewater Treatment Systems

Wastewater from the CBCP will originate from a number of sources such as cooling tower blowdown, boiler blowdown, metal cleaning wastes, sanitary wastes, site runoff, construction dewatering, and low volume sources such as ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, floor drains, cooling tower basin cleaning wastes and blowdown from recirculating house service water systems. These discharges will be regulated according to NPDES permit No. FL0041173 (Appendix B). The receiving waters include the St. Johns River during construction (OSN 003, 005, and 008) and operation (OSN 001, 002, 003, 004, 006, 007 and 008) with emergency overflow discharges to the Broward River (OSN 003 and 008). All waste effluents to the St. Johns River will be via the SK discharge diffuser system (NPDES No. FL0000400). Table 3-4 of the next chapter summarizes the type and sources of the wastewater discharges. For a sketch showing the location of the discharges, see Attachments A and B of NPDES permit No. FL0041173 (Appendix B). Detailed descriptions of the discharges can be found in Section 4.3 and Appendix B.

During construction, various techniques including sedimentation will be used to control construction related runoff (OSN 003 and 008). A copy of the applicant's proposed Erosion and Sediment Control (E&SC) Plan is provided in Appendix I. The E&SC Plan as submitted is inadequate. Revision of the Plan is necessary before it is consistent with requirements of Part III. D of the Draft NPDES permit (Appendix B) and can be considered an acceptable plan. The revised and tentatively approved plan will be included in the FEIS. A list of needed revisions is given in Appendix I.

A physical/chemical treatment system will be required for plant dewatering waste (OSN 005). Treatment by this system is needed to reduce, copper, zinc, and other metals. However, details on this treatment system have not as yet been provided by the applicant. A thorough description of this system will need to be included in the FEIS.

During operation, recirculating cooling towers (with dechlorination) will be used to treat waste heat (OSN 002), sedimentation for stormwater runoff (OSN 003), reuse for boiler blowdown (OSN 004), neutralization and/or oil removal as pretreatment followed by further treatment in the SK IWTS for low volume wastes (OSN 006), offsite disposal and/or physical/chemical treatment for metal cleaning wastes (OSN 007), and sedimentation followed by further treatment in the SK IWTS for coal, limestone, and ash storage area runoff (OSN 008). Plant sewage will be treated in the SK domestic waste treatment plant.

A description of the treatment system for metal cleaning wastes (both chemical and nonchemical) has not as yet been provided by the applicant. This treatment system will need to be described in the FEIS.

2.2.8 Solid Waste Handling and Disposal

Solid waste generated by the CBCP will consist primarily of fly ash and bed ash (including spent limestone). This material is to be disposed of by the coal supplier at an approved disposal location outside of the State of Florida or sold to the building materials industry. The quantities of the waste produced will depend on the properties of the coal and limestone used in the combustion process. Fly ash will be conveyed to storage silos by a vacuum transport system. Bed ash will be conveyed to a storage hopper by mechanical conveyors and from the storage hopper to silo by a vacuum system.

Ash from the storage silos may be sent directly to railcars in a dry form, or ash may be formed into pellets by mixing it with water and allowing it to cure. After curing, the pelletized ash would be stored before removal by truck or rail. It is estimated that approximately 354,000 tons per year of fly ash and 88,000 tons per year of bed ash could be generated.

2.2.9 Transmission Facilities

An interconnection from CBCP to JEA electric power grid will be made by constructing a 138 KV transmission line from CBCP to JEA Eastport substation. The Eastport substation is located directly southeast and adjacent to the SK. Since the interconnecting transmission line will be constructed over already disturbed SK property or on JEA right-of-way, the environmental impacts will be slight.

2.2.10 Resource Requirements

The major resource requirements of the, CBCP on a yearly and lifetime basis are summarized in Table 2-1. Coal will be burned in the boilers along with wood waste. No. 2 fuel oil will be used for boiler startup. Limestone will be used for adsorption of SOx as the coal is burned. Consumptive uses of groundwater include boiler makeup, cooling tower makeup, and potable water. There will be no consumptive use of surface water.

Table 2-1

Major Resource Requirements of the CBCP

Resource	Yearly	Lifetime (5)
Coal (1)	1.105 tons	33.15 Mtons
Wood Waste (2)	0.198 Mtons	5.94 Mtons
Fuel Oil (3)	0.160 MGals	4.80 MGals
Limestone	0.100 Mtons	3.00 Mtons
Groundwater (4)	1.99 BGals	59.70 BGals

(1) Based on a coal consumption rate of 145 tons per hour, a design capacity factor of 87 percent and maximum coal properties of 15% ash and 3.3% sulfur.

(2) Based on operating with a combination of coal and wood waste, a consumption rate for steam generation of 8 tons per hour and the operation of 3 steam generators. Also assumes availability of sufficient fuel with a heating value of 6,791 BTU/lb.

(3) Assumes that each of the 3 steam generators will experience 5 cold or 12 hot startups per year.

(4) Based on average daily use of 5.44 mgd for 365 days a year.

(5) Based on a service life of 30 years

2.3 SITE ALTERNATIVES

As stated by AES-CP in the SCA, the proposed site for the CBCP was an ideal construction site because of its proximity to the steam customer, the SK paper mill, and because the industrial nature of the proposed site (an IH zone) has been extensively disturbed by previous industrial use over the last 35 years.

Even though the CBCP is in compliance with local zoning ordinances, it must also be found to be consistent with the NDP, prepared by the planning department of the City of Jacksonville. The NDP requires that every effort be made to reduce or mitigate the negative environmental impacts of the project. Potential adverse impacts of the proposed CBCP are specified in Chapter 5 of this document. Chapter 5 also identifies available mitigative measures.

Assuming that the project conforms to the NDP and acknowledging that an alternative site would lengthen the steam delivery line, thereby increasing heat loss and reducing plant fuel use efficiency, further evaluation of alternative sites was determined not to be necessary.

Site design alternatives are defined in Section 2.4 for the respective CBCP systems and sites for alternative power generating sources are defined in Section 2.8 for the alternative means of satisfying need for the project.

2.4 PLANT SYSTEMS ALTERNATIVES

Within the framework of the 225 MW cogeneration facility being proposed, alternatives were developed for evaluation for every major aspect of plant design for which some flexibility existed except steam generation. The alternative processes presented in this section are limited to the environmental controls which are required to meet standards and those plant units with designs which are of environmental concern. For each system, an attempt was made to describe alternatives which merit serious consideration and to describe the advantages and disadvantages of each.

2.4.1 Cooling Systems

2.4.1.1 Cooling Facilities

Waste heat from the condensation of turbine exhaust steam is disposed into the atmosphere by a heat rejection system referred to here as a cooling system. The term "cooling tower" as used in this document is defined in the Glossary (Appendix K). The water used to produce steam is ultra pure treated water. This costly to produce raw material must be reclaimed for reuse. The low pressure, low temperature steam which has been used to drive the turbine must be condensed to water, so that it can be pumped back to the boiler where it is reheated to produce high pressure, high temperature steam. AES-CB has proposed the use of wooden (treated blue spruce), rectangular mechanical draft towers. A number of alternative cooling systems exist. Below is a list of alternatives considered along with comments from the initial screening of the alternatives.

2.4.1.1.1 Once-Through Cooling

A once-through cooling system would use cooling water from the Broward River or the St. Johns River and pump it through a condenser to condense the turbine exhaust steam. The heated water would then be discharged back to the source river. A cooling pond could be used as an intermediate discharge point. The once-through cooling system was eliminated from use in this project because it was determined that it would not be able to meet Florida's Water Quality Standards requirements. Also the large land area requirements and high capital cost of cooling ponds make the use of ponds undesirable.

2.4.1.1.2 Wet Natural Draft Cooling Towers

Natural draft cooling towers use a large chimney to create an upward draft to pull air through the tower fill. Circulating water is pumped to the fill elevation of the tower and allowed to fall. Water is distributed over the fill and heat exchange occurs by evaporation and convection. The density difference between the warm air inside the tower and the cooler air outside creates a "natural draft" and airflow occurs without using mechanical draft fans. Natural draft cooling towers generally are higher in capital cost but lower in operating cost and energy consumption than rectangular and round mechanical draft cooling towers. This can result in natural draft towers having a slightly lower annualized equivalent cost. From an environmental perspective, natural draft towers exhibit a higher vapor plume rise and a longer drift. Because of their greater height, however, the vapor plume reaches the ground at a distance and the potential for ground fogging as compared to mechanical draft towers is reduced. This alternative is eliminated because of its high capital costs and large size.

2.4.1.1.3 Mechanical Draft Cooling Towers

Mechanical draft towers use large fans to pull air through the tower fill. Water is distributed over the fill, and heat exchange takes place by evaporation and convection. Since airflow is produced by mechanical fans, the structure of the tower is smaller than a natural draft tower. Subsequently, initial capital costs are lower but operating costs and energy consumption are higher. Two types of mechanical draft towers are used in the power generation industry, rectangular towers built of treated wood and round or rectangle towers built of concrete. The rectangular towers generally have a lower initial capital cost and a lower energy consumption rate than round towers. Wooden towers have a lower initial capital cost than concrete towers, but higher operation and maintenance costs. AES-CB proposes to use wooden towers. Operating costs are comparable. Round towers have a slightly better drifting characteristic with lower fogging potential.

2.4.1.1.4 Dry and Wet-Dry Cooling Towers

Dry cooling towers are very advantageous when water supplies for cooling are limited because the system does not require makeup water to replace water lost by evaporation. The system dissipates heat from the condenser by conduction and convection directly to the atmosphere via banks of metal finned-tube heat exchangers. These cooling towers are approximately an order of magnitude more expensive than wet towers and required a very large physical structure.

Wet-dry cooling towers use a combination of dry and evaporative cooling. The resulting air leaving the tower is in a warm but unsaturated condition. The reduced evaporation minimizes makeup requirements. These cooling towers are also more expensive than the traditional wet cooling towers and have been excluded because of the high costs and relatively large land area requirements.

2.4.1.2 Cooling Water Sources

AES-CB proposes to use existing SK water supply wells from the Floridan aquifer to supply the water needs of the CBCP. These wells are approximately 1,400 feet deep, and are located on the SK site. The water mass balance chart prepared by AES-CB indicates that the cooling towers will require approximately 4.147 MGD (estimated annual average for 100 percent load) of water as make-up. This includes 3.990 MGD of groundwater and 0.157 MGD of boiler blowdown. Of this make-up, 3.236 MGD is expected to evaporate in the towers and 0.911 MGD will be disposed of as cooling tower blowdown to the St. Johns River. The following sections describe alternatives to the ground- water source.

2.4.1.2.1 Surface Water

Use of surface water from the Broward River or the St. Johns River would require the construction of new intake facilities. In addition, the brackish waters would require treatment to meet the water quality requirements of the cooling towers. This alternative water source was eliminated due to costs, environmental impacts (impingement and entrainment of aquatic organisms) and possible impacts of salt water drift on SK and CBCP facilities.

2.4.1.2.2 Recycled Wastewater

Recycling of CBCP Wastewaters

The CBCP water mass balance indicates that a total of 1.147 MGD of wastewater will be discharged from the CBCP facilities during operation. Of this flow 0.911 MGD is cooling tower blowdown; 0.229 MGD is sanitary treatment plant effluent, and 0.007 MGD is stormwater runoff collected from the roof and yard areas. This volume rate would only meet 28% of the cooling towers needs and therefore require a supplemental water source. In addition, recycling would require extensive treatment to meet the water quality requirements of the cooling towers.

Recycling of Reclaimed Municipal Wastewaters

SJRWMD has required, as a condition for permit approval, AES to pursue the use of reclaimed water from the City of Jacksonville to supply the non-potable cooling tower needs. The City of Jacksonville has recently completed a SJRWMD-required Reuse Feasibility Study as part of a separate permit application. One alternative identified in the report, diverting flow from the Buckman WWTP to the District II (Cedar Bay) WWTP and increasing the level of treatment, could provide up to 10 MGD of reclaimed water to the CBCP. AES has agreed to design the CBCP so that it will be capable of receiving reclaimed water from the City of Jacksonville for use as cooling make-up water.

EPA supports the SJRWMD's requirement that reclaimed municipal wastewater be used for CBCP cooling tower needs in lieu of groundwater from the Floridan Aquifer. When the City of Jacksonville can provide treated wastewater of suitable quality, this alternative should be implemented.

2.4.1.3 Cooling Water Discharge Alternatives

An existing outfall structure located in the St. Johns River is currently used to discharge effluent from the SK mill. AES-CB proposes to discharge 0.911 MGD of chlorinated and dechlorinated cooling tower blowdown via this outfall. Since AES-CB proposes to use well water as its raw water source, there will be no screened organisms or trash for disposal. Alternatives to this discharge scenario are described below.

2.4.1.3.1 Discharge to the Broward River

Discharge to the Broward River would require the construction of a new outfall. In addition, an evaluation would need to be made to determine the effect of the discharge on this smaller river. This evaluation would include an analysis of the minimization of thermal plume entrainment, thermal plume attraction, cold shock, salinity and biocidal and chemical effects. This alternative was eliminated due to costs and adequacy of the SK discharge system.

2.4.1.3.2 Recycle Cooling Water

The alternative is similar to the Cooling Water Source alternative described in Section 2.4.1.2.2. Not only could the 0.911 MGD of cooling water be treated and recycled to the cooling towers, but it could also be treated and recycled to the steam cycle and/or service water system of the CBCP which use 1.385 MGD and 0.065 MGD of water, respectively. This alternative was eliminated due to very high costs and the complexity of the treatment system required.

2.4.2 Water System Alternatives

The water requirements of the CBCP are described in Section 2.2 and the water system alternatives for the condenser cooling system, the primary water use, are described in Section 2.4.1. This section analyzes the other alternative water systems proposed for the CBCP which include water use for potable water, general plant uses, fire water, and makeup to the steam cycle.

The proposed primary source of water for all systems of the CBCP is groundwater from the Floridan aquifer. The groundwater used by the CBCP with the exception of cooling tower usage, will be softened and filtered in the SK pretreatment system.

2.4.2.1 Potable Water Systems

Potable water uses include water for drinking, washing and for toilets. The annual average expected usage is 4,100 gpd based on an average plant staff of 75 people and an average potable water requirement of 55 gallons per capita per day. This flow includes use at both the cogeneration plant and the SK paper mill. Because of the high quality water needed for potable water uses and the low volume of flow involved, no alternative to groundwater use is proposed.

2.4.2.2 Makeup Demineralizer System

Other than cooling water, the major use of water in the CBCP will be for demineralized water makeup to the boiler/turbine/condenser cycles. Demineralized makeup water is required to replace water lost to SK process steam uses, boiler blowdown, and miscellaneous steam losses.

An annual average of 1.385 MGD of water will be demineralized using three ion exchange demineralizer trains. The resulting 0.147 MGD regenerate waste stream will be routed to the neutralization basin for pH adjustment and then to the SK WTP. The regenerant is not considered suitable for reuse because of its high dissolved solids content. Because of the demand for high quality water in the steam cycle, no alternatives to groundwater use are proposed. A portion (1.263 MGD) of the steam produced for the SK mill processes will be returned to the steam cycle for reuse after it is polished using a powdered resin type condensate polishing system.

2.4.2.3 Other Water Uses

The fire protection system water requirements are negligible. Even though groundwater is the source proposed, no alternatives are considered here. High quality water is required to prevent corrosion and scaling in the storage and distribution system.

65,000 gpd of treated groundwater is expected to be used in the service water system which includes water for water seals, cleaning, and flushing. No alternatives are provided for this water use.

2.4.3 Wastewater Treatment Systems Alternatives

The CBCP will utilize the existing SK IWTS for final treatment of demineralizer regeneration wastewater, condensate polisher regeneration wastewater, metal cleaning wastes, miscellaneous wastewater, and coal, limestone, and ash area runoff after pretreatment by CBCP. Stormwater runoff from roofs and yard area will be diverted to a holding pond after which it will be discharged along with the cooling tower blowdown and the SK IWTS effluent into the St. Johns River.

A sand/gravel filter may be added to a holding pond for improved TSS, silt and sediment removal. A sand/gravel filter consists of a mound of gravel covered with sand within the holding pond. All water in the holding pond flows through the sand/gravel filter to a perforated pipe. The "filtered" water is then discharged. This relatively inexpensive alternative is strongly recommended for the CBCP.

2.4.3.1 Sanitary, Plant Process, and Chemical Wastewater Collection

Separate collection systems are proposed to collect chemical wastewater and miscellaneous plant wastewater. Collected flows and their destinations include the following:

- Miscellaneous flow drains will direct water service system wastewater to an oil separator and then to the SK IWTS via OSN 006.

- All sanitary wastewater from the potable water system will be routed directly to the SK Sanitary WTP.

- Surface runoff from the coal, limestone, and ash storage areas will be collected in the fuel storage area retention basin (OSN008) and then routed to the SK IWTS. Emergency overflow from high intensity storms will be discharged to the Broward River.

- Regeneration wastewater from the demineralizer will be directed to the neutralization basin after which it will be routed to the SK IWTS via OSN 006.

- Wastewater from the condensate polisher will be routed directly to the SK IWTS via OSN 006.

- Metal cleaning wastes (OSN 007) will be pretreated and discharged to the SK IWTS via OSN 006.

- Effluent from the SK IWTS will be routed to the St. Johns Rivers outfall.

- Surface runoff from the roof and yard drains will be directed to the retention pond (OSN 003) after which it will be routed to the St. Johns River outfall (OSN 001).

- Cooling tower blowdown (OSN 002) will be routed directly to the St. Johns River outfall (OSN 001)

Alternatives to these conveyance systems would include possible recycling of wastewater or independent treatment of wastewater flows.

2.4.3.2 SK Industrial Wastewater Treatment System

The existing facility consists of a clarifier followed by aeration ponds. Wastewater from the CBCP routed to the WTP is expected to average 229,000 gpd of flow, 75 lb/day of suspended solids (SS), and 20 lb/day of BOD_5. Wet weather flow is expected to be 622,000 gpd. SK has agreed to accept this waste to their treatment system without increase in limitations for their discharge (NPDES FL0000400). Alternatives were not considered because it has been determined that the SK IWTS can provide adequate treatment for the additional flow.

2.4.3.3 Treatment of Recirculating Cooling Water

Cooling water is to be treated with sulfuric acid and an organic phosphate type scale inhibitor to control the scaling tendency of the circulating water system. Also, intermittent shock chlorination will be used to prevent biological fouling of the water. The blowdown will be dechlorinated prior to disposal via the St. Johns River outfall, using either sulfur dioxide or sodium sulfite.

Chlorination is the industry standard for control of biological fouling in cooling systems. Chlorine is an inexpensive and effective biocide. It can be added to the recirculating cooling water either as gaseous chlorine, solid calcium hypochlorite, or liquid sodium hypochlorite to form hypochlorous acid and hypochlorite ions which are the effective biocides. In order to control biological fouling, a sufficient concentration of residual chlorine biocides must be maintained in the system for a long enough period of time (typically 2 hours) to destroy microorganisms in the system. Total chlorine residuals (TRC) in the form of free available chlorine and combined residual oxidants remaining in the system are discharged in the system blowdown. The toxic effects of chlorine residuals on the aquatic environment are of concern and must be minimized by careful management of chlorine dosing or by using a dechlorination unit. Alternatives to chlorination are bromochlorination and ozonation as presented below.

2.4.3.3.1 Bromochlorination

The use of bromine chloride as a cooling system biocide is relatively new. The bromine chloride hydrolosis in water to hypobromous acid (an effective biocide) and hydrochloric acid. This hydrolysis results in a lower level of residual chlorine and chloramines than does the hydrolosis of chlorine. However, adequate toxicity data is not available for bromine residuals on aquatic organisms and its use is eliminated for that reason.

2.4.3.3.2 Ozonation

Ozone (O_3) is one of the most powerful biocides known. It is very effective and decomposes to oxygen after a short time in the water, thereby improving water quality. However, ozonation has several drawbacks including the need for expensive on-site production facilities (it cannot be stored), corrosiveness to iron alloys and slightly less effectiveness than chlorine on some biological slimes which foul cooling towers. There is no operating experience with ozone for this purpose and the capital and O&M costs are high. Ozone is extremely reative and not expected to be present in effluant. This alternative is eliminated because of technical unknowns.

2.4.4 Air Pollution Control System

The evaluation of emission control alternatives with regard to energy, environmental, engineering, and economic objectives is a requirement of the Best Available Control Technology (BACT) portions of the applicable federal Prevention of Significant Deterioration (PSD) regulations and their counterparts in the rules of the FDER (Chapter 17.2, FAC). PSD permit requirements apply to the CBCP because the net emissions increase of at least one regulated pollutant exceeds the "significant" levels defined by USEPA and FDER. AES-CB proposes in the SCA that a CFB with limestone injection and combustion controls, followed by a fabric filter, is BACT for the cogeneration plant.

The air pollution emission-generating components of the CBCP are the only components to be considered in this SAR/EIS. This facility is to consist of three (3) coal fired CFB boilers and various material handling operations. The emission-generating components of the SK paper mill are not included in this development of alternatives. The CFB is considered a "concurrent-combustion emission-control process" technology. Much of the sulfur is removed during combustion by a sorbent material, in this case limestone. Also in this process nitrogen oxides (NOx) production is low because of the relatively low temperature at which the combustion reaction takes place.

2.4.4.1 Particulate Control

A fabric filter is proposed as the particulate control unit following the CFB boilers for limiting TSP emissions. An alternative to the use of fabric filters is the use of electrostatic precipitators (ESP). ESP's tend to have a higher capital cost than fabric filters, but this difference is compensated with their lower operation and maintenance costs. Fabric filter operation and maintenance costs tend to be higher as a result of filter replacement costs and higher fuel costs required for operations. The use of fabric filters as proposed by AES-CB in the SCA, though maybe more expensive, is a desirable control method because of its high particulate control rate of 0.02 lb/MBTu as compared to the 0.03 lb/MBTu control rate of ESP's.

2.4.4.2 Sulfur Dioxide Control

TRS and SO_2 is proposed to be controlled by proper boiler design and combustion controls in the CFB boilers. The SCA summarizes the results of the BACT analysis completed for the cogeneration facilities. The analysis compared three CFB boilers (each providing 33 percent of the total capacity) to a single full-capacity pulverized coal (PC) fired boiler. The SO_2 removal alternatives evaluated included the PC boiler followed by a wet limestone scrubber system (designed for both 90 and 94 percent SO_2 removal) and the PC boiler followed by a lime spray dryer system (designed for 90 percent SO_2 removal).

2.4.4.3 Alternative Controls for Other Emissions

Other emissions of concern include NOx, CO, VOC, and Pb. The AES-CB states in the SCA that CFB boilers have lower NOx emission levels than PC boilers (0.36 lb/MBtu as compared to 0.40 lb/MBTu) with no air quality control unit. It also stated that a CFB or a PC boiler should be capable of meeting a CO emission rate of 0.19 lb/MBtu (CFB boiler) or 0.11 lb/MBtu (PC boiler) while meeting previously discussed NOx and SO_2 emission levels. To employ NOx emission limiting techniques such as lower combustion temperatures and excess combustion air are counterproductive relative to CO emissions because the emission levels of NOx and CO are inversely related to each other.

Alternatives to controlling NOx emissions after combustion include selective catalytic reduction (SCR) and selective noncatalytic reduction (Thermal DeNOx) control technologies. With regard to the technology being proven, both SCR and SNCR have had operating experience in both Japan and Europe. More recently, several facilities in California have been permitted with SNCR. Compliance testing has indicated that one of the facilities which is now operating (Corn Products) has passed its compliance test. Another operating facility (Cogeneration National) has had trouble meeting the No_x emission limitation while also maintaining compliance with the CO and SO_2 emission requirements. This plant has continued with adjustments targeted at achieving coincidental compliance.

Outside of California, the application of SNCR on CFBs is extremely limited. A recent permit for the Panther Creek Partner facility (Carbon County, Pennsylvania), however, determined that BACT for the new CFB boilers would be SNCR to achieve a NO_x limit of 0.2 lb/MMbtu (one hour average).

The applicant has stated that SNCR systems emit various amine compounds formed by unreacted ammonia which represents a potential adverse human health effect. Although it has been demonstrated that ammonia slip does occur, this does not indicate that the technology has not been proven. The use of both SCR and SNCR as representing BACT is becoming more and more prevalent for internal combustion engines, boilers and turbines.

EPA's recent BACT determinations for other facilities would tend to support incorporation of SNCR as BACT for nitrogen oxides control for the CBCP. The site is located in an area which is designated as being nonattainment for ozone. Nitrogen oxides are known to be a precursor to ozone.

Fugitive particulates will be generated by fuel handling, waste handling, and salt drift from the cooling towers. Control measures for these sources include coal pile wetting, enclosed conveyors, fabric filters at transfer points, and mist eliminators on the cooling towers.

2.4.5 Solid Waste Management Alternatives

The combustion products to be generated by the CBCP include fly ash and bed ash. The quantities of waste to be produced will depend on the properties of the coal and limestone used in the combustion process. AES-CB estimates that both the bed ash and the fly ash will be disposed of by the coal supplier at an approved disposal location outside of the State of Florida or sold within the building materials industry.

2.4.5.1 Bed Ash

AES-CB estimates that bed ash production will be approximately 88,000 tons per year. It is to be conveyed from the boiler ash coolers to a storage hopper by mechanical ash conveyors. From the hopper, the bed ash will be conveyed via a vacuum transport system to a silo.

As stated above, it is proposed that the coal supplier will dispose of the bed ash outside of Florida or to the building materials industry. This does not relieve AES-CB of the responsibility of assuring the adequacy of disposal. Because no disposal means has yet been defined, alternatives are to be considered including: (1) wet sluicing to a lined ash pond for disposal; (2) wet sluicing to dewatering bins and landfill disposal; and (3) mechanical ash removal with landfill disposal. The first alternative, wet sluicing to a lined ash pond, is the industry standard. In this system, ash laden sluicing water is routed from the ash hoppers to the pond where the ash settles out and the water is recirculated back to the plant. The second alternative is similar except that the ash is separated from the sluicing water in bins and then trucked to a landfill for disposal. The third alternative accomplishes simultaneous ash removal and dewatering by means of a conveyor system. The ash is trucked from the conveyor discharge point to a landfill. This alternative requires less water and power than the other systems and is consistent with the design of the CBCP. The major concern is the location of a landfill that could receive the dry bed ash.

2.4.5.2 Fly Ash

AES-CB estimates in the SCA that fly ash will be produced at a rate of 354,000 tons per year. Most (336,000 tons per year) is to be collected using a fabric filter after which it will be conveyed by an enclosed vacuum transport system to a storage silo. Bag filters are proposed to control fugitive dust emissions from the ash silo and vacuum system. Fly ash expected to accumulate in the air heater hoppers (18,000 tons per year) will also be conveyed to the silo via the vacuum transport system.

As is the case with bed ash, even though the SCA states that final disposal is to be the responsibility of the coal supplier, alternative disposal means must be defined.

Two fly ash disposal alternatives were considered: (1) wet sluicing to an ash pond for disposal and (2) vacuum conveyance with landfill disposal. Since the fly ash will be collected dry and sold if possible, it appears that the first alternative would create an unnecessary wastewater stream. Further, a complete recycle system would be required for the fly ash transport water because proposed USEPA regulations prohibit any discharge of TSS and oil and grease from the system. Because of dissolved solids buildup in the transport water and associated scaling problems, a complete recycling system would be expensive and difficult to operate. The second alternative requires the need for a landfill site which can receive the dry fly ash.

2.4.5.3 Hazardous Waste

AES-CB states in the SCA that there will be no hazardous waste produced by the CBCP. Demineralizer wastes, which can contain up to 10 percent sulfuric acid (H_2SO_4) or up to 5 percent sodium hydroxide (NaOH), will be routed to the neutralization basin for pH adjustment. The neutralization basin serves as an "elementary neutralization unit" allowing the cogeneration plant an exemption from permitting as a hazardous waste facility. Furthermore, because the demineralizer wastes are not stored prior to pH adjustment, they are not counted as generated hazardous waste, and the plant is therefore not subject to regulation as a hazardous waste generator.

Details on treatment systems proposed for the disposal of metal cleaning wastes (both chemical and nonchemical) have not as yet been provided by the applicant. A thorough description of these systems will have to be submitted to determine whether hazardous wastes will be involved.

2.4.6 Materials Handling Systems Alternatives

2.4.6.1 Construction Materials and Equipment

AES-CB states in the SCA that construction materials and equipment will be delivered to the site using existing roads and railroads. A new access road is to be constructed on the mill site to provide access to the construction areas from Eastport Road. Construction material is to be stored in areas currently used to store lime mud, logs and debris which are located north of the SK mill woodyard. Materials are to be unloaded and moved around the site using portable cranes and trucks. Heavy items will be delivered via rail and handled using special rigging. Pollution control measures are to include runoff detention ponds to hold and clarify storm runoff prior to release to natural drainage. Main roads at the site are to be gravel surfaced and treated with dust palliative to reduce dust. Also, water sprays will be used, as required, to control dust due to traffic.

2.4.6.2 Limestone Handling

Limestone handling consists of delivery, unloading, stockout, reclaiming, preparation, and storage. Fugitive dust control from the handling processes is to be accomplished by fabric filter dust collectors. The limestone belt conveyors and feeders are to have covers over the belt to control fugitive dust. If limestone is delivered by rail, a lowering well is to be used for limestone stockout. Water sprays are proposed to be used to control dust from mobile equipment operators. Storm runoff from the storage area is to be collected and routed to a lined retention basin.

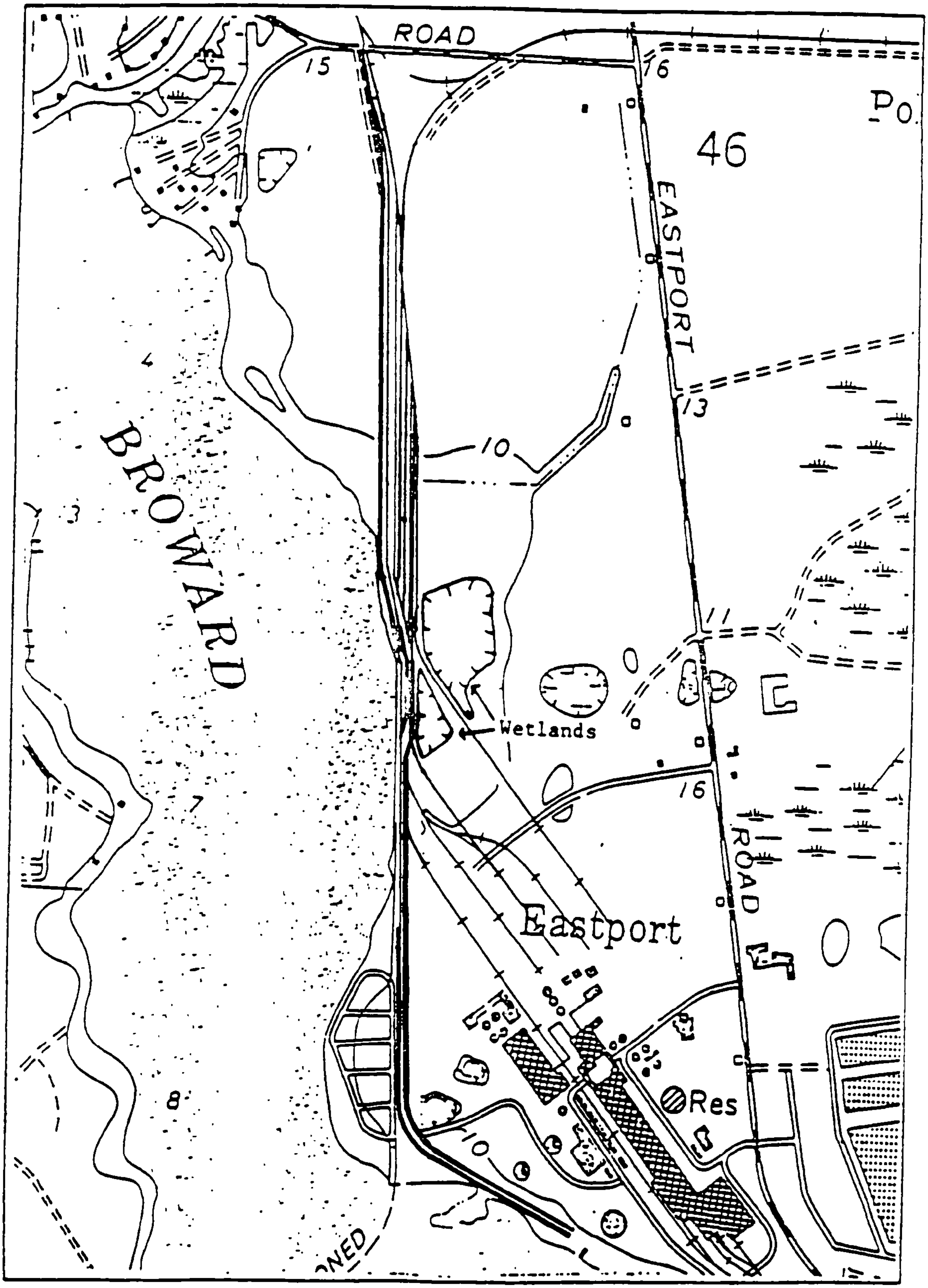
2.4.6.3 Ash Handling

Ash generation and handling is described in Sections 2.4.5.1 and 2.4.5.2. Up to seven (7) days of dry ash pellet (9,700 tons) may be stored on-site in an area that is to be lined with a synthetic liner. The liner is to be protected with a soil cover and storm runoff will be collected and diverted to the lined retention basin. Removal of ash pellets or silo-stored ash from the site will use either closed truck or railcars. Water sprays will be used, as required, to reduce fugitive dust from pellet handling and fabric filters will be used to collect dust from dry ash handling.

2.4.6.4 Coal Delivery and Handling

Coal is to be delivered via rail. The CSX Railroad currently serves the SK mill site. The line from which the mill spur branches is currently used for unit train coal delivery to the JEA St. Johns Power Park a few miles east of the mill site. This line is not expected to need upgrading for the proposed CBCP. Modifications will be necessary to the mill spur. In general, the CBCP will require one parallel rail line placed to the west of the existing rail sidings located north of the plant site a new tract placed east of the single causeway track, and a double track extension along the southern portion of the site. The rail corridor and extension layout are shown in Figure 2-2.

AES also considered a coal delivery alternative via a coal conveyor across the Broward River. This alternative included a coal marine terminal located south of the central plant area across the Broward River on Drummond Point. The conveyor was to start at the barge unloading dock at the terminal and run north for about 4,000 feet to the coal stockout pile. It was designed to be an enclosed belt type conveyor with covers and full length continuous dock plate. It would have been supported by a structural steel gallery with a vertical clearance beneath the gallery of 13 feet. The spans were to vary from about 20 to 100 feet and the superstructure was to be supported on piling type foundations. This alternative was rejected by AES for the following reasons:



RAILROAD LOCATION
PLAN

FIGURE 2-2

- Potential inpact due to construction and future maintenance on an intertidal wetland area located along the conveyor route;
- Public criticism - particularly concerned about potential spills in the event of a breakdown or collision by water borne craft and the impact on development potential of waterfront properties, and
- Potential impact of low clearance on access to the Broward River.

Coal handling systems remove coal from the coal delivery system, in this case railcars, and convey it to a storage site. In addition, handling of coal is necessary to take coal from the storage site to in-plant silos. Of major concern is the control of fugitive dust and storage area runoff.

2.5 NO-ACTION ALTERNATIVE

Conventionally, the No-Action Alternative is the baseline for evaluating the environmental impacts of the proposed project and the various structural alternatives in the EIS process. It represents how existing conditions would be altered in the future in the absence of federal action, in this case permit approval. As is the case for developing alternative means of satisfying the need for the project, the definition of the No-Action Alternative components depends on the definition of need for the project. As presented in Section 1.5, the need for the project as defined for this SAR/EIS is additional electricity-generating capacity and displacement of oil-fired generation from 1993 to 2025.

As defined, the No-Action scenario can be one in which no electrical power generation plant is constructed and, therefore, the needs of the project are not met or one in which the needs are met by an alternative power source that would supply FP&L with 225 MW of electricity and displace the future consumption of oil by 2.2 million barrels per year. The first scenario involves a lowered reserve margin (below 15 percent) for Peninsular Florida's electrical-generating capacity in 1993 and an increased future dependence on oil as a generating fuel. This scenario is considered to be the No-Action Alternative for the EIS/SAR. The second scenario is addressed in a variety of alternative means of satisfying the need of the project as presented in Section 2.8.

2.6 POWER GENERATION ALTERNATIVES

Power generation alternatives as presented in this section are composed of two components, fuel type and power production technology. Fuel type alternatives are identified in Section 2.6.1. Oil is not considered a viable fuel type alternative since the need for the project has been defined to include the displacement of oil consumption (refer to Section 1.5). Commercially-available technology alternatives are identified in Section 2.6.2. It should be noted that some technology alternatives are presented as a fuel type alternative because the fuel type and technology are not uniquely separate components. The screening process used to develop a list of feasible power generation alternatives for use in Florida is described in Section 2.6.3. Fuel types and power production technologies that are not available to Florida and/or are not commercially feasible were not considered for this development of alternatives.

2.6.1 Fuel Types

These are alternatives to the use of coal and biomass/wood as proposed for the CBCP. Fuel type alternatives exclude the use of oil and natural gas (Refer to Section 1.5, need for the project). The coal for the proposed project is to be crushed prior to combustion. Generally speaking, the domestic coal supply is fairly stable with a market characterized by many small companies with abundant reserves in all sulfur grades and excess production capacity.

2.6.1.1 Nuclear

Nuclear fission produces energy when the heat released from a controlled chain reaction of atom-splitting is used to boil water and converted to electricity. Nuclear fission involves the splitting of heavy atoms, usually uranium, and produces large amounts of energy.

Nuclear power plants are currently in use throughout the United States, and can produce anywhere from 100 to 1500 MW of electricity. The thermal efficiency of the process averages about 32 percent. Current costs of nuclear fuels per unit of power generated are lower than all fossil fuels and are predicted to remain so.

Construction of nuclear powerplants has declined sharply in the United States. The major handicaps to nuclear powerplants are rising construction costs and construction time and public concern over powerplant safety and radioactive-waste disposal.

The nuclear industry has been promoting the use of a "second generation" of nuclear power plants that are supposed to be safer. Nuclear-powered energy sources could replace the use of fossil fuels which add carbon dioxide to the atmosphere and thereby contribute to the planet warming phenomenon known as the "greenhouse effect".

The time required to build a nuclear powerplant has risen from four years in 1970 to ten years today, after licensing. Since licensing takes approximately four years, a power producer would have had to begin planning a new nuclear powerplant by 1979 in order to have it on line in 1993. Because of this time requirement, the financial risk resulting from licensing difficulties, the availability of an affordable small capacity plant and "radioactivity" concerns for selling steam; nuclear power was not considered to be a feasible alternative.

2.6.1.2. Municipal Solid Waste

With the drive to develop alternatives to solid waste landfills, many agencies and municipalities are looking to utilize municipal solid waste as a source of energy. The solid waste can be utilized as it is delivered (Mass Burn Technology) or it can be processed to remove the recyclable and noncombustible materials (Refuse Derived Fuel, RDF).

Due to the low Btu content of solid waste (≈ 4500 Btu/pound), typical energy recovery is only around 540 kwh/ton. This could eliminate solid waste as a primary substitute for a coal fired plant due to tonage of fuel required and the size of the plant required to provide 225 MW of electricity. However, use of RDF technology could provide a supplemental fuel to be burned in the CFB boilers along with the coal.

The use of a RDF supplement would impact material handling capabilities, size of the boilers, reagent useage, and size of the pollution control equipment. It would also require a source organization to provide the RDF. The material handling would be impacted due to additional storage silos, feed conveyors and injection requirment due to a second fuel. An impact would also be felt in the size of the boilers. Additional heat transfer surface would be necessitated along with an increase in size to handle the additional volume of fuel. This is due to the lower heating value of the RDF as compared to coal. The reagent requirements may go down, dependent upon the chemical composition of the RDF. Typically, sulfur and chlorine levels would be minimal due to the processing and overall acid gas levels would be reduced. This would lower the amount of reagent required. Air pollution control equipment would increase in size due to the higher volumes of air required in the combustion process.

The overall impact to the project would be negative relative to the above described reasons. Further consideration is not recommended based on the need of the project as defined in this document.

2.6.1.3 Coal Gas

Low- or medium-Btu gas is produced from pulverized coal by heating the coal in a pressurized chamber with steam with either air or pure oxygen. The products of this reaction are, principally, carbon dioxide, carbon monoxide, methane, and hydrogen. To produce gas with a higher Btu value (synthetic natural gas), the medium-Btu gas must be upgraded.

An average medium-Btu coal gasifier can produce from 7 to 10 billion Btu per day, but multiple-user facilities exist which can produce upwards of 30 billion Btu's per day. Low-Btu gasifiers are currently used in a number of industries in the United States to produce heat for industrial processes, including brick ovens and lime kilns.

To use a coal gas as an alternative fuel for producing electricity, it would have to be gasified, burned and converted to electricity in an integrated electric power plant. In the first, or gasification stage, the coal is partially reacted with a deficiency of oxygen to produce a low-heating-value fuel gas that can be readily cleaned. In the second stage, the cleaned fuel gas is burned in a boiler that produces steam for a steam turbine that generates the electric power. Some of the fuel gas can also be burned in a combustion turbine as part of a combined-cycle unit as described in Section 2.6.2.4. Heat produced in the gasification stage is recovered by generating steam. The gasifier steam is merged with the steam generated in the power boiler. Such integration is necessary for high plant efficiency regardless of whether the gasification system is retrofit to an existing power plant or whether the system is applied to a new steam or combined-cycle power plant.

Coal gasification is considered a pre-combustion emission-control process because sulfur and ash are removed in the gasification process which produces a clean gas fuel for the boiler and/or combustion turbine. The energy efficiency of the coal gasifier in an integrated system is about 96 percent.

2.6.1.4 Solar

Solar radiation can be converted directly into electrical energy using photovoltaic cells, or it can be used to heat water which is then vaporized to steam to power conventional turbines. These technologies are described in Section 2.6.2. Solar power generation is technically feasible in Florida. Florida has an insolation value (mean annual total direct and diffuse radiation at the earth's surface) between 140 and 160 (kilogram-calorie per square centimeter per year in a horizontal surface) which is favorable for solar power generation.

2.6.1.5 Wind

Wind energy systems convert the kinetic energy of wind into rotary, translational, or oscillatory mechanical motion which can be converted to electricity or heat. The output capacity from wind-powered electricity generating units ranges from 500 KW to 4 MW with a thermal efficiency between 15 and 25 percent. Wind energy systems are technically feasible and commercially viable.

Small wind energy systems for residential application are possible but due to low wind speeds in Florida, they are not considered a viable energy alternative for utility application. The U.S. Department of Energy (USDOE, Office of Solar Energy Programs - Wind Systems Branch) estimates that the average wind speed must be between 12 to 14 miles per hour to be considered a valuable wind resource. The wind resource in Florida is minimal, as the average wind speed is approximately 8.6 mph. The potential of wind as a large-scale alternate energy source in Florida is among the lowest of the 48 contiguous states.

2.6.1.6 Hydroelectric

In hydroelectric power generation, the kinetic energy of falling water is trapped and used to drive a turbine which generates electricity. The water may be falling from a natural waterfall, or across a man-made dam built for that purpose. In either case, there must be sufficient hydraulic head to produce the energy of the falling water.

Hydroelectric powerplants are currently in extensive use across the United States. Florida is quite flat, and few rivers have an adequate natural head to generate significant amounts of energy. Therefore, the potential in Florida is only for about 9 MW of electricity, with an energy efficiency of 66 to 80 percent.

2.6.1.7 Ocean Tides

Tidal-electrical power is obtained from the oscillatory flow of water in the filling and emptying of partially enclosed coastal basins during the semidiurnal rise and fall of oceanic tides. The water flow while the basin is filling or emptying can drive turbines propelling electric generators. Atlantic Ocean tides in Florida are only a few feet, which is far below the practical level for tidal power application. Because there is not a sufficient ocean tidal resource in Florida for large scale application, ocean-tidal power will not be considered a viable energy alternative.

2.6.2 Technology Types

The following techniques are alternatives to the fluidized bed combustion technology proposed for the CBCP. The CBCP is a concurrent-combustion emission-control process in that sulfur is stripped and NOx formation is controlled during the combustion process. These boilers produce steam to drive an automatic extraction condensing turbine generator that produces electricity and process steam.

2.6.2.1 Conventional Coal-Fired Steam Turbine

A conventional coal-fired electric power plant produces steam to drive a high-speed turbine. It is considered a post-combustion emission-control process because emissions are controlled after combustion, in as removed from the boiler exhaust gases. Traditional emission-control processes include dispersion (tall stacks) and lime/limestone scrubbers for SO_2 removal and mechanical cyclone collectors, scrubbers, electrostatic precipitators, and baghouses for particulate removal. Processes and equipment for removing NOx from the flue gas leaving a conventional coal-fired boiler are in developmental stages. Boiler designs have been modified in some applications to reduce oxide formation. Post-boiler gas treatment techniques currently being used include catalytic decomposition, selective catalytic reduction (SCR), selective noncatalytic reduction, and absorption.

The design of the steam-producing combustion unit of a conventional system must be suitable for optimum performance in burning the particular coal available. Coals with high-fusion temperatures are inherently suitable for burning, when pulverized, in dry-ash-removal hopper-bottom furnaces. Low ash-fusion coals, in crushed form, are burned in the Cyclone Furnace with slag-tap ash removal.

The conventional subcritical coal-fired unit selected for analysis in the FCG studies burns pulverized coal in a conventional boiler designed to produce high pressure steam. The steam is then expanded through a multi-staged turbine which is directly coupled to an electrical generator which produces energy for the utility grid.

Because of the complexity of the conventional coal-fired unit's systems (including the emissions-control systems), they have long start-up times and are not readily adaptable for cyclic operation. These units are highly efficient and are capable of burning low-cost, widely available coal.

2.6.2.2 Combustion Turbine

Combustion turbines have been used by electric utilities and other major industries for many years. Traditionally, utilities installed them for peaking service, as their low capital costs, higher operating costs and quick-start capabilities made them appropriate for low capacity factor operation. Many combustion turbine installations utilize an axial flow compressor which compresses outside air into a combustion area where fuel is burned. The hot gases from the burning fuel-air mixture drive the turbine, which in turn rotates a generator which produces electrical energy for the utility grid. The hot exhaust gases from the turbine are then discharged into the air.

Combustion turbines have the flexibility to burn natural gas, distillate oil (No. 2 fuel oil), and in some cases residual oil which has been treated to remove impurities. Additionally, gasified coal as described in Section 2.6.2.2 could be burned if the economics of the fuel conversion are justified. They have rapid start-up times compared to conventional fossil steam generating units but are relatively inefficient compared to conventional fossil steam or combined cycle units.

2.6.2.3 Combined Cycle

A combined cycle plant is a hybrid of combustion turbines and a steam driven turbine generator. The hot exhaust gases produced by the combustion turbines that would otherwise be discharged into the air are passed through a heat recovery steam generator which produces steam. This steam is used to drive an additional turbine generator combination. This utilization of the waste heat provides an overall plant efficiency that is much better than that of a combustion turbine. The overall annual heat rate ranges from 7,300 to 7,500 Btu/kWh, which is more efficient than a base load coal unit.

Combined cycle plants have the same fuel flexibility available to a combustion turbine: gas, distillate fuel, treated residual fuel and potentially gasified coal. The capital investment is higher than that of a combustion turbine, but is still substantially less than that of a conventional coal-fired unit. Because of the modular configuration of combustion turbines and heat recovery/steam turbines, combined cycle units may also be operated as simple cycle combustion turbines, increasing dispatch flexibility and yielding high unit availabilities.

2.6.2.4 Photovoltaic Cells

Photovoltaic cells convert solar radiation directly into electrical energy. They have no moving parts and have been used for decades to power satellites and other spaceships. Traditionally, the use of photovoltaic cells as an alternative to a coal-powered electrical generating facility would involve installation of photovoltaic cells in the homes of utility customers, at the utility's expense. Customers would then pay a rental user fee. The size of a photovoltaic cell can vary greatly, so that a cell could supply all the electricity needs of a home. Recently, development has been looking at the possibility of constructing central stations using the photovoltaic technology. The commercial availability of centralized power generation, though, is not expected to be available until 1996.

Like all solar residential units, photovoltaic cells must have a backup electrical system or an energy storage system (such as batteries) for times when the sun does not provide sufficient energy. The costs of these cells have dropped by about two orders of magnitude since the early 1970's, which has made their use more attractive.

2.6.2.5 Passive Collection Panels

A centralized facility for solar power generation can be constructed by assembling a number of passive collection panels at a specific site, and using the total energy collected to heat water. The hot water is then vaporized, and the resulting steam is used to power conventional turbines for electricity generation. Central solar generators can produce up to 10 MW, but higher production requires high capital costs, as well as a large geographic area. Although the solar collection efficiency can be very high, the energy efficiency of the system as a whole, (including collectors, storage facilities, and generators) averages only about 20 percent. Solar power generation is feasible in Florida with an expected capacity factor of 60 percent but the negative impact of committing large areas of land makes this technology an improbable alternative.

An alternative to a centralized facility is the installation of individual residential solar water heating systems with small (approximately 40 square feet) collection panels. These systems can be expected to replace the use of approximately 2,100 kwh of electricity per year. Also they require a backup system for times when the weather rendered them ineffective.

2.7 MANAGEMENT ALTERNATIVES

2.7.1 Purchase of Power

As used in this EIS/SAR, the management alternative of purchasing power is having FP&L purchase power from an existing power plant not owned by FP&L to replace the 225 MW needed capacity that the CBCP was expected to fulfill. The proposed project is by definition a purchased-power alternative in itself, but is different in that it requires construction of a new plant. The identification of feasible power suppliers that could be contracted by FP&L are provided in Section 2.8 along with a description of any additional transmission capacity needs.

The alternative of purchasing power is valid only if there is transmission capability available. The Florida transmission systems are part of SERC and the overall electric power systems of the eastern United States. The peninsular Florida systems can exchange assistance with the Southern Company (SOU) and the Tennessee Valley Authority (TVA) through several transmission interconnections.

Purchasing power from power generators offer some advantages to a utility such as FP&L including reduction of generation investment, diversification of investment base, and becoming a selling service. Possible risks to FP&L in such an arrangement include paying too much for power, reduction of system reliability, investment in interconnections yielding insufficient payback, and the need for self-service/retail sales wheeling.

2.7.2 Joint Projects

Joint ownership of a project is an arrangement normally undertaken to diversify risk and, in some cases, to take advantage of the tax and financial market changes that may occur.

For the proposed CBCP the entities involved include AES-CB (the applicant, a wholly owned subsidiary of Applied Energy Services, Inc., a privately held corporation), SK (privately held corporation which owns and operates the paper mill that is to receive the CBCP's process steam), JEA (a municipally owned electric utility that is to wheel the 225 MW of generated electricity), and FP&L (an investor owned utility that is to buy the 225 MW electricity to fulfill its future capacity needs). Joint ownership of the CBCP or any of the proposed alternative means presented in Section 2.8 could be undertaken between any combination of the involved entities.

2.7.3 Conservation

Conservation as a management alternative includes conservation practices for reducing the demand of the product and for increasing the efficiency in supplying the product. The product being, in this case, electrical energy. The legislative intent of FEECA to reduce "the growth rates of electric consumption and weather-sensitive peak demand"; to increase "the overall efficiency and cost-effectiveness of electricity and natural gas production and use"; and to conserve "expensive resources, particularly petroleum fuels" reflects this understanding of conservation. Both conservation approaches are addressed below.

2.7.3.1 Demand-Side Conservation Practices

The forecasting of long-term energy sales and peak demands is generally based on historical data. The models used for such forecasting can contain several variables to reflect changes in consumption (demand) due to variations in measurable parameters. In terms of electrical energy, FP&L has defined the following parameters as part of their load forecasting in their "Ten Year Power Plant Site Plan, 1989-1998".

- Price term - reflects changes in consumption due to changing prices of produced electricity;
- Weather term - reflects changes in consumption due to variation in the weather (accounts for minimum and maximum temperatures);
- Per capita income - reflects changes in consumption due to changes in the service area's economic prosperity; and
- Appliance term - reflects changes in consumption due to improved appliance efficiencies and/or increase appliance use.

In the plan, FP&L stated that demand forecast models cannot predict the effects of future technological advancements or changes in consumer lifestyle. In order to account for these anticipated changes in their load projections, FP&L has evaluated their seven (7) conservation programs and estimated the cumulative effects of these programs on the peak demand forecasts. These programs, which are listed in Table 2-2, are generally implemented by encouraging monetary savings for the consumer. No legislation exists for enforcing demand side conservation. Subsequently, quantifying the effects of such programs for forecasting purposes is difficult and incurs the risk of understating future demands.

2.7.3.2 Supply-Side Conservation Practices

Pursuant to FEECA, Section 366.82 F.S., enacted by the 1980 Legislature, the FPSC has the responsibility to establish conservation goals for the electric utilities of Florida. In QF need determination cases prior to the CBCP hearing, the FPSC has concluded that "cogeneration is a conservation measure". Since then the FPSC has rethought this position. In the FPSC Order No. 21491 it is stated that there is a recognition in the industry that cogeneration does not "conserve" fuel in the traditional sense, it merely utilizes fuel to "deliver a service at the least cost". In some instances the fuel efficiency of a cogeneration unit will be the factor that makes a cogeneration project a cost-effective means of producing power, but that is not necessarily the case. The price of the electricity produced by a cogeneration unit could be lower than that of comparable noncogeneration units simply because the sales price of the steam produced by the QF and sold to the steam host is high and produces a great deal of profit.

2.8 ALTERNATIVE MEANS OF SATISFYING THE NEED FOR THE PROJECT

2.8.1 <u>Need for Analysis of Alternatives</u>

As stated in Section 1.5, the determination of need for the CBCP is based on the need for additional electricity generating capacity and for the displacement of future oil and gas consumption. Analyses of alternative means of satisfying the need for the project are to determine if the proposed project represents the lowest cost and most environmentally-sound alternative available to provide 225 MW of electric power to FP&L and to displace 2.2 million barrels per year of future oil consumption or gas equivalent. The FPSC did not consider any alternatives to fulfill these requirements during

Table 2-2

Long-Term Forecast
Conservation Programs
FP&L, "Ten Year Power Plant Site Plan 1989-1998"

1. Commercial/Industrial Lighting Incentive Program

   This is an incentive program which began in mid-1984 to encourage demand and non-demand commercial/industrial customers to replace their fluorescent lamps with reduced wattage energy efficient lamps.

2. Residential Pool Usage Moderation Program (Pool Pump Timer)

   The Residential Pool Pump Program was developed by FPL for the purpose of lowering both the annual energy usage (KWH) and peak demand requirements (KW) of residential customers who own swimming pools.

   FPL began offering pool audits to its residential customers in June, 1981. The auditors place timing devices on swimming pool pumps. The timers shut off the pool pumps during the time of the day when the system normally experiences its peak demand; furthermore, they reduce the number of hours of daily operation of most swimming pool pumps, while still maintaining pool cleanliness.

3. Commercial/Industrial Customer Audit Program

   This is an energy audit program designed to assist commercial/industrial customers in making their facilities more energy efficient through the installation of conservation measures and the implementation of conservation practices.

   Each year, FPL offers energy audits to small (peak demand of 20 KW or less), medium (21 through 499 KW peak demand) and large (peak demand of 500 KW or more) commercial/industrial customers. The savings for each customers are commensurate with its size.

   Residential Customer Incentive Programs

   In an effort to induce customers to upgrade the thermal efficiency of their dwellings and/or to purchase more energy efficient appliances, FPL has initiated incentive programs in each of the following areas:

4. Home energy loss prevention.

5. Window film treatment.

6. Water heating.

7. Residential ceiling insulation.

their evaluation of need for this project. The FPSC stated that the CBCP was a qualifying facility pursuant to the PURPA regulations and therefore was the most cost-effective alternative. Subsequently, the FCG 1989 Generation Expansion Planning Studies document was used as the basis for alternative development for this SAR/EIS.

The environmental evaluation of alternatives to the CBCP was identified at the public scoping meeting as a major issue for consideration in the SAR/EIS. In addition, USEPA is required by the regulations of NEPA to identify and assess reasonable alternatives to the proposed action that could potentially avoid or minimize adverse effects on the quality of the human environment.

The purpose of EIS alternatives analysis is to consider feasible alternatives that would meet the CBCP objectives of supplying electricity and displacing gas and/or oil consumption with a less expensive supply of electricity for the FP&L customers. The economic and environmental ramifications of these alternatives were examined.

2.8.2 Available Technologies for Oil and Gas Displacement

In order to develop alternatives, the technologies appropriate for use in Florida during the current time frame had to be identified. These technologies must meet the following criteria:

- Technology must be implementable by 1996;
- Technology must be technically and commercially proven;
- Technology should displace the use of oiland/or gas as a fuel source; and
- Needed fuel resource must be available in Florida or a transportation network must be feasible to bring in the fuel.

Many alternative technologies can be removed from further consideration based on extensive lead time requirements, regulatory and/or environmental constraints, high operation and/or construction costs, or the unproven nature of the technology. Those technologies which were considered as viable alternatives to the CBCP were not restricted by regulatory, environmental, or technological constraints; were relatively cost-effective; and could be brought on-line within the required time frame.

In summary, the technologies which met the criteria and were identified as feasible technologies for alternatives to the CBCP included the following:

- purchase of power;
- reduction in electrical demand by installing residential solar hot water heaters;
- construction of a combustion turbine power plant (gasified coal-fueled);
- construction of a combined cycle power plant (gasified coal-fueled); and
- construction of a conventional coal-fired power plant.

2.8.3 Development of Alternatives

In view of the fact that the FPSC did not analyze alternative technologies for the preparation of their final order (refer to Section 1.5 of this document) and that the planning studies conducted by the FP&L and by the FCG only provided general data for the alternative power systems analyzed, the alternatives developed for this document could not be developed to the level of detail provided by AES-CB for the proposed project. However, the alternatives presented have been developed to a level of detail sufficient to determine the basic engineering and economic factors required to make a meaningful comparison of their relative environmental impacts.

2.8.3.1 Criteria for Alternative Development

The feasible technologies were combined into alternatives which met the following criteria:

- the alternative must supply at least 225 MW of electric power;
- the alternative must displace at least 2.2 million barrels of oil consumption or its gas equivalent; and
- the alternative must be implementable by 1996.

Large-scale technologies such as construction of a combustion turbine power plant were proposed for the CBCP site. In this way, the environmental impacts of the alternative could be evaluated for a particular site. Small-scale technologies (i.e., installation of residential solar hot water heaters) could not reasonably be tied to a particular site or even a particular area within the service area of the utility because their application would be so widely dispersed. Therefore, assessment of the alternatives involving a small-scale alternative was treated generally.

Table 2-3 summarizes the alternative's advantages and disadvantages in satisfying the need of the project.

2.8.3.2 Alternative 1 - Purchase of Power

The purchase of power is dependent on the availability of power from an outside utility and the availability of power transmission. As documented in the FCG 1989 Generation Planning Studies, in September 1985, a detailed study of the economic viability of additional transmission capacity into the state of Florida was completed. This study was entitled the Cost Effective Oil Backout Study. This study evaluated the cost-effectiveness of constructing additional transmission facilities in order to raise the transfer capability above the current 3,200 MW level. The study was produced through the cooperative efforts of representatives of FCG, SOU, TVA and FPSC staff.

Two incremental 500 MW blocks of energy transfers above the existing 3,200 MW transfer limit were analyzed. Savings in the study were identified in two areas: energy savings and transmission loss savings. The energy savings were calculated by detailed comparison of the incremental costs of increased generation in either Southern or TVA systems in order to offset oil-fired generation in Florida. Transmission loss savings were calculated by analyzing the potential increase in efficiency of the transmission system through the addition of the new transmission facilities. The energy savings and transmission loss savings were compared with the incremental costs associated with the transmission facilities required to accomplish the additional transfers to Florida. As with the energy and transmission loss savings, the cost of incremental transmission facilities was studied and amortized over the 1988-1995 period.

Table 2-3
Power Supply Alternatives
Summary of Advantages and Disadvantages

Alternatives	Advantages	Disadvantages
1. Purchase of Power	o No significant environmental impact on the Jacksonville area	o Low reliability impact o High costs of transmission
2. Residential Solar Water Heaters	o Low to no significant environmental impact	o Needs 100% backup system for inclement weather conditions o Coordination of implementation efforts complex o Responsibilities for maintenance need to be clearly defined o Questionnable reliability
3. Combustion Turbine Power Plant (gasified coal fueled)	o Coal based substitute for Natural Gas o Has ability to meet air emissions restrictions	o Highly complex refining process that must be implemented with power producing equipment o Just starting to come out of demonstration stage to commercial viability o May have some problems with CO_2 emissions o High maintenance operation

Table 2-3
Power Supply Alternatives
Summary of Advantages and Disadvantages
(Continued)

Alternatives	Advantages	Disadvantages
4. Combined Cycle Plant (gasified coal-fueled)	o Coal based substitute for Natural Gas o Has ability to meet air emissions restrictions	o Highly complex refining process that must be implemented with power producing equipment o Just starting to come out of demonstration stage to commercial viability o May have some problems with CO_2 emissions o High maintenance operation
5. Conventional Coal-fired Power Plant	o Known and well-tested Technology o Plentiful fuel source	o Major environmental impact on air quality which requires expensive pollution control facilities

The study showed 500 MW and 1,000 MW of additional sales above the 3,200 MW limit would not be economical. In all cases, the increased costs of the incremental transmission facilities exceeded the savings from energy and reduced transmission losses.

One of the major driving forces in the economics of the cost-effective oil backout study was the assumed difference between the price of coal and the price of oil during the 1988-1995 study period. If the assumed coal/oil differential had been higher, the energy savings associated with the additional transfers would have been higher. Conversely, lower coal/oil differentials would have caused the energy savings associated with the transfers to be lower.

The FCG current high-band fuel forecast shows coal/oil differentials that are lower than those assumed at the time of the 1985 Cost Effective Oil Backout Study. This leads to the conclusion that it is unlikely that additional transfers from either SOU or TVA above the existing 3,200 MW transfer capability would be economical given the current fuel price outlook. In addition to the economic analysis of increased transfer capability, a sensitivity analysis which analyzed the reliability impact of additional transfer capbility was conducted. This sensitivity showed minimal reliability benefit from an increase in transfer capability.

2.8.3.3 Alternative 2 - Residential Solar Hot Water Heaters

Under this alternative, it is assumed for alternative develoment and evalution purposes that FP&L would sponsor a retrofitting of solar water heaters for 50% of all new and 10% of all existing customers in its service areas. In case of a retrofit unit, the utility is assumed to pay for the manufacture and installation of the flat-plate collector, the additional piping, the pump, and the storage tank. New units would be very similar, although the additional storage tank is not absolutely necessary. Alternative financing not addressed here could include purchases of the heaters directly by the customer with the provision of no-interest loans and/or the distribution of costs between the utility and the customers (say 50%-50% cost distribution).

By 1998, this program would result in the installation of approximately 729,600 solar water heating units in the FP&L service area. The construction of the solar units is assumed to occur evenly throughout a nine-year period (1990-1998) and would require FP&L to provide about 81,000 units/year. Each solar water heater unit is expected to replace the use of approximately 2,100 kwh of electricity per year at the end of the installation period. This replacement would save FP&L approximately 2.4 million barrels of oil per year. The solar water heaters would displace oil-fired generating capacity, and would generate no air pollutants, wastewater discharges, and solid wastes. In addition, they would require no increase in groundwater consumption. The implemention of the solar water heater program can also be expected to boost employment by about 1,650 new jobs for each year of the program in the area of manufacturing and installation of these units.

The use of these units, however, would require provision for backup power in case weather conditions render them ineffective for an extended period of time. These backup systems would have to provide peak capacity sufficient to meet demand. Table 2-3 lists the assumption and calculations used for the development of this alternative.

2.8.3.4 Alternative 3 - Construction of a Combustion Turbine Power Plant with Coal Gasification

FP&L or the applicant would build a combustion turbine power plant with a capacity of 225 MW at the proposed site. The facility would be comprised of three 75 MW (net) gas turbine generators with Heat Recovery Steam Generators (HRSG). Fuel for the facility would be generated in a fully integrated coal gasification system. Projected lead time for this facility is four to five years.

The coal gasification process generates a low Btu gas to be burned in the gas turbines. This is considered a "clean coal technology" in that coal is gasified, the off gas generated is then scrubbed of particulates and ammonia and then the suflur is removed. Dependent upon the process, the sulfur may be recovered and sold. This process provides a relatively "environmentally clean" fuel for the gas turbine. This "coal gas" can be subsitute fuel for natural gas.

Table 2-4
Solar Water Heating Units
Assumptions and Calculations

o	Estimated Number of FP&L Customers for 1990 (1)	3,194,466	customers
o	Assume 50% live in single family units and 20% of these "existing" homes will be retrofitted with a solar hot water system	x.50 x.20 319,447	Existing customers to receive systems
o	Estimated Number of FP&L Customers for 1998 (1)	4,014,689	Total projected customers
		3,194,466	Existing estimated customers
		820,223	New Customers
o	Assume 50% of these customers will be fitted with solar hot water systems	x.50 410,112	Future customers to receive systems
o	Total number of units (homes)	729,559	(319,447 + 410,112)
o	Assume a solar hot water system that has an average collector size of 40 sq. ft. will replace 2,100 kwh/year/home	x 2.1	Mwh/year/home
o	Assume heat rate of backed out oil units = 10 MBtu/Mwh	x 10	MBtu/Mwh
o	Assume heating value of oil = 0.151 MBtu/gal	/ .151	MBtu/gal
o	Assume barrel size = 42 gal	/ 42 2,415,758	gal/barrel barrels of oil (2.4 Mbarrels)
o	Assume 81,062 units built/year (729,559/9)	81,062	units
o	Assume 42.3 person hours to be invested per system for design, manufacture, installation, and maintenance.	x 42.3	person hours/system
o	Assume 2080 work hours/year/ person	% 2,080 1,649	hours/year/person employees required

(1) Source: FP&L's Ten Year Power Plant Site Plan, 1989 - 1998

The gasification process is essentially a minature petrochemical refinery. It effectively breaks down the coal into its basic elements by use of heat and pressure. These basic elements are oxidized in a combustor. The gas that is generated is low in Btu value and has a mixture of H_2, CO, and methane along with CO_2, N_2, and H_2O. Exact composition can have a tremendous effect of the sizing of the combustion turbine.

The installation of a combustion turbine system would not be economically feasible if it was only there to generate electricity. The only way this system can be justified is if the low pressure steam, downstream of the HRSG is utilized in a process.

2.8.3.5 Alternative 4 - Construction of a Combined Cycle Coal Gasification Power Plant

FP&L or the applicant would build a combined cycle coal gasification power facility with a capacity of 230 MW at the proposed project site. Gasification is the process by which coal is converted into a combustible gaseous fuel for consumption. The facility would be comprised of a gasification combined cycle plant with two 114 MW combined cycle units and a gasification unit. Each combined cycle unit consist of two gas turbines with associated heat recovery steam generators (HRSG) and one steam turbine. The estimated project lead time is 4 years. The condenser cooling system would require a freshwater source to cool through evaporation and heat transfer. Plant stack emissions would primarily be SO_2 and NO_2.

The combined cycle technology has many advantages: relatively low investment requirements, phased construction, high operating efficiency and fuel flexibility (natural gas, fuel oil, or gas derived from coal). The phase construction can begin with the construction of the combustion turbines followed by the steam cycle and then the gasifier.

2.8.3.6 Alternative 5 - Construction of a Conventional Coal-Fired Power Plant

FP&L or the applicant would build a conventional coal-fired power plant with a capacity of 225 MW at the same site as the proposed project. The facility would be comprised of a single pulverized coal, high pressure boiler with a steam turbine generator set. Current design practices relative to NOx control would need to be incorporated in the boiler and burner designs. Additional NOx control, downstream of the combustion zone, may be required in the form of catatytic decompostion, selective catalytic reduction, selective noncatalytic reduction and absorption. These four methods have little history from which to develop any probabilities of meeting present and/or future NOx requirements.

These units are highly efficient and are capable of burning low-cost widely available coal. However, due to inherent design requirements of the emission controls, the coal specification must be developed during design and utilized during operation. The emission control systems design are based on coal specification and a deviation in the suflur or ash content, as examples, could have an adverse impact on the ability of the system to meet environmental requirements. This may limit the sources for long term coal supplies. The coal would typically be delivered to the site by unit train or barge.

A conventional coal fired plant is typically designed for base load operation. Due to extended start-up sequences and typically poor turndown ratios, pulverized coal (PC) and cyclonic type boilers are ill suited for cyclic or peaking operations. Normally, the most cost effective and environmentally sound method of operation is to start these units up and run them at maximum load year round. The only downtime should be for planned outages.

Due to the size, and complexity of a coal fired plant of this type it is estimated that project lead time is 5-8 years. This could be implemented within the required in-service date of 1996.

2.8.4 Economic Analysis of the Alternatives Including the Proposed Project

The basis of an economic analysis in the evaluation of the alternatives should be an analysis of the impact on the customer. The FCG in their studies, measures this impact by the cummulative present worth of future revenue requirements. In addition, the FCG evaluates alternatives by considering "strategic issues" including the following:

- Capital investment and financial risk;
- Construction flexibility;
- Potential changes in governmental regulations;
- Statewide fuel diversity;
- Unit fuel flexibility; and
- Project lead time.

Since the alternatives developed for this study were not developed to the detailed needed to do an in depth economic analyses as described in FCG studies, the issues presented above could not be addressed in detail. The economic analyses of this section is a simple economic screening that compares the present worth values of the power supply alternatives for each KW of power produced. Table 2-5 summarizes the economic analysis of the selected alternatives.

Table 2-5

Power Supply Alternatives

Summary of Economic Analysis (1)

Alternatives	Estimated Construction/ Installation Costs	Estimated Annual (2) O&M Costs	Present (3) Worth Value
1. Purchase of Power	(Not available)	(Not available)	(Not available)
2. Residential Solar Water Heaters	$1,760/KW (4)	$ 8/KW/year	1,843/KW
3. Combustion Turbine Power Plant (gasified coal-fueled)	$1,260/KW (5)	$16/KW/year	1,426/KW
4. Combined Cycle Power Plant (gasified coal-fueled)	$1,400/KW	$20/KW/year	1,608/KW
5. Conventional Coal-fired Power Plant	$1,500/KW	$14/KW/year	1,645/KW
CBCP	$1,450	$18/KW/year	1,637/KW

(1) Cost estimates in first quarter, 1990 Dollars.

(2) Assumes a 87% capacity factor for Alternatives 3, 4, 5 and CBCP.

(3) Assumes an 8.875 percent compound interest rate for a 30 year period.

(4) This estimate includes a backup system ($353/KW natural-fired combustion turbine facility).

(5) This estimate assumes an open cycle facility that requires an additional steam turbine for the gasification plant.

NOTE: The cost estimates, unlike "levelized" cost estimates, do not include fuel costs and do not address a range of unit capacity factors .

CHAPTER 3
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing environment at those locations which could potentially be affected by the proposed project or other alternatives under evaluation. Because the project involves modifications at an existing papermill and because of the cogeneration aspects of the project, certain alternatives are not available.

3.1 AIR RESOURCES

This section provides a summary of the existing air resources at the proposed plant site. Detailed information concerning air resources is presented in Appendix L.

3.1.1 Climatological/Dispersion Characteristics

The terrain surrounding the CBCP site is level. Easterly maritime winds blow about 40% of the time which produces a moderate climate. Summers are long, warm and relatively humid. Winters are mild, but occasionally interrupted by invasions of cool to occasionally cold air from the north. The following summary of existing climatological conditions in the Jacksonville area is based on past weather data.

The annual mean temperature at Jacksonville is 68.4°F. June, July, and August are the hottest months, with temperatures averaging near 80°F. December, January, and February are the coolest months with mean temperatures near 55° F. In winter, temperatures fall to freezing or below about 12 times per year. Annual rainfall averages about 54 to 55 inches per year. Rainfall averages over seven inches per month during the summer. Infrequently, heavy rains associated with tropical storms can deposit several inches of rain in a short period of time. The driest months are November, December, and January when precipitation averages less than three inches per month. The highest annual average 10-year, 24-hour rainfall event is about 7.5 inches. The 100-year, 24-hour rainfall event is about 11 inches.

The average relative humidity is about 75%. In the early morning relative humidities average about 90% while afternoon humidities average 55%. Daily sunshine in December averages 5.5 hours; in May the average daily sunshine is 9.0 hours.

Prevailing winds are northeasterly in the autumn and early winter shifting to northwesterly in late winter and early spring. In spring and summer winds move to the southwest then to the southeast as sea breezes exert their influences. Wind speeds average slightly less than nine mph overall. Wind speed are slightly higher during spring than in other seasons. The mean annual morning mixing height at Jacksonville is 1,600 feet. Afternoon mixing heights average about 4,600 feet annually.

3.1.2 Air Quality

The area of Jacksonville bounded by the St. Johns River to the east and south, Trout River on the north and I-95 on the west is a designated non-attainment area for TSP. Violations of both the annual standard (60 ug/m3) and the 24-hour standard (150 ug/m3) are indicated. Average annual TSP values of less than 40 ug/m3 and average 24-hour values of less than 90 ug/m3 are indicative of the outlying areas of Jacksonville.

Annual values of SO_2 in outlying areas of Jacksonville are 5 to 15 ug/m3. Annual values in areas close to major sources have been reported to be in the range of 20 ug/m3. Highest 24-hour values in outlying areas are primarily in the range of 30 to 60 ug/m3, whereas monitors close to the major emissions sources have recorded highest 24-hour averages of 100 to 200 ug/m3 and highest 1-hour averages of 400 to 900 ug/m3. Most of the monitors are significantly influenced by the existing major sources of SO_2. While Jacksonville is considered attainment for SO_2, recent modelling submitted with consideration of downwash have indicated potential violations of air quality standards in certain of the industrial areas.

Annual NO_2 concentrations in outlying areas average less than 20 ug/m3, whereas downtown values are about 40 ug/m3. Some monitors are affected by major point sources and others are presumably influenced by transportation sources. These values are well below the standard of 100 ug/m3. Maximum CO levels are about 8000 ug/m3 (8-hour average) and 14,000 ug/m3 (1-hour average). These levels are well below the allowable standard of 10,000 ug/m3 (8-hour average) and 40,000 ug/m3 (1-hour average). The 1-hour average State standard for ozone of 160 ug/m3 is often exceeded in the warm summer months; however, maximum values reported have been nearly 300 ug/m3. The entire Jacksonville area is designated non-attainment of the NAAQS for ozone.

Sulfates are associated with acidic precipitation and therefore have received more attention in recent years even though there are no ambient sulfate standards. In 1979 FDER determined that concentrations of sulfate had a mean of 9.06 ug/m3 with a range of 2.90 ug/m3 to 18.20 ug/m3. Acid rain measurements in the Jacksonville area during 1978 to 1979 indicated a volume weighted pH of 4.74.

3.1.3 Existing Air Pollution Sources

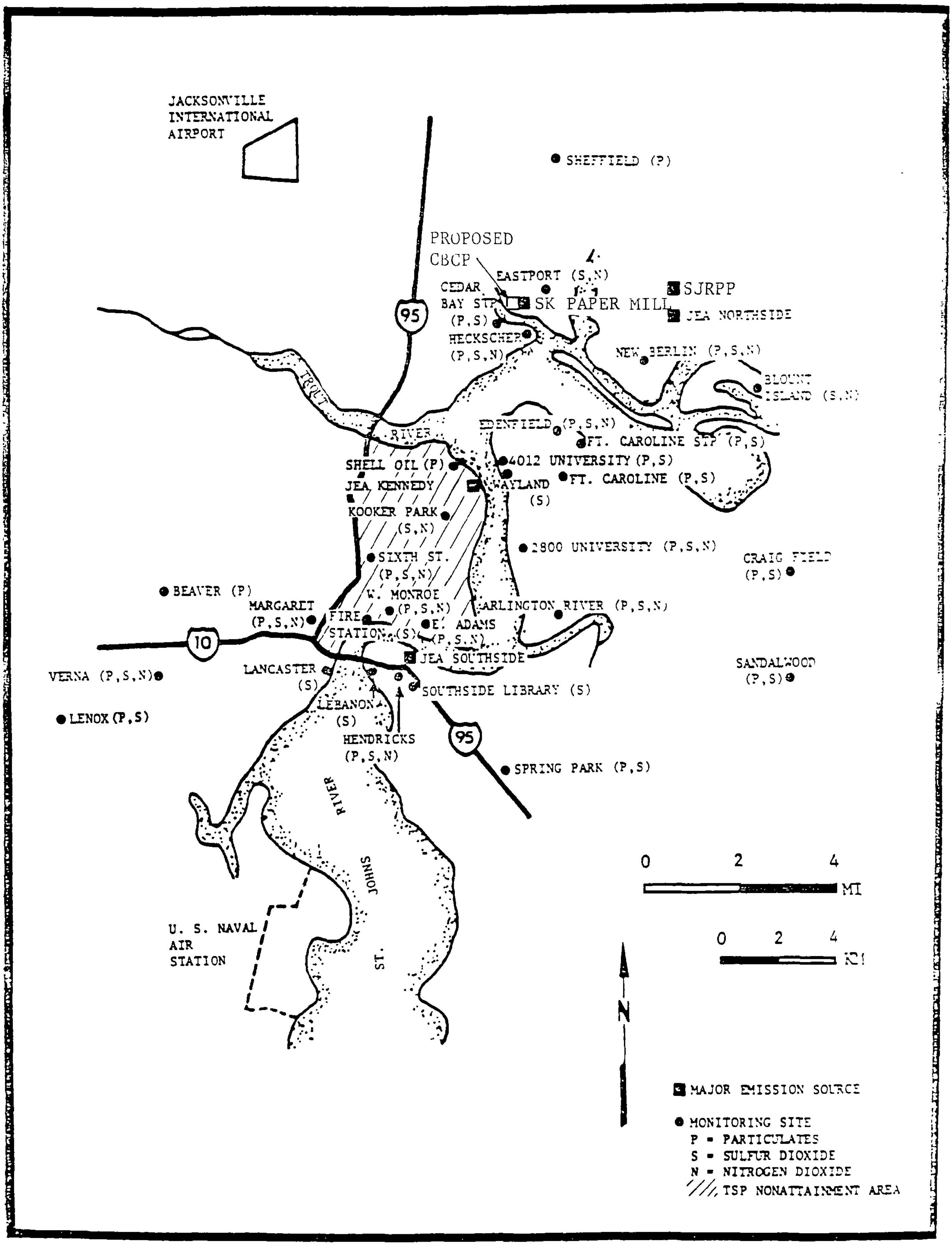
The locations of major air pollution sources in the area is depicted in Figure 3-1. In addition to these major sources, there are a large number of minor sources in the area which also contribute to air pollution. The FDER is working with a number of the existing sources to resolve the modeled SO_2 violations.

3.1.4 Regulatory Framework

This section summarizes the Federal and State regulatory requirements for air emissions that the CBCP must meet. Also included is a summary of air emission regulations which would have to be met for alternatives.

3.1.4.1 Federal Regulatory Requirements

CBCP will have to meet two major Federal requirements: National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD). The NAAQS establishes a limit for air quality degradation in areas of the United States. The PSD program limits the amounts of increase (increment) over a baseline level above which a new source may not deteriorate air quality.



Locations of major emission sources and monitoring sites in the Jacksonville area (JEA/FP&L 1981a).

FIGURE 3-1

The 1970 Clean Air Act Amendments (CAAA) required the Federal Government to set standards for ambient air quality for the principal type pollutants (criteria pollutants) and the levels of each that should not be exceeded for the protection of public health and welfare (Table 3-1). In areas where the air quality does not meet these standards (non-attainment), new pollution sources are restricted through the requirements of pollution offsets. Prior to the construction of a new significant contributor of the non-attainment pollutant in or near a non-attainment area, an equal or greater reduction of that pollutant from another pollution source in the area must be secured. This generally precludes the development of major industries in a non-attainment area due to the expense of obtaining the required emissions offset.

In areas with air quality cleaner than the NAAQS, PSD applies. PSD restricts the amount of air quality degradation in an area to a specific amount (increment). PSD applies to sulfur dioxide (SO_2), particulates (TSP), and nitrogen oxides (NOx). The amount of incremental increase depends on the classification of the area affected (Table 3-2). In Class I areas, which are predominately large national parks, the increment is very small. A moderate increment is allowed in Class II areas, while the greatest increments are allowed in Class III areas. Presently there are no Class III areas in Florida.

Two additional Federal regulations associated with PSD include the New Source Performance Standards (NSPS) and Best Available Control Technology (BACT). Fossil fuel-fired steam generating units of more than 250 MMBtu/hr of heat input produce three types of emissions for which USEPA has established NSPS (44 CFR (113) 3357933624, June 11, 1979). The applicable NSPS for these pollutants from coal-fired units are as follows:

- Particulate Matter - 0.03 lb/MMBtu heat input and 20% opacity based on a six minute average.

Table 3-1

FEDERAL AND FLORIDA AMBIENT AIR QUALITY STANDARDS

Pollutant	Sampling Period	Federal Standards Primary ug/m^3	Federal Standards Secondary ug/m^3	Florida Standards ug/m^3
Sulfur Dioxide (SO_2)	Annual	80	---	60
	24-hour	365	---	260
	3-hour	---	1,300	1,300
Nitrogen Dioxide (NO_2)	Annual	100	100	100
Particulate Matter (PM_{10})	Annual	50	50	50
	24-hour	150	150	150
Carbon Monoxide* (CO)	8-hour	10	---	10
	1-hour	40	--	40
Ozone (O_3)	1-hour	235	235	235
Lead (Pb)	Calendar Quarter	1.5	1.5	1.5

* Units are mg/m^3.

Table 3-2

PSD CLASS I AND CLASS II AIR QUALITY INCREMENTS

Pollutant	Class I Increment	Class II Increment
SO_2		
Annual	2	20
24-hour	5 (2)	91 (2)
3-hour	25 (2)	512 (2)
Particulates		
Annual	5	19
24-hour	10	37
NO_x (1)		
Annual	2.5	25

(1) Proposed February 8, 1988.

(2) Increments that are not to be exceeded more than once per year.

- o Sulfur Dioxide - 1.2 lb/MMBtu heat input and a 90% reduction in potential SO_2 emissions is required at all times except when atmospheric emissions are less than 0.60 lb/MMBtu per hour heat input. When SO_2 emissions are less than 0.60 lb/MMBtu heat input, a 70% reduction in potential emissions is required. Compliance with the emission limit and percent reduction requirements is determined by continuous monitoring to obtain a 30-day rolling average.

- o Nitrogen Oxides - 0.6 lb/MMBtu heat input for bituminous coal and a 65% reduction in potential NOx emissions based on a 30-day rolling average expressed as NO_2. The percent reduction is not controlling as USEPA has determined that compliance with the emission limitation will assure compliance with the percent reduction requirement.

In addition to these requirements, the Clean Air Act (CAA) as amended in 1977 and the implementing PSD regulations require a case-by-case evaluation of BACT for projects the size of the CBCP. BACT is defined as follows in the Federal regulations:

> "Best available control technology means an emission limitation (including a viable emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification, which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other

costs determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques, for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61."

3.1.4.2 State Regulatory Requirements

The Florida rules and regulations pertaining to air quality are similar to the Federal regulations. The Florida Air Quality Regulations are defined in FAC 17-2, and administered by the FDER (Table 3-1). The primary difference between the Federal requirements and Florida's requirements is in the NSPS. Florida's NSPS are as follows:

- Particulate Matter — 0.1 lb/MMBtu, two hour average and 20% opacity.

- Sulfur Dioxide — 1.2 lb/MMBtu, maximum two-hour average, no percent reduction requirement.

- Nitrogen Oxides — 0.7 lb/MMBtu, maximum two-hour average.

3.2 SURFACE WATER RESOURCES

This section describes the existing surface water resources which may be affected by the CBCP. The waters of concern include the St. Johns River and the Broward River. CBCP will discharge to the existing SK paper mill discharge pipeline to the St. Johns River. The Broward River serves as the western boundary of the proposed site. These rivers have been classified by the State of Florida as Class III marine waters - "Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife", (FAC 17-3.161). Applicable criteria and conditions for toxic substances are provided in FAC 17-3 and 17.4; and particularly Sections 17-3.051, 17-3.121, and 17-4.244. "All surface waters of the State shall at all times be free from domestic, industrial, agricultural, or other man-induced non-thermal components of discharges which, alone or in combination with other substances or in combination with other components of discharges (whether thermal or non-thermal): are acutely toxic [FAC 17-3.051(1)(d)]." "Acute Toxicity" is defined in FAC 17-3.3.021(1) as: "the presence of one or more substances or characteristics or components of substances in amounts which: (a) Are greater than one-third (1/3) of the amount lethal to 50% of the test organisms in 96 hours (96 hr. LC_{50}) where the 96 hr. LC_{50} is the lowest value which has been determined for a species significant to the indigenous aquatic community; or (b) may reasonably be expected, based upon evaluation by generally accepted scientific methods, to produce effects equal to those of the concentration of the substance specified in (a) above." FAC 17-4.244(4) provides "... in no event shall the maximum concentration of wastes in the mixing zone exceed the amount lethal to 50% of the test organisms in 96 hours (96 hr. LC_{50}) for a species significant to the indigenous aquatic community." Additionally, at the edge of an assigned mixing zone, specific criteria are applicable (FAC 17-3.121). For instance, the criterion for total copper is 0.015 mg/l at the edge of the mixing zone [FAC 17-3.121(11)]. Florida statutes allow variances from water quality criteria if ambient levels of constituents in State waters exceed the specified water quality standards presented in Table 3-3 (FAC 17-3.031). AES-CB has applied for a variance for the discharge of iron from the CBCP.

3.2.1 St. Johns River at Jacksonville

At the CBCP site, the St. Johns River runs in an east-west direction lying south of the site. The SK paper mill discharge pipeline extends into the river to a point near the main shipping channel. The river in the vicinity of CBCP is greatly influenced by the Atlantic Ocean. Due to the tidal influence, currents are highly varied and the flow in the St. Johns River may change direction up to four times per day. The estimated freshwater flow in the St. Johns River is approximately 9300 cfs. In 1979-1980 flow measurements were made in the river approximately three miles east of the

Table 3-3

WATER QUALITY CRITERIA

Parameter	Class II	Class III Fresh Chloride Concentrate $\leq$1,500 mg/l	Class III Marine Chloride Concentrate $\geq$1,500 mg/l
Oil and Grease			
Dissolved or Emulsified	5.0 mg/l	5.0 mg/l	5.0 mg/l
Undissolved	No visible oil to interfere with beneficial use	No visible oil to interfere with beneficial use	No visible oil to interfere with beneficial use
Pesticides and Herbicides			
Aldrin Plus Dieldrin	0.003 ug/l	0.003 ug/l	0.003 ug/l
Chlordane	0.004 ug/l	0.01 ug/l	0.004 ug/l
DDT	0.001 ug/l	0.001 ug/l	0.001 ug/l
Demeton	0.1 ug/l	0.1 ug/l	0.1 ug/l
Endosulfan	0.001 ug/l	0.003 ug/l	0.001 ug/l
Endrin	0.004 ug/l	0.004 ug/l	0.004 ug/l
Guthion	0.01 ug/l	0.01 ug/l	0.01 ug/l
Heptachlor	0.001 ug/l	0.001 ug/l	0.001 ug/l
Lindane	0.004 ug/l	0.01 ug/l	0.004 ug/l
Malathion	0.1 ug/l	0.1 ug/l	0.1 ug/l
Methoxychlor	0.03 ug/l	0.03 ug/l	0.03 ug/l
Mirex	0.001 ug/l	0.001 ug/l	0.001 ug/l
Parathion	0.04 ug/l	0.04 ug/l	0.04 ug/l
Toxaphene	0.005 ug/l	0.005 ug/l	0.005 ug/l
pH Range	6.5 to 8.5	6.0 to 8.5	6.5 to 8.5
pH Variation from Background	$\pm$ 1.0	$\pm$ 1.0	$\pm$ 1.0
Phenolic Compounds	1.0 ug/l	1.0 ug/l	1.0 ug/l
Phosophorous (Elemental)	0.1 ug/l	---	0.1 ug/l
Phthalate Esters	---	3.0 ug/l	---

Table 3-3

WATER QUALITY CRITERIA

(Continued)

Parameter	Class II	Class III Fresh Chloride Concentrate ≤1,500 mg/l	Class III Marine Chloride Concentrate ≥1,500 mg/l
Polychlorinated Biphenyls	0.001 ug/l	0.001 ug/l	0.001 ug/l
Radioactive Substances			
Radium 226 and 228	<5 pCi/l	<5 pCi/l	<5 pCi/l
Gross Alpha	<15 pCi/l	<15 pCi/l	<15 pCi/l
Selenium	25 ug/l	25 ug/l	25 ug/l
Silver	0.05 ug/l	0.07 ug/l	0.05 ug/l
Specific Conductance	---	Shall not be increased more than 50% above background or to 1,275 umhos/cm, whichever is greater	---
Temperature	90 F Max Ambient +5 F	90 F Max Ambient +5 F	Summer: 92 F Max Ambient +2 F Remainder: 90 F Max Ambient +4 F
Transparency	<10% reduction from background	<10% reduction from background	<10% reduction from background
Turbidity	<29 NTU increase from background	<29 NTU increase from background	<29 NTU increase from background
Zinc	1.0 mg/l	30 ug/l	1.0 mg/l
Alkalinity	---	>20 mg/l as $CaCO_3$	---
Aluminum	1.5 mg/l	---	1.5 mg/l
Ammonia, un-ionized	---	.02 mg/l	---
Antimony	0.2 mg/l	---	0.2 mg/l
Arsenic	0.05 mg/l	0.05 mg/l	0.05 mg/l

Table 3-3

WATER QUALITY CRITERIA

(Continued)

Parameter	Class II	Class III Fresh Chloride Concentrate $\leq$1,500 mg/l	Class III Marine Chloride Concentrate $\geq$1,500 mg/l
Beryllium	---	0.011 mg/l if hardness $\leq$150 mg/l $CaCO_3$ 1.10 mg/l if hardness >150 mg/l $CaCO_3$	---
Biological Integrity	Shannon-Weaver Diversity Index (H) of benthic macroinvertebrates shall not be reduced to less than 75% of established background	Shannon-Weaver Diversity Index (H) of benthic macroinvertebrates shall not be reduced to less than 75% of established background	---
Bromates	100 mg/l	---	100 mg/l
Bromine (Free Molecular)	0.1 mg/l	---	0.1 mg/l
Cadmium	5.0 ug/l	0.8 ug/l if hardness <150 mg/l $CaCO_3$ 1.2 u/l if hardness $\geq$150 mg/l $CaCO_3$	5.0 ug/l
Chlorides	<10% increase over normal background levels in predominantly marine waters	---	<10% increase over normal background levels in predominantly marine waters
Chlorine (Total Residual)	0.01 mg/l	0.01 mg/l	0.01 mg/l
Chromium, Total (After mixing)	0.05 mg/l	0.05 mg/l	0.05 mg/l
Coliforms, Fecal	14 counts/100 ml median; 43 counts/ 100 ml <10% of samples	200 counts/100 ml monthly average; 400 counts/100 ml <10% of samples per month; 800 counts/100 ml on any one day	200 counts/100 ml monthly average; 400 counts/100 ml <10% of samples per month; 800 counts/ 100 ml on any one day

Table 3-3

WATER QUALITY CRITERIA

(Continued)

Parameter	Class II	Class III Fresh Chloride Concentrate <1,500 mg/l	Class III Marine Chloride Concentrate >1,500 mg/l
Coliforms, Total	70 counts/100 ml median; 230 counts <10% of samples	1,000 counts/100 ml monthly average; 1,000 counts/100 ml <20% of samples per month; 2,400 counts/100 ml at any time	1,000 counts/100 ml monthly average; 1,000 counts/100 ml <20% of samples per month; 2,400 counts/ 100 ml at any time
Copper	15 ug/l	30 ug/l	15 ug/l
Cyanide	5.0 ug/l	5.0 ug/l	5.0 ug/l
Detergents	0.5 mg/l	0.5 mg/l	0.5 mg/l
Dissolved Gases, Total	<110% saturation	<110% saturation	<110% saturation
Dissolved Oxygen	>5.0 mg/l 24 hour average; >4.0 mg/l instantaneous	>5.0 mg/l	>5.0 mg/l 24 hour average; >4.0 mg/l instantaneous
Fluoride	1.5 mg/l	10 mg/l	5.0 mg/l
Iron	0.3 mg/l	1.0 mg/l	0.3 mg.1
Lead	50 ug/l	30 ug/l	50 ug/l
Manganese	100 ug/l	---	---
Mercury	0.1 ug/l	0.2 ug/l	0.1 ug/l
Nickel	100 ug/l	100 ug/l	100 ug/l
Nutrients	Shall not be altered so as to cause an imbalance in natural population of aquatic a flora and fauna	Shall not be altered so as to cause an imbalance in natural population of aquatic flora and fauna	Shall not be altered so as to cause an imbalance in natural population of aquatic flora and fauna

site. Velocities varied from 0.45 fps to 1.76 fps during flood tide and 0.43 to 1.79 fps and ebb tide. Flows varied from 40,000 cfs at flood stage to 29,000 cfs at ebb stage. On some occasions during a dry fall with strong northeast winds, the river may reverse flow for a period of time.

Data collected over the past few years in the river showed that ambient water quality concentrations of the following pollutants have been found to exceed the State water quality standards for Class III marine waters: aluminum, total residual chlorine, copper, total coliform, cyanide, iron, mercury, oil and grease, and silver.

3.2.2 Broward River

Water quality data for the Broward River just upstream of its confluence with the St. Johns River was obtained from the Jacksonville Department of Health, Welfare And Bio-Environmental Services. Data indicates occasional exceedances of State water quality standards criteria for pH, iron, lead, and copper.

3.2.3 Surface Water Uses

The St. Johns River is under the jurisdiction of SJRWMD. The SJRWMD has formulated policies to ensure a continued adequate supply of surface water for various uses including public, industrial, power generation, irrigation, rural, and recreational. Primary surface water uses in the site vicinity include cooling, navigation, and recreation. Population growth in the region as well as increased leisure time has resulted in a high demand for recreational uses. The St. Johns River is a prime recreational resource. Boating, water skiing, and fishing are enjoyed by both residents and tourists in the area. The St. Johns River is also used for commercial navigation serving domestic and foreign cargo lines at the Port of Jacksonville including Blount Island as well as ports up stream as far as Sanford.

3.2.3.1 Water Withdrawal

Total freshwater use in the Lower St. Johns River Basin (from Lake St. George to the Atlantic Ocean) in 1975 was estimated to be 398.8 mgd. Of this total, groundwater use was estimated to be 213.2 mgd and surface water use was estimated to be 185.6 mgd. In 1975, nearly all freshwater consumption for rural water use, irrigation, and public drinking water supply was developed from groundwater resources, principally from the Floridan aquifer. In 1986, a total of 133.72 mgd was withdrawn from the Floridan aquifer for power generation uses. A significant portion of water use for industry and power generation was developed from surface water sources, principally the St. Johns River.

The Northside Generating Station, St. Johns River Power Park, and SK paper mill are the major users of surface water from the St. Johns River in the area. JEA withdraws approximately 806 mgd. The SK paper mill presently uses up to 60 mgd for cooling purposes from the Broward River. Groundwater uses are substantially less than surface water uses within a five mile radius, although groundwater consumption represents a significant portion of total water use at SK paper mill.

3.2.3.2 Water Discharges

When the CBCP goes into operation, the existing SK power boilers, bark boilers, and chemical recovery boilers will be taken out of service. As a result, the existing once-through cooling system will no longer discharge 30,000 gpm of heated water to the St. Johns River. The SK paper mill currently discharges 13,900 gpm of wastewater from its industrial wastewater treatment system (IWTS) to the St. Johns River. Table 3-4 is a summary of proposed discharges for the CBCP during both construction and operations.

Table 3-4

Summary of CBCP Wastewater Discharges

NPDES Outfall Serial Number	Type and Source of Wastewater	Flow Volume (MGD)		Receiving Waters	
		Construction	Operations	Construction	Operations
001	o Main Plant Discharge via SK Discharge System (receives effluent from OSN 002, 003, 005 and 008 (Construction flows only)	2.88 (design)	1.150 (design)	----	St. Johns
002	o Cooling Tower Blowdown to OSN 001	----	0.911 (avg.)	----	St. Johns
003	o Yard Area Runoff Pond Effluent (includes construction runoff and roof and yard drains) to OSN 001	.007 (avg.) .500 (max.)	----	St. Johns	----
	o Yard Area Runoff Pond (includes roof and yard drains) to OSN 001	----	0.007 (avg.) 0.005 (max.)	----	St. Johns
	o Emergency Overflow	N/A	N/A	Broward	Broward
004	o Boiler Blowdown to the Cooling Tower for Reuse	----	0.157 (avg.)	----	St. Johns
005	o Construction Dewatering Wastes to OSN 001 via the SK Once-through Cooling Water Effluent Line	1.68 (avg.) 2.88 (max.)	----	St. Johns	----
006	o Pretreated Low Volume Wastes (demineralizer regeneration, floor drains,lab drains, and similar wastes) and Discharge 007 to the SK IWTS	----	0.213 (avg.)	----	St. Johns
007	o Pretreated Metal Cleaning Wastes and Nonchemical Metal Cleaning Wastes to OSN 006 (1)	----	0.0 (avg.) 1.261 (max.)	----	St. Johns
008	o Coal, Limestone and Ash Storage Areas Runoff Retention Basin Effluent to OSN 001	.014 (avg.)	----	St. Johns	----
	o Coal, Limestone and Ash Storage Areas Runoff Retention Basin Effluent to the SK IWTS	----	0.014 (avg.)	----	St. Johns
	o Emergency Overflow	N/A	N/A	Broward	Broward

(1) Flow will occur only during maintenance outages.

3.3 GROUNDWATER RESOURCES

This section summarizes the groundwater resources in the Jacksonville area.

3.3.1 Regional Groundwater Systems

Peninsular Florida's sedimentary rock sequences consist of about 8,000 feet of marine, littoral, and terrestrial deposits. The Paleozoic and Mesozoic sequences comprise about 5,000 feet while Cenozoic strata extend from the ground surface down to a depth of approximately 3,000 feet. The Cenozoic sediments include the following geologic and hydrologic formations pertinent to this project:

- The Cedar Keys Limestone which is the lowest confining unit (aquiclude) for the Floridan aquifer;

- The Floridan aquifer which includes the Lake City Limestone, the Avon Park Limestone, and the Ocala Group;

- The Hawthorn Formation which is the upper confining unit for the Floridan aquifer; and

- The Choctawhatchee Formation.

The post-Miocene sediments in peninsular Florida are characterized by a complex series of unconsolidated sands, clays, and shell. Where present, undifferentiated upper Miocene and Pliocene sediments consist of poorly sorted sands, gray clays, and shell beds with abundant mollusks. Pleistocene and Holocene comprise the upper 10 to 90 feet in northern peninsular Florida. These are yellow to tan sands with scattered thin clay layers. These sediments contain a second important source of fresh water known as the shallow aquifer system. This aquifer lies between the ground surface and a depth of approximately 100 feet in the Duval County area.

Two shallow aquifers underlie the CBCP site, the water table aquifer (-7 to -30 feet) and the shallow rock aquifer (-40 to -100 feet). They are collectively referred to as the shallow aquifer system. The shallow rock aquifer produces water that is generally acceptable for most domestic, commercial, and industrial uses. Well yields in the shallow aquifer zone are generally less than 100 gpm although yields of up to 200 gpm have been reported. Water wells completed in surficial sands (water table aquifer) generally yield less than 10 gpm. One well completed in a sand bed yielded in excess of 40 gpm. Recharge to the shallow aquifer system occurs from rainfall and surface water. Movement of ground water at the plant site is generally towards the rivers (Broward River or St. Johns River). The water table aquifer lies about seven feet below the ground surface in the plant area.

The CBCP site is underlain by the shallow aquifer system and the deeper Floridan aquifer. The Floridan aquifer is encountered at depths ranging from 400 and 600 feet in the Duval County area and consists of two distinctly separate zones referred to as the upper and lower permeable zones. The upper permeable zone is the principle source of fresh water in Duval County. Development of the lower permeable zone has been limited since adequate yields of fresh water are obtained from the upper zone. Recharge to the Floridan aquifer in this region occurs in western Putnam and Clay Counties and eastern Alachua and Bradford Counties. Recharge occurs where rain and surface water enter the Floridan aquifer through breaches in the overlying aquicludes. Groundwater movement in the Floridan is from these recharge areas to the north and east.

3.3.2 Groundwater Use

The Floridan aquifer is the principal source of fresh water for the Jacksonville area. Users include utilities, private domestic water systems, the military, commercial businesses and industry. In 1988, the Floridan aquifer provided approximately 163 mgd for Duval County. A breakdown of groundwater use in the surrounding area includes the following estimates:

User	Amount (mgd)
Public Water Supply Systems	84.9
Other Domestic Uses	15.5
Industry	38.1
Agriculture/Irrigation	18.8
Thermal Electric	5.6
Total	162.9

The potentiometric surface for the Floridan aquifer in Jacksonville was observed to be declining at a rate of 0.5 to 2.0 feet per year between the 1940's and 1962 due to increased pumping. Wells on Fort George Island to the East of the site have shown evidence of salt water intrusion. Localized depressions have been observed in the vicinity of Eastport and Jacksonville where heavy pumping occurs. U.S. Geological Survey (USGS) files indicated in 1979 that the potentiometric surface near the site was about 35 feet above mean sea level. Water levels (piezometric levels) in three nearby USGS observation wells have varied from 41 feet to 32 feet NGVD over the last nine years. The well grade elevations are approximately 16 feet NGVD. The Floridan Aquifer at the project site is, therefore, free flowing artesian. The SK wells flow at approximately 7,500 gpm at 9.5 psi pressure at the ground surface.

The SJRWMD has prepared a report concerning the CBCP pursuant to Paragraph 403.501 (1)(c), Florida Statutes. The report, which is included in Appendix G, addresses only the consumptive use of water pursuant to Chapter 40C-2, FAC. The report identified 2 primary areas of concern regarding AES proposed withdrawal plans. The first concern focused on the use of potable groundwater for cooling tower make-up water (average flow of 3.99 MGD) and is summarized in Section 2.4.1.2.2 of this document. The second concern relates to the potential hydrologic impacts which could be caused by the applicant's proposed well water withdrawals.

Addressing the second concern, SJRWMD required AES to perform a detailed hydrologic investigation to determine the impacts of the proposed withdrawals on existing legal users and the impacts to the groundwater resources itself.

AES was required to use the USGS groundwater flow and transport models, MODFLOW and MOC, to predict the impacts. SJRWMD required analyses for a withdrawal rate of 7.0 MGD, the maximum projected at the site. This value was to be evaluated because although reclaimed water is to be utilized as cooling tower make-up, the district recognized that there may be times when reclaimed water will not be available due to circumstances at the supply end, and the CBCP could require up to 7.0 MGD of groundwater for power generation and cooling. SJRWMD reviewed the modeling results presented in the report entitled "Ground Water Investigation Report" for the CBCP which concluded that the proposed withdrawals (7.0 MGD) for power generation and cooling tower make-up will not cause adverse impacts to existing legal users or cause adverse water quality problems.

SJRWMD also reviewed the potential for groundwater impacts due to proposed dewatering withdrawals associated with the construction of the rail car unloading facility. AES performed a hydrologic investigation to determine the potential adverse impacts due to the temporary (9 months) construction dewatering. AES concluded that the area of influence from the proposed dewatering will not affect the existing legal users.

While it is recognized that the USGS flow and transport models, MODFLOW and MOC are excellent models, they require a massive amount of work to calibrate and run. The review process, by necessity, was limited to comparing the output and predictions of the models to known or anticipated conditions. An independent modeling effort has not been conducted by the State, the SJRWMD, the City of Jacksonville, nor by EPA. Concerns relating to the limitations of the models include the following:

- Because of the large area (10-1/2 by 18 miles) required to be simulated in the models, a large grid size had to be used. This may have masked significant localized effects, such as a possible up-coning of salt water in the vicinity of the site, simply because the models may not have used enough resolution to portray this effect.

- An assumption used in the model was that the high chloride concentrations (up to 3000 mg/l) in the lower water bearing zone (LWBZ) are effectively separated from the upper water bearing zone (UWBZ) by two, continuous aquicludes. Normal faults (Page 4-2 of AES-CB "Ground Water Investigation Report") were neglected in the model because they do not have any major effect on the flow system of the aquifer (Miller, 1982). On a smaller scale, would these faults allow chloride contamination to increase in the UWBZ, given the effects of proposed on-site pumping?

- The ratio of vertical conductivity to horizontal conductivity used in the MODFLOW model varied between 0.05 and 0.0002. These values are significantly lower the typical literature values. These lower ratios reflects a slower rate of flow and therefore permit the model to simulate a lower potential for brackish water to move from the LWBZ to the UWBZ. Additional information is needed to document the values of vertical conductivity that were used in the MODFLOW model.

- It appears from the modeling report that existing pumpage rates were used rather than the full permitted pumpage rates for the existing permitted uses. The modeling effort should address the full permitted rates in order to evaluate the impact of a "worse-case" scenario.

- The piezometric head of the Floridan aquifer in the area has shown a regional decline of about 1/2 foot per year for the last 40 years. To have the model project these head drops into the future, it would be necessary to construct a time variable constant-head boundary condition. The MODFLOW modeling of the study assumed constant head boundary conditions for the 40-year simulation period which could bias the piezometric head in the UBWZ.

The recommendation of this EIS is that sensitivity analyses be conducted to evaluate the effects of these concerns. These analyses should investigate the effects of:

- Incorporating the simulation of faults into the MOC model to show the effect of more rapid flow between the LWBZ and the UWBZ. Flow through hypothetical faults could be added to the LWBZ to UWBZ flux (leakage) that was estimated for the MOC model.

- Increasing vertical conductivities by one to two orders-of-magnitude.

- Increasing existing user pumping rates to reflect full permitted values.

- Decreasing the piezometric heads at MODFLOW boundaries.

Also a more detailed technical summary of the groundwater modeling should be prepared to off-set the fact that independent modeling was not performed.

Concern was also expressed that the modeling effort did not consider the impacts of other future withdrawals by new users which would occur around the site. This is not the responsibility of AES without specific information from SJRWMD about what these withdrawals may be. It is recommended that SJRWMD estimate the impacts of future withdrawals by new major users based on anticipated applications. These estimates should be provided to AES for input into the modeling effort described above.

3.3.3 Groundwater Quality

State water quality standards for groundwater are contained in rules of the FDER Chapter 17-3, FAC Sections 17-3.401 to 17-3.404 and 17-22.104. These standards state that "all groundwater with total dissolved solids of less than 10,000 mg/l are classified as Class 1-B." The water quality criteria (Table 3-5) for Class 1-B are to be applied except within zones of discharge.

The quality of the water from the Floridan aquifer is variable depending on the sampling location, sampling depth, and date of sampling. Contaminants such as hydrogen sulfide gas (1-3 mg/l) and chlorides (10-30 mg/l) have been found in wells in the Floridan aquifer in Duval County. Increases in chloride concentrations have been documented in several high yield wells and are

Table 3-5

STATE AND FEDERAL GROUNDWATER QUALITY CRITERIA[a]

Constituent	State of Florida [b] Class I-B Waters	USEPA Drinking Water Standards [c] Primary	USEPA Drinking Water Standards [c] Secondary
Inorganic:			
Arsenic	0.05	0.05	
Barium	1.0	1.0	
Cadmium	0.01	0.010	
Chloride			250
Chromium	0.05	0.05	
Color			15
Copper			1
Fluoride	1.5[d]	1.4-2.4[e]	
Foaming Agents			0.5
Iron			0.3
Lead	0.05	0.05	
Manganese			0.05
Mercury	0.002	0.002	
Nitrate (as N)	10.0	10.0	
Odor			3
pH			6.5-8.5
Selenium	0.01	0.01	
Silver	0.05	0.05	
Sulfate			250
Total Dissolved Solids			500
Zinc			5
Radioactive Substances:			
Radium (226[f] + 228)	5	5	
Gross Alpha	15	15	
Organic Chemicals:			
Endrin	0.0002	0.0002	
Lindane	0.004	0.004	
Methozychlor	0.1	0.1	
Toxaphene	0.005	0.005	
2, 3-D	0.1	0.1	
2, 4, 5-TP	0.01	0.01	

a All values in milligrams per liter (mg/l) except color which is in color units, odor which is in odor units, pH which is in Standard Units, and radioactive substances which are in picocuries per liter (pCi/l).

b Florida Administrative Code, Chapter 17-3, March 1, 1979.

c Environmental Protection Agency, National Interim Primary and Secondary Drinking Water Regulations; 40 CFR Parts 141 and 143, as amended.

d 1.5 mg/l or background levels, whichever is greater.

e Specific limit depends upon average maximum daily temperature.

f Including radium 226; excluding radon and uranium.

attributed to high rates of pumping which cause a distinct cone of depression and lower the potentiometric surface. Chloride concentrations increased during the 1940 to 1962 time period due to heavy pumping. Wells penetrating permeable zones deeper than the Ocala Group generally have higher chloride concentrations because there is less hydrologic separation from the inferior quality water within the Cedar Key Limestone and underlying formations. In some areas, however, confining beds may retard movement between the zones of high and low salinity.

Testing of water samples from Floridan aquifer wells on or near the SK paper mill indicate that the water is of the calcium bicarbonate type. SK well No. 2 showed increases in concentrations of sodium, conductivity. dissolved and total solids in the 1972-1975 time period. That well displayed higher values than other wells located at a greater distance from the River. Sampling in 1983 also indicated that the conductivity in Well No.'s 1 and 2 had significantly higher conductivity values than other wells tested.

Water in the "shallow-rock" aquifer and the intermediate sand zone at the site is also of the calcium-bicarbonate type. Some sodium and chloride ions are present as a higher percentage of the total ionic weight in the water. Water in the water table aquifer has a lower concentration of total dissolved solids than that of deeper aquifers and other shallow aquifers. In general water produced from the water table and shallow rock aquifer has a quality that compares favorably with both State criteria for Class 1-B waters In the instance of the SK property, however, the long term accumulation of spent lime mud has led to contamination of the shallow aquifer. The pH has been elevated in some areas. Metallic ions such as zinc, mercury arsenic, cadmium, chromium, and lead show values in excess of State water quality criteria. Copper and nickel levels are elevated as is phenol and certain hydrocarbon compounds due to oil spills on site.

3.4 EARTH RESOURCES

This section includes descriptions of the existing local and regional physiography, topography, soils, and geology of the CBCP site. The site is located in the St. Johns River Basin, an elongated area of approximately 51,200 square miles in northeast Florida. The area is underlain by limestone and sands of Pleistocene to Eocene age and the surface is generally comprised of sands and gravels of Pleistocene and Holocene terrace deposits. The terrace deposits parallel the shoreline and form the topography of northeast Florida.

3.4.1 Physiography and Topography

Florida can be divided into three major transpenninsular physiographic zones: the Northern or Proximal Zone; the Central or Mid-peninsular Zone; and the Southern or Distal Zone. The CBCP site is in the Northern Zone. The topography of the site is controlled by Pleistocene marine terraces and beach ridges bordered by tidal marsh and estuaries of the St. Johns River. The site topography is gently sloping from the northeast to the southwest with surface elevations varying between 20 feet and sea level. Surficial deposits are sands, silty sands, and clayey sands to depths of 55 to 80 feet.

3.4.2 Soils and Geotechnical Conditions

Borings made on site show that the natural deposits are very erratic. In some areas the site has been used to store lime mud and wood chips. Borings show that these materials may be as much as 19 feet deep, overlying the natural soils. Natural soils are medium to dense sands and silty sands that vary greatly with depth and from one location to another, typical of marine terrace deposits. These soils are about 80 feet deep and overlie the Hawthorne formation. The Hawthorne formation consists of interbedded sandy clays, clayey sands, and limestone. It serves as the Floridan aquifers confining unit. Due to the high water table (three to eight feet below ground level) and the loose, unconsolidated nature of the soils, special construction techniques will be necessary to provide a firm foundation.

Foundations for heavy structures may be a combination of friction and bearing piles, driven into the dense sands or the Hawthorne formation. More lightly loaded structures could be placed on shallow footings, mats, or piles as necessary. Site improvements using ground modification techniques, such as deep dynamic compaction, vibroflotation, or vibro-replacement are possibilities to reduce or eliminate deep foundations. Removal of lime mud and wood chips will also be necessary.

3.4.3 Regional Geology

Peninsular Florida is part of the Eastern Gulf Coast Sedimentary Basin with a sedimentary sequence of limestones, dolomites, evaporites, and unconsolidated sands, gravels, and clays that ranges in depth from 8,000 feet in northern Florida to 18,000 in the southern portion of the state. These strata are of late Mesozoic to Recent ages. The present land surface is covered with Pliocene and younger unconsolidated sediments resulting from fluctuations in sea level. They are generally marine terrace and beach ridge deposits. Eocene and younger rocks comprise the strata encountered at the surface and are penetrated by most water wells in the area. The principal aquifers used in the Jacksonville area are of Eocene or younger age.

3.4.4 Site Geology

The site is covered with unconsolidated sediments of the Pleistocene to Recent age that are primarily marine terrace and beach ridge deposits. These sands and gravel overlie Mio-Pliocene deposits and the Hawthorne formation. The Mio-Pliocene strata consist of semi-consolidated sands, gravels, shells, and clay materials. The Hawthorne formation is the upper confining layer for the Floridan aquifer in most areas and consists of clays, sands and some limestones.

Uncomfortably beneath the Hawthorne formation lies the Ocala Group. At the site the Ocala is approximately 450 feet deep. The Ocala Group overlies, in descending order, the Avon Park Lime-stone, the Lake City Limestone, and usually the Oldsmar Limestone. These strata are limestones and dolomites, generally very permeable, and yield high quantities of groundwater. 3.5

AQUATIC AND TERRESTRIAL ECOLOGY

This section provides a summary of the existing biological resources in the vicinity of the CBCP site. Since the CBCP site area is presently in use by the SK paper mill, onsite terrestrial resources are limited.

3.5.1 Aquatic Ecology

The proposed CBCP site is adjacent to the extreme northern portion of the St. Johns River. Aquatic communities near site are typical of southeastern estuaries, but are currently stressed by poor water quality caused by elevated nutrient and pollutant loadings. Aquatic plants important to the ecology of the estuary include phytoplankton, periphyton, and emergent marsh vegetation. These primary producers support animal life within the estuary either directly or via production of detritus (dead plant material). Aquatic animal life in the area includes zooplankton, benthic invertebrates, fish, and marine mammals, including an occasional manatee. Although stressed by poor water quality, the St. Johns River in the vicinity of the SK paper mill is nevertheless a highly productive estuarine area.

The CBCP will discharge its liquid effluents via the existing SK discharge system. Therefore, the SK discharge is considered as part of the existing environment. The CBCP will slightly change the chemical concentrations of the combined discharge. Thus elimination of once-through cooling water flow and the use of the recirculation cooling towers by CBCP (with groundwater make up) will eliminate the negative impacts on aquatic organisms due to entrainment and impingement. Additionally, the thermal impact will be significantly reduced. When CBCP begins operation, SK will purchase process steam from CBCP and will eliminate its existing steam boilers and associated once-through cooling water system.

3.5.1.1 Flora

Phytoplankton are the most important primary producers in the open waters of the St. Johns River estuary. Densities, rates of production, and species composition of phytoplankton populations all indicate that the River is subject to excessive nutrient and pollutant loadings. It has been reported

(USCOE, 1976) that diatoms were the most abundant phytoplankton in waters of Duval County. Studies at the JEA Northside Generating Station a few miles east of the site, showed that phytoplankton communities were dominated by pennate and centric diatoms, dinoflagellates, and cryptomonads with occasional reports of green and bluegreen algae blooms (JEA 1976). JEA (1976) indicated that total densities of algae ranged from 200 to 6,750 organisms/ml during a one-year study period. Periphyton populations in the upper St. Johns River are composed primarily of diatoms (Weston, Inc. 1978). Periphyton are important primary producers in area salt marshes (JEA/FP&L 1981a).

Tidal salt marshes border the CBCP site on both the south and east sides. The dominant emergent plants in these areas are black needlerush (Juncus roemerianus) and salt marsh cordgrass (Spartina alterniflora; S. patens). Areas of the Broward River and the St. Johns River in the vicinity of the CBCP site are bordered by narrow marshy areas with growths of black needlerush and cordgrass. Extensive undisturbed tidal salt marshes also border Dunn's Creek to the east of the site. Submerged aquatic vascular plants occur in seasonally flooded wetlands on one small area of the site site. Tidal salt marsh communities provide nursing, spawning, and/or feeding habitats for many species of commercially important fish and shellfish. Salt marshes also produce large amounts of dead plant material (detritus) which supports the estuarine food web. These communities also maintain the ecological balance of the estuary by helping to filter pollutants, nutrients, and sediments which otherwise might flow directly into sensitive nursery and spawning grounds. Wetlands also act as aquifer recharge zones and help to maintain salinity patterns.

3.5.1.2 Fauna

Zooplankton. The principal zooplankton in the St. Johns River estuary are copepods of the genus Acartia, cladocerans, larval forms of benthic animals (primarily barnicle nauplii and cypris larvae), arrow worms (Sagitta sp.), and mysid shrimp (JEA/FP&L 1981a). Zooplankton are an important intermediate component of estuarine food webs. They are preyed upon intensively by many commercially important species (e.g., menhaden) as well as by non-commercial but ecologically important fishes (e.g., anchovies, silversides).

Macroinvertebrates. Benthic macroinvertebrate populations in the study area are dominated by polychaetes, obligochaetes, and small crustaceans (JEA/FP&L 1981a). Benthic population densities in the vicinity of the site are generally low with scattered, high density patches of several opportunistic species. Benthic invertebrates are consumed by redfish, sea trout, croakers, and many other predators.

Oysters, shrimp, and crabs are abundant in the St. Johns River estuary. Commercial shrimp and blue crab spawn offshore and move into tidal creeks and salt marsh areas of the St. Johns River near the site where they grow and mature. Commercially important species include white shrimp (Penaeus setiferus), brown shrimp (P. aztecus), pink shrimp (P. duorarum), and blue crab (Callinectes sapidus). A limited number of oysters are commercially harvested from a small area in northeast Duval County (USCOE 1980). The FDER has not approved the St. Johns River in Duval County for shellfish harvesting, however (JEA/FP&L 1981a).

Fish and Ichthyoplankton. The St. Johns River estuary supports an abundant and varied fish community both seasonal and permanent residents of the estuary (mummichog, menhaden, weakfish, perch, spot, spotted seatrout), anadromous species (shad, striped bass), occasional oceanic species (bluefish, tarpon, jacks) and strays from freshwater areas (gars, catfish). Freshwater creeks, tidal creeks, and the St. Johns River have been previously surveyed in the vicinity of the site (JEA/FP&L 1981a). This study lists 113 fish species of fish from the estuarine portion of the St. Johns River. Many of these species are commercially important and use the area near the site as spawning and nursery grounds during different seasons of the year. The availability of these areas is essential to the maintenance of a visible commercial fisheries industry.

3.5.2 Terrestrial Ecology

Northeastern Florida falls within the southern mixed forest category as defined by Kuchler (1964). The region is characterized as a tall forest with broadleaf deciduous and evergreen species. Dominant trees are sweetgum, southern magnolia, slash pine, loblolly pine, and oaks. The following discussion deals with the proposed site. Communities on most of the surrounding CBCP site have been either highly disturbed or eliminated.

3.5.2.1 Site Area Vegetation

The proposed project site is located on industrialized land which has been used for pulp mill operations for at least 30 years. During that period alteration of the natural vegetation of the area has occurred with the exception of the northern portion where there exists habitat suitable to the gopher tortoise. The majority of the onsite vegetation consists of a mix of annual and perennial weedy invasive species. A narrow band of trees has grown up along the bank of the Broward River. A majority of the site is covered by weedy species such as briar, ragweed, dog fennel, and Bermuda grass. Shrubby grounsel trees occur along the river and on certain isolated portions of the site. Other species in shrubby wooded sections consist of black cherry, wax myrtle, and cabbage palm. Along the shore of the Broward River is a Spartina-Juncus marsh.

3.5.2.2 Site Wildlife

Onsite wildlife habitat is limited, scattered in small patches, and is of poor quality. Wildlife use of the site is limited to those species which are able to adapt to human activity and a disturbed, industrial environment. Animals observed on site include rabbits, snakes, tortoises, and armadillos. Raccoons, skunks, mice, and opossums are likely onsite. Due to lack of useful habitat, larger mammals such as deer may only occasionally visit fringe areas of the SK paper mill site.

3.5.2.3 Biologically Sensitive Areas and Resources

Biologically sensitive areas on the CBCP site include the Spartina-Juncus marsh bordering the river and habitats for rare, threatened, or endangered species. The marsh system bordering the Broward River is a part of the estuarine system of the St Johns River. It provides habitat for breeding and nursery functions for aquatic organisms.

According to the Florida Natural Areas Inventory, there are no records of federally or Florida listed threatened or endangered species onsite. However, the West Indian Manatee, a federally and Florida endangered species, inhabits the waters of the St. Johns River and has been observed in the Broward River. On the northern portion of the SK site occurs habitat suitable for the gopher tortoise. The gopher tortoise harbors in its burrows at least 30 types of commensal animals, including the indigo snake. It is a federal C2 candidate species and a species of special concern in Florida. Avian species of concern that may visit the site include Bachman's sparrow, snowy egret, Louisiana or tricolored heron, and the red cockaded woodpecker. The American alligator inhabits ponds, lakes, and rivers. It may potentially be onsite near the river or north of the site in a small wetland area. Due to a recent increase in population it has been reduced in rank to a federal listing of "threatened due to similarity of appearance" and a Florida listing of special concern. Its superficial resemblance to the rarer American crocodile has resulted in its current continued federal listing.

Shallow freshwater, brackish, and saltwater wetlands are the habitats of wading birds such as the little blue heron, snowy egret, and Louisiana heron. These wading birds are species of special concern to Florida and may utilize the shallow waters and low-tide mudflats near the proposed site. The water adjacent to the site may also be a hunting area for osprey.

No rare, threatened or endangered species of vegetation are found on site.

3.6 CULTURAL RESOURCES

Cultural resource data, including comments from the State Historic Preservation Officer (SHPO) of the Florida Department of State Division of Historical Resources (FDS DHR), were available to describe the existing environment at the proposed CBCP site.

3.6.1 CBCP Site

The CBCP site is located within the Northern St. Johns Archaeological Area. This region between the mouths of the St. Johns and St. Marys Rivers is referred to as a transition zone between the Georgia Coastal tradition and the St. Johns tradition of East Florida (Wood and Rudolph 1980b). Many of the recorded prehistoric shell middens and mounds along the St. Johns River have been destroyed by residential and industrial development (FDAHR 1980). Sources of information on the project area include the 1976 cultural resource survey of Duval County (FDAHR 1980), a cultural reconnaissance report (Wood and Rudolph 1980a), a report of the testing of eleven archaeological sites (Wood and Rudolph 1980b), and the applicants' SCA/EID (AES/SKC 1988). These sources indicate no presence of an archaeological district within the project area which would be eligible for nomination to the National Register of Historic Places (Percy/Tesar 1988).

Site - specific cultural resources information for the CBCP site was requested from the Florida SHPO. The SHPO stated in a letter dated August 4, 1988:

> "A review of the Florida Master Site File indicates that no significant archaeological and/or historical sites are recorded for or considered likely to be present within the project area. Therefore it is the opinion of this office that the proposed projects will have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state, or local significance. The project is consistent with the historic preservation aspects of Florida's coastal zone program, and may proceed without further involvement of this agency."

3.7 EXISTING SOCIAL AND ECONOMIC CONDITIONS

The analysis of existing socioeconomic conditions focuses primarily on the CBCP region. Because the locations associated with the other alternatives are not limited to specific sites or communities, the socioeconomic analysis of existing conditions is restricted to this region.

The primary impact area of the CBCP project is considered to be the City of Jacksonville and Duval County. This area will be referred to as the project area. The six surrounding counties which include Baker, Clay, Flagler, Nassau, Putnam, and St. Johns Counties are considered to be secondary impact areas and will be referred to as the project region. The following analysis identifies the existing social and economic conditions of both the project area and project region which could be affected by the proposed CBCP projects.

3.7.1. Population Levels

The population of Duval County has grown rapidly during the 1980s, primarily because of increased immigration to the area, and this growth is forecast by JPD to continue. The total population in 1987 was 670,688, an increase of almost 100,000 from 1980. The annual growth rate for the area population has been 2.49 percent, double the rate of the 1970s. The geographical pattern of growth has been uneven during this period, with the largest gains in the southeast regions of the county, and estimated decreases in population in the urban core. The estimated annual rate of growth in the Southeast district from 1980-87 was 5.76 percent, versus 3.21 percent in the North district (where CBCP will be located) and negative 0.63 percent in the urban core. Much of the expansion has been due to a large increase in opportunities for white-collar workers in the service sector. Another major factor in the population growth has been the further development of three US Navy bases located in the county.

Table 3-6 presents the population profile of Duval County for the period 1980-87, showing the population trends for each of the districts in the county. These data are from the US Department of Commerce and from JPD. Table 3-7 provides estimated population figures for 1988 and 1990 for districts within the county. The estimates for 1988 are obtained by extrapolating the 1987 population estimates by the 1980-87 average annual population growth rate for each of the districts. The population projections for 1990 were prepared by JPD.

JPD has forecast that the population growth of Duval County will continue through the year 2010, with an average annual growth rate (in the period 1980-2010) of 1.50 percent.

Table 3-6

Population Estimate for Duval County, Florida, by Planning District and Municipality (April 1, 1987)

	1980 Actual Population*	1987 Estimated Population	1980-87 Net Change	1980-87 Percent Change	Average Annual Percent Change
Duval County	571,003	670,688	99,685	17.46	2.49
Planning Districts					
North District	33,408	40,912	7,504	22.46	3.21
Greater Arlington Dist.	110,286	136,497	26,211	23.77	3.40
Southeast District	95,753	134,380	38,627	40.34	5.76
Southwest District	102,861	121,793	18,932	18.41	2.63
Northwest District	142,317	147,056	4,739	3.33	0.48
Urban Core District	56,295	53,831	-2,464	-4.38	-0.63
City of Jacksonville	540,920	634,469	93,549	17.29	2.47
Atlantic Beach	7,847	10,901	3,054	38.92	5.56
Baldwin	1,526	1,612	86	5.64	0.81
Jacksonville Beach	15,462	17,649	2,187	14.14	2.02
Neptune Beach	5,248	6,057	809	15.42	2.20
Other Municipalities	30,083	36,219	6,136	20.40	2.91

SOURCE: (*) US Department of Commerce, Bureau of the Census, 1980 Census of Population and Housing

Table 3-7

Population Projections for 1988 and 1990

	1988 Estimated Population	1990 Projected Population
Duval County	687,388	690,354
Planning Districts		
North District	42,225	43,187
Greater Arlington District	141,137	139,988
Southeast District	142,120	144,601
Southwest District	124,996	127,294
Northwest District	147,761	147,876
Urban Core District	53,491	51,101
City of Jacksonville	650,140	654,047

NOTES:

1. 1988 population estimate based on extrapolating 1987 JPD estimate by 1980-87 growth rate.

2. 1990 projected population prepared by JPD.

3.7.2 Economic Conditions

It is expected that the area principally affected by CBCP will be Duval County. The data included in this section were collected from several sources, including the 2005 Development Plan for Duval County, the North District Plan, the 1987 Northeast Florida Comprehensive Regional Policy Plan, the 1980 Census of Population and Housing for Jacksonville, and the 1987 Annual Statistical Package prepared by the Jacksonville Planning Department.

3.7.2.1 Employment

The increase in population in Duval County has been paralleled by a dramatic increase in employment. During the period 1980-87, nonagricultural employment grew by 32 percent, from 288,600 persons to 382,200 persons. The rate of unemployment has ranged from a low 5.0 percent in 1980 to 7.8 percent in 1983. It currently stands at 5.2 percent (August 1988). Table 3-8 provides a sector-by-sector analysis of employment from 1980-87 to give a clearer picture of the employment trends in the county. The dramatic expansions for construction activity, retail trade, and services are an indication of the economic growth of the area. Manufacturing and wholesale trade employment has not kept pace with the growth of the county's economy, an indication of the trend toward service-based industries. Employment in the Government sector grew slightly during this period, primarily because of the continued development of the naval bases.

3.7.2.2 Income

The growth in the level of household income in Duval County from 1970 to 1980 is detailed in Table 3-9. In 1980, an estimated 12.7 percent of families in Duval County had incomes below the poverty line. The 1985 per capita income was $10,565, an increase of 55 percent from 1980.

Table 3-8

Employment Trends in Duval County, Florida
1980 to 1987

Employment Sector	Number of Jobs 1980	% of Total	1987	% of Total	Percent Increase
Construction	15,500	5.4	27,200	7.1	75.5
Manufacturing	34,100	11.8	38,000	9.9	11.4
Transportation	23,700	8.2	27,200	7.1	14.8
Wholesale Trade	22,600	7.8	27,800	7.3	23.0
Retail Trade	51,700	17.9	75,200	19.7	45.4
Finance, Insurance and Real Estate	27,200	9.4	36,300	9.5	33.5
Services and Mining	60,400	20.9	93,000	24.2	54.4
Government	53,400	18.5	57,500	15.0	7.6
Total County	288,600	--	382,200	--	32.0

Table 3-9

Household Income in Duval County, Florida

	1970	1980	Percent Change
Families			
Median	8,671	17,661	103.7
Mean	9,931	20,784	109.3
Households			
Median	6,642	14,938	124.9
Mean	8,039	18,377	128.6
Per Capita (Age 15+)	2,834	6,822	140.7

SOURCE: 1980 Census of Population and Housing, Jacksonville SMSA, US Department of Commerce, Bureau of the Census, 1983.

3.7.2.3 Housing

This section presents a profile of the existing housing stock, along with trends in housing construction since 1980, the average size of the household, and finally the stock of housing for the next two decades. Data for this section are largely drawn from the 1987 Statistical Package prepared by JPD.

The profile of the existing housing stock is summarized below:

	1980	1987	Net Change	Percent Change
Single Family	142,310	161,482	19,172	13.47
Duplexes	6,811	7,753	942	13.83
Tri/Quad-plexes	9,841	16,286	6,445	65.49
Five or More	41,562	54,333	12,771	30.73
Mobile Homes	13,032	23,461	10,429	80.03
Demolitions	0	-1,802	-1,802	--
Total	213,556	261,512	47,957	22.46

The greatest percentage increase has been in mobile homes and multifamily units; 53.49 percent of this new multifamily construction has been in the Southeast District. A total of 92.9 percent of these new multifamily dwellings have been built in three areas of the county; Southeast District, Greater Arlington District, and Southwest District.

In addition to the dwellings listed above, there were an estimated 21,966 seasonal units (transitory apartments, rooming houses, hotels and campgrounds) in 1985, and this number was forecast to grow to 26,965 by 1995.

The average household size during this same period has declined dramatically, from 3.35 persons per dwelling in 1980 to 2.6 persons in 1987. This is a 22.4 percent decrease.

JPD has forecast that housing stock in Duval County will continue to grow, expanding by 60.6 percent by the year 2010, to a total of 363,831 units. A table summarizing the projected housing growth pattern is included in Table 3-10. This continued growth is demonstrated by the number of new building permits issued in the period from April 1987 through May 1988, as follows:

Building Type	Number of Permits	Percent of Total
Single Family	4,550	61
Multifamily	2,071	28
Mobile Homes	837	11

SOURCE: JPD

3.7.3 Community Services

Minor project-related impacts on community services and facilities are expected to occur in the Jacksonville/Duval County area. While there may be some secondary impacts realized in other counties of the project region, it is not expected that their public or private services and community infrastructure will be directly affected by CBCP. Consequently, this analysis only addresses the community services of Jacksonville/Duval County area.

3.7.3.1 Water Supply and Wastewater Treatment

The Jacksonville/Duval County public works service function includes sewage, water, and sanitation services. At present, each component is operating with excess capacity. The sewage component has a current design capacity of approximately 87.41 mgd while the current wastewater flow is about 44.99 mgd or an excess capacity of approximately 42.42 mgd. The current design capacity of the water treatment component is about 175 mgd while the current demand is approximately 65.45 mgd or an excess of over 109.55 mgd. City water is not available and, therefore will not be used by CBCP. The current service level capacity of the sanitation component is 1.1 million pounds per day (1980). Resident demand for this public service function at that time was about 864,000 total pounds per day. However, remaining space in existing landfills is becoming critically small. At the present time, there are two municipal landfills in operation. One of these was to be closed

Table 3-10

PROJECTED HOUSEHOLD POPULATION AND DWELLING UNITS FOR DUVAL COUNTY, FLORIDA (1980-2010)

	Population		Group Quarters				Dwelling Units			
Year	Total	Household	Total	Civilian	Military*	Household Size	Total	Occupied	Vacant	Vacancy Rate Percent
1980	571,033	559,694	11,309	6,235	5,074	2.6863	226,611	208,151	18,260	8.06
1985	633,920	617,885	16,035	6,561	9,474	2.6093	258,518	236,799	21,719	8.40
1990	690,354	672,570	17,784	6,887	10,897	2.5611	285,756	262,610	23,146	8.10
1995	733,914	715,804	18,110	7,213	10,897	2.5098	310,747	285,204	25,543	8.22
2000	769,565	751,129	18,436	7,539	10,897	2.4659	332,285	304,606	27,679	8.33
2005	799,467	780,705	18,762	7,865	10,897	2.4289	351,090	321,423	29,667	8.45
2010	827,151	808,063	19,088	8,191	10,897	2.4289	363,831	332,687	31,144	8.56

* Includes only 28.32 percent of the personnel projected to be assigned aboard ships for N.S. Mayport basin (because the projected remainder has another place of residence within 50 miles), and other unaccompanied personnel for all three naval facilities.

SOURCE: US Department of Commerce, Bureau of Census, 1980 Census of Population and Housing (Jacksonville Planning Department, October 1985).

in 1989. An application has been filed for a second landfill in the Southeast District. It was expected to be opened in 1989. The county has also filed a request for expansion of the present North District landfill. If both requests are granted, the system capacity will be approximately 1.7 million cubic yards of usable space.

3.7.3.2 Public Safety

The public safety service function includes law enforcement and fire protection. Based on US Department of Commerce standards, the law enforcement component for 1979-80 has adequate personnel to meet public demand in the Jacksonville/Duval area. A city of this size reportedly requires 1,325 enforcement officers and support personnel to satisfy the public demand. Jacksonville/Duval County currently has a staff of 1,485 which actually represents an excess of 160 full-time personnel (JEA/FP&L 1981a). The evaluation of the Duval County police facilities for the 2005 Comprehensive Plan recommended the construction of a new jail and the possible construction of new police stations, if a decentralized policy were adopted.

Within the North District, there are presently (1985) eight fire stations, manned by a combination of paid and volunteer personnel. Two of the facilities are manned only by volunteers. Structural conditions of the facilities vary from fair for most stations to very good for the newer facilities. Because of the large geographic area in the North District, very few areas are serviced with an average response time of less than three minutes from existing stations. This is expected to improve somewhat with the relocation of one of the fire stations and the addition of new equipment. The station is being moved from the Navy Fuel Depot to the intersection of Busch Drive and North Main Street.

3.7.3.3 Education

The public school system of Jacksonville/Duval County area consists of 132 schools and currently has the physical capacity to accommodate an enrollment of approximately 104,300 students. The current physical capacity of the school system in pupil stations is slightly more than 107,000, resulting in an excess of approximately 2,700 pupil stations. There are also approximately 60 private and parochial schools located in Duval County. These schools range from 3 grades to 13 grades (k-12) and include two special education centers (Jacksonville Area Planning Board 1979 in JEA/FP&L 1981a). The Jacksonville area also has several postsecondary educational institutions.

There was a decline in Duval County school enrollment during the 1970's, but enrollment is expected to increase during the period of 1980-2000. In 1977-78, 14.5 percent of elementary school students and 12.5 percent of secondary students were enrolled in private or parochial schools. If it is assumed that the percentage of students enrolled in these schools remains constant in the future, then the forecast enrollment and capacity needs for Duval County are as follows (data from the Duval County 2005 Comprehensive Plan).

Elementary Schools	Projected Enrollment	Additional Schools
1980	49,582	2
1990	56,570	0
2005	65,200	8
Secondary Schools		
1980	52,170	0
1990	52,273	0
2005	63,709	6

An alternative assumption is that the absolute number of students in non-government schools remains constant. In this case, the number of additional schools required would be slightly lower in some cases.

3.7.3.4 Health Care

Based on US Department of Commerce standards, a city of Jacksonville's size should maintain a public health staff of approximately 750 personnel. At present, the public health service function of Jacksonville/Duval County has a staff of only 165, resulting in a deficiency of approximately 590 personnel (JEA/FP&L 1981a). One explanation for this public health service deficiency could be the abundance of non-public health facilities (hospitals) in the city. The various private hospitals in Jacksonville/Duval County are currently maintaining a service level of approximately 1,065,000 patient days. With a current resident demand of about 779,200, this equates to a current excess of approximately 286,000 patient days or a 73% capacity level. The capacity benchmark utilized by a majority of the area's hospitals is 80% (JEA/FP&L 1981a).

It should be noted that, at present there is no hospital in the North District of Duval County. The nearest two facilities are located approximately 4.5 miles south on I-95. These two hospitals (Methodist Hospital, Inc. and the University Hospital of Jacksonville) are multipurpose facilities. In addition, there are other hospitals farther from the District. JPD has forecast the need for small-to-medium size facility to service the needs of the expanding population in this North District.

There are numerous medical and dental private offices and clinics in the District. The majority of these are located in the southern and central portions of the North District.

3.8 LAND USES, RECREATIONAL RESOURCES, AND AESTHETIC CONDITIONS

This section addresses the existing land uses, recreational resources and aesthetic conditions of the areas surrounding the CBCP site. Because the other alternatives considered are not restricted to specific sites and communities, a detailed analysis of existing conditions for any other affected areas is not presented.

3.8.1 Cedar Bay/Cogeneration Project Area

The primary impact area of the CBCP is considered to be Jacksonville/ Duval County. This area is referred to as the project area. The six surrounding counties which include Baker, Clay, Flagler, Nassau, Putnam, and St. Johns Counties are considered to be secondary impact areas and are referred to as the project region. Land use in the seven county project region is predominantly agricultural with approximately 233,650 acres (82%)

devoted to this use. Other land uses in the region include residential; commercial; industrial; and extractive (Table 3-11). The greatest urban-related use in the Northeast Region is residential land use (approximately 102.930 acres or 4%). Low density development are located primarily near the St. Johns River and transportation corridors throughout the region. Medium and high density residential areas are found along the coast and near downtown Jacksonville as well as St. Augustine, Jacksonville Beach, and Atlantic Beach.

In contrast to the region, Duval County has only 58.8% of its land in agricultural uses. The most predominant land use in Duval County is residential comprising 58,247 acres (11.8%) while industrial institutional, and commercial uses constitute 36,950 acres or approximately 9% of the total land area (Jacksonville Area Planning Board 1977a in JEA/FP&L 1981a).

3.8.1.1 Existing Land Cover

Most of the land within the five mile radius of the proposed CBCP site is within the North District of the City of Jacksonville. A total of 116,545 acres can be considered suitable for development. Of this total, 30,951 acres were covered with urban development in 1985. Of this urban development, some 9997 acres is residential; mostly single family. Most of the residential areas are south or west of the St. Johns River or west of Main Street. Transportation facilities covers 9651 acres within this district. Parks and recreational areas cover 4992 acres.

3.8.1.2 Existing Land Uses

The land use within a five mile radius of the proposed CBCP is concentrated primarily in the northern half of Duval County located near the St. Johns River. Land use in the vicinity of the proposed CBCP is highly related to uses of the St. Johns River and is expected to continue in such related uses (Table 3-12). Demands are heavy for that land which is easily accessible to the river. These demands are primarily for industrial, commercial, residential, and recreational land uses. Recent land use trends in the vicinity of the site since 1985 can be ascertained from building permit

Table 3-11

Existing Land Use Acreage - Northeast Florida Region (Jacksonville area Planning Board 1977a in JEA/FP&L 1981a).

	County							
Classification	Baker	Clay	Duval	Flagler	Nassau	Putnam	St. Johns	Region
Residential [a]	2,568	11,382	58,247	1,774	7,316	10,304	11,234	102,934
Commercial & Services	84	845	5,754	244	416	534	740	8,617
Industrial	83	674	4,819	110	300	545	446	6,978
Transportation [b]	3,849	4,284	20,677	3,296	5,167	4,288	54,564	47,125
Communication & Utilities	321	175	843	39	42	1,145	176	2,741
Institutional	315	67,991	26,378	188	255	729	673	94,530
Recreational [c]	161	1,884	6,660	264	1,861	525	791	12,146
Mixed	-	-	318	-	63	430	11	822
Extractive	182	3,891	2,214	-	76	666	-	7,029
Total Developed	7,674	91,126	125,909	5,916	15,495	19,166	19,637	284,922
Total Land Area	374,144	379,520	490,048	311,872	416,000	498,368	387,008	2,856,960
Developed as % of Total Land	2.1	24.0	25.7	1.9	3.7	3.8	5.1	10.0
Agriculture	357,562	346,971	288,240	282,378	348,452	379,452	333,306	233,652
Agriculture as % of Total Land	95.6	91.4	58.8	90.5	83.8	76.2	86.1	81.8 [a]

a. Includes local streets right-of-way. b Includes an estimated 11,316 acres of rights-of-way.
c Excludes national forest and/or swamp lands and game management areas or refuge.

Note: Columns may not total exactly due to rounding.

Table 3-12
Summary of Land Use Existing in 1985 in the Area Surrounding the Plant
(Census Tracts 102.01 and 102.02)(AES/SKC 1988)
Census Tracts

Land Use	102.01 Acres	102.02 Acres	Total Acres	Percent of Total
	Controls			
Gross Area	5,565.24	5,777.92	11,343.16	
Less Water	624.91	938.90	1,563.81	
Less Salt Marsh	294.17	362.01	656.18	
Net Land Area	4,646.16	4,477.01	9,123.17	100.0
Urbanized Development				
Single Family	1,089.70	436.32	1,526.02	16.7
Multi-Family	0	0.00	0.00	0.0
Parks and Recreation	36.05	77.39	113.44	1.2
Institutional	20.19	158.00	178.19	2.0
Commercial and Service	44.52	30.65	75.17	0.8
Communications and Utilities	33.00	13.63	44.63	0.5
Major Transportation	186.90	316.85	503.75	5.5
Industrial	179.55	789.01	968.56	10.6
Total Urban Development	1,589.91	1,821.25	3,411.16	37.4
Remaining Developable Land	3,056.25	2,655.16	5,711.41	62.6

Source: Jacksonville Planning Department, North District Plan. Jacksonville, Florida, June 1986.

data for census tracts 102.01 and 102.02. These tracts are bordered by Duval Station road on the north, by Dunn Creek on the East, by Main Street on the West and by the St. Johns River on the South.

The proposed site is currently zoned for heavy industrial use which may include, by exception, power plant siting. The land contiguous to the north, east, and south of the proposed site is zoned industrial as well. The Broward River is to the west of the site. Approximately 969 acres of the total land in the two census tracts is currently identified as industrial use.

Industries are locating in this area not only because of the St. Johns River, but also because of the proximity to interstate highways and the Jacksonville International Airport. In 1985, 10.6 % of developable land in Census tracts 102.01 and 102.02 was devoted to industrial use. Between 1985 and 1988, 24 building permits were issued for industrial sites in this area representing over 44 acres of new industrial development. Most of this industrial development occurred along Hecksher Drive, Eastport and Busch Roads, and Main Street.

Residential land use constituted 16.7% of the developable land in this area in 1985, encompassing 1526 acres and 2977 dwelling units. By September of 1988, residential land use had expanded to approximately 18% of the developable land area due to issuance of an additional 237 residential permits, about 4 miles from the site. The closer residential areas are a mixture of house trailers and single-family dwellings of varying conditions and ages. The area farther from the site is separated by commercial districts and consists primarily of well-maintained, middle to upper income dwellings.

In 1985, less than one percent of the developable land in Census tract 102.01 and 102.02 was used for commercial or service activities. Between 1985 and 1988, 72 building permits were issued representing over 57 acres of industrial development. this development occurred primarily along Main Street, New Berlin Road, and Busch Drive, with some development along Eastport Road and Hecksher Drive.

3.8.1.3 Projected Land Uses

The Northeast Region is expected to experience an increase in urban-related land uses as the decline in agricultural uses continues. However, the growth of urban-related land uses is likely to occur in a restricted pattern. Natural resource factors such as the availability of adequate water supplies may condition the location of such future development. Future land uses within the five mile radius are expected to continue focusing on activities associated with the St. Johns River. Heavy demands are projected for the shores of the river by industry, water-related commercial, and residential land uses. The 2005 Comprehensive Plan by the Jacksonville Area Planning Board calls for port- and water-related industry as well as protected wetland areas in the vicinity of the proposed project (JEA/FP&L 1981a). The area along Heckscher Drive from Interstate 95 east to just north of Blount Island is expected to continue developing as industrial and storage facilities. By the year 2005, the area of the proposed CBCP should have experienced major industrial development even without the proposed project. Blount Island is expected to continue developing as a center for water-related industries.

3.8.1.4 Existing Zoning

Land in the primary project area is zoned for industrial uses. The proposed CBCP site has been zoned for heavy industrial use (IH). Power plants are permissible uses in IH zones. A 1.9 acre portion of the original site is zoned Open Rural (OR). The City Council declined to rezone this parcel. Consequently AES deleted the 1.9 acre parcel from the site and added a one acre parcel on the pulp mill property that was zoned IH. The paper mill's existing wastewater treatment ponds are located on property zoned OR. The use of the OR land for a wastewater treatment plant was allowed for the paper mill as an essential service. Existing land use ordinances refers to a single industrial use under the Essential Services definition. The City granted an exception on March 16, 1989, to allow the wastewater treatment facility to treat wastewater from the cogeneration plant. The Siting Board found the site to be in compliance with local land use and zoning plans on June 27, 1989.

3.8.1.5 Recreational Resources

Recreational areas in the region center around the coast and the river. Within the five mile radius of the proposed CBCP is the Jacksonville Municipal Zoo between two to three miles southwest of the site. Also within this radius is Yellow Bluff Fort, an undeveloped State park at the site of Confederate Army gun placements which were used in 1862 to protect Jacksonville from Union gunboats. A number of areas also exist that are not officially designated as parks. These areas are normally used for fishing, sunbathing, and picnicking.

Between 7 and 10 miles from the proposed site are two regional parks. One of these parks is the Kingsley Plantation, a State historic and recreational site located on Fort George Island near the beaches. The Jacksonville Area Planning Board (JAPB) estimates that over 35,000 people visit the plantation each year (JEA/FP&L 1981a). Also located on Fort George Island is the Rollins Bird and Plant Sanctuary. To the east is the 2,500 acre Little Talbot Island State Park. This park provides beach recreation to over 35,000 visitors each year (JEA/FP&L 1981a). The Fort Caroline National Memorial is located approximately eight miles southeast of the site. It is a 120-acre reconstruction of a French fort built in 1564. The JAPB estimates that visitation to the fort averages around 400,000 people per year.

North of Jacksonville on the Florida/Georgia border is the Okefenokee Swamp, a National Wildlife Area. The swamp is over 40 miles long and 20 miles wide and contains abundant wildlife including rare species of flora and fauna. Also located north of Jacksonville at St. Mary's, Georgia is the Cumberland Island National Seashore. Cumberland Island is a National Park offering camping, biking, swimming, and fishing in a natural wildlife setting.

3.8.1.6 Aesthetic Conditions

The site of the proposed CBCP is a relatively flat area on the eastern shore of the Broward River and the western portion of an industrial area. The general vista is open to the south and west due to the rivers. To the south the vista is influenced by industrial development associated with existing oil terminals. Adjacent to the proposed site is the Seminole Kraft

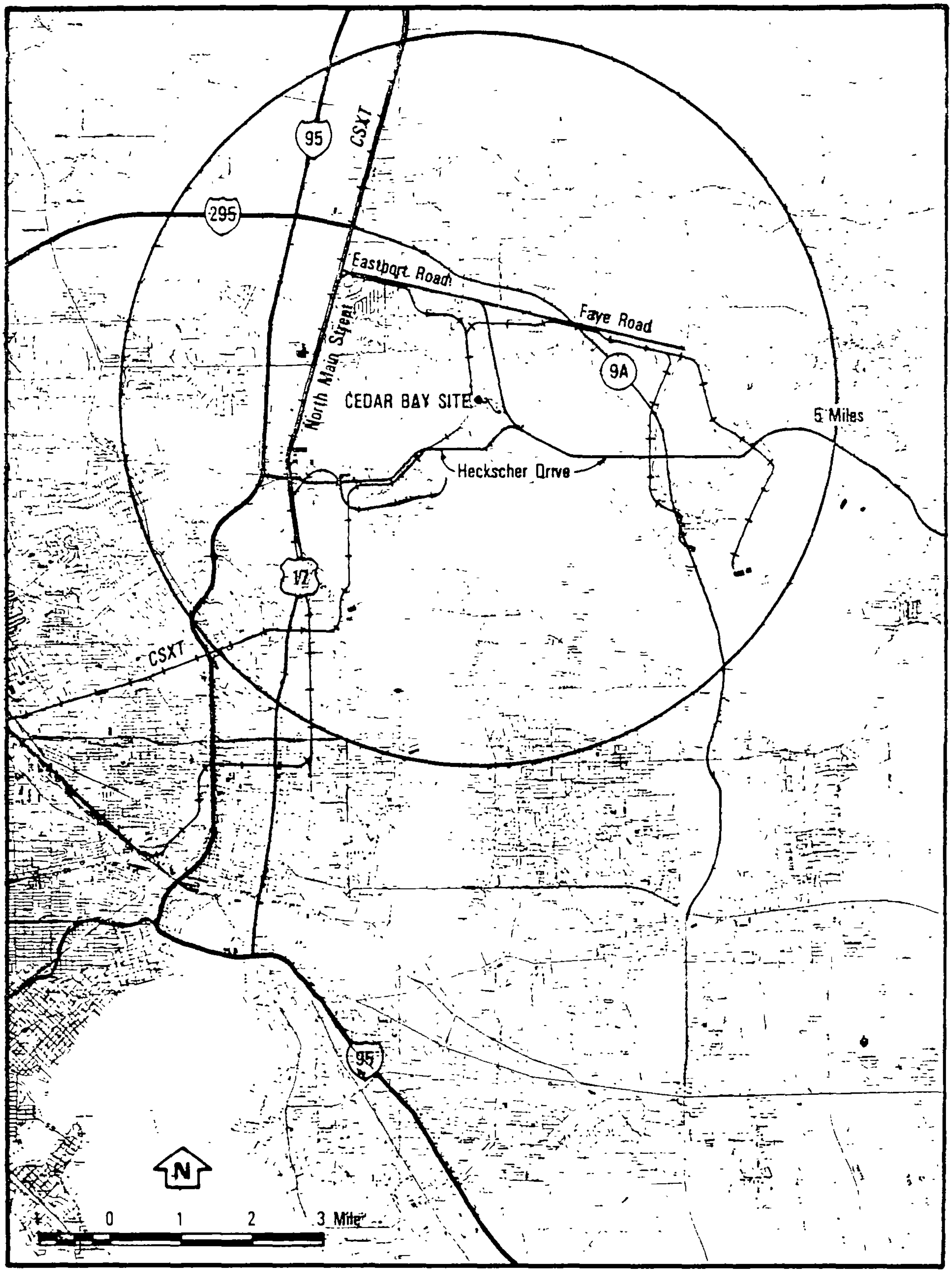
Corporation paper mill. The existing view toward the proposed site is dominated by the buildings and stacks of the paper mill.

The viewshed of the proposed site extends mostly to the south because of the St. Johns River and the marshes. Homes located on the western shore of the Broward River are most affected by the view of industrial structures in the area. The only major road south of the St. Johns River that offers a view of the industrial structures close to the proposed site is Fort Caroline Road which runs contiguous up to the marshes and Mill Cove. On the north side of the River south of the proposed site, a view of the proposed CBCP will be possible from Heckscher Drive. This view is presently dominated by the paper mill in the foreground and is typical of the industrialized section of Heckscher Drive. East of the site, the tree cover allows only a limited view of the structures.

3.9 EXISTING TRANSPORTATION

The study area of northeast Florida was considered in order to determine the existing transportation facilities available to the proposed CBCP. The study area includes the transportation facilities of Jacksonville, Florida which will serve the proposed project.

Transportation systems of importance to the Jacksonville area are highways, railroads, airports, and ship facilities (Figure 3-2). Major highways include Interstate Highways 10 and 95 and US Highways 1, 17, 23, and 90. Three rail systems serve the area: the Southern Railway; the Atlantic Coast Line Railroad; and the Seaboard Coast Line Railroad. Only the Seaboard Coast Line (SCX) serves the Cedar Bay area. Major airports include Jacksonville International Airport, Craig Airport, Herlong Airport, and the Mayport Naval Air Field. Major port facilities include Blount Island and the Talleyrand Docks and Terminals.



REGIONALLY SIGNIFICANT ROADWAYS AND RAILROADS

FIGURE 3-2

Roads expected to provide access to the proposed CBCP site are Heckscher Drive, Eastport Road, and Main Street. Traffic courts indicate that (under existing conditions) all signalized locations and roadways in the area operate at level of service C or better with additional capacity available. Level of service C is defined as stable traffic flow where most drivers are restricted in selecting their speed, but where all stopped traffic will clear a signalized intersection. The intersection of I-95 to Heckscher Road and its intersection with Heckscher Drive going toward Main Street, however, is congested during peak periods (JEA/FP&L 1981a).

Jacksonville International Airport is a major asset to the region. This Airport provides commercial service directly to Atlanta and other southeastern cities as well as to several other major airports. In addition, this Airport provides general aviation facilities. It is the only civil airport in the region that is capable of accommodating higher performance, more sophisticated general aviation aircraft (JEA/FP&L 1981a).

Jacksonville functions as a major port facility serving the southeastern United States. Port facilities include Blount Island and the Talleyrand Docks and Terminals. Many Jacksonville industries are dependent upon barge and oceangoing vessels for transportation of raw materials and finished products. Port facilities serve as an asset in attracting new industries to the City. The USCOE maintains a channel depth of 38 feet in the St. Johns River near the project area (Moulding 1981).

3.10 SOUND QUALITY

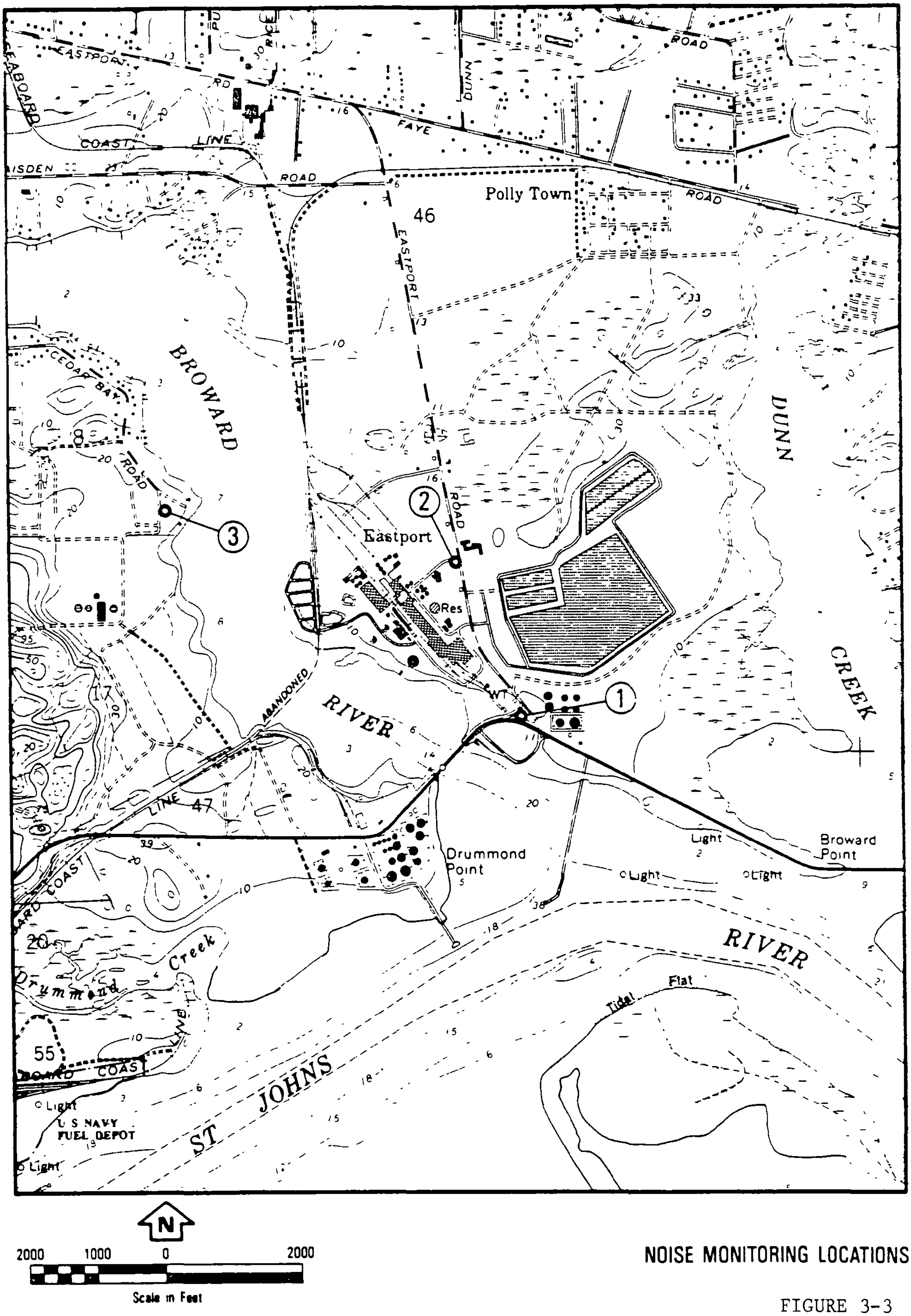
This section describes the existing ambient sound environment for the proposed site. The study area includes noise receptors that could be possibly affected by noise from the CBCP. Noise sources in the area include roadways, railroads, industrial plants, SK paper mill, and airports. A noise survey was performed in March and July 1988, at three locations around the site. One location was at the Junction of Eastport Road and the northeast entrance to the Seminole Kraft paper mill site. Another location was at the junction of Heckshcr Drive and Eastport Road. The last location was in a residential area along Cedar Bay Road. Existing noise levels are listed in Table 3-13. and monitoring locations are shown on Figure 3-3. The noise receptor most likely to be affected by the CBCP is site 3 located near residences along Cedar Bay Road some 2,000 feet west of the site . Measured noise levels ranged from a Leq of 46.3 dBA during nighttime hours to 65.7 dBA during daytime hours. Lmax values ranged from 48.3 dBA during nighttime hours to 83.1 dBA during daytime hours. While making measurements, insect noise, a sewage treatment plant and the pulp mill were the most identifiable noise sources. The Cedar Bay Road area would be the most sensitive area for plant induced noises. Other noise sensitive locations would be residential areas along the rail line to the northwest of the site.

There are no existing federal or state noise control regulations that apply directly to offsite noise levels resulting from CBCP. Two local ordinances regulating noise levels are applicable to CBCP, the Land Use Regulations for the City of Jacksonville, Florida and the restrictions established by the Jacksonville Environmental Protection Board. Daytime sound levels caused by project construction are not expected to exceed any limits. If nighttime construction is allowed, the noise level requirements may exceed the 60dBA limit. AES simulated operation sound levels using a computer model and information contained in a guidance document by the Edison Electric Institute for estimating noise emissions from specific equipment. It was concluded that the overall effect of the operational noise from CBCP on the surrounding area will be acceptable.

Table 3-13
EXISTING NOISE LEVELS

NML*	Period	Day	Time	dBA		Identifiable Sources
				L_{eq}	L_{max}	
1	Nighttime	3-10-88	1:20 a.m.	48.3	51.7	Paper mill plant
				50.0	54.6	Train horn
				60.7	81.8	Train horn and two car passes in distance
1	Daytime	3-10-88	10:55 a.m.	70.0	79.6	Traffic on Heckscher Blvd., paper mill plant
						Train horn, leaf rustling
				68.7	77.4	Same as above
1	Nighttime	7-28-88	2:18 a.m.	66.2	75.3	Generator for construction lights and arrows on nearby bridge
				64.2	67.8	Traffic noise and generator
				63.6	67.7	Same as above
1	Daytime	7-28-88	3:45 p.m.	68.2	78.0	Approximately 30 car and truck passes
				64.5	73.8	Approximately 25 car and truck passes
				64.6	70.7	Approximately 15 car and truck passes and airplane overhead
2	Nighttime	3-10-88	1:35 a.m.	69.9	74.5	Paper mill plant
				68.7	73.3	Same as above
2	Daytime	3-10-88	10:35 a.m.	72.0	78.5	Paper mill plant, wind noise, flapping flag, auto traffic
				71.1	83.2	Truck noise
2	Nighttime	7-28-88	2:25 a.m.	63.3	65.2	Paper mill plant
				63.5	65.2	Paper mill plant
				64.6	70.9	Paper mill plant
2	Daytime	7-28-88	3:25 p.m.	76.5	93.2	Paper mill plant, traffic
				59.2	65.7	Paper mill plant, traffic
				69.0	83.1	Paper mill plant, traffic
3	Nighttime	3-10-88	2:10 a.m.	46.6	49.3	Paper mill, insects
				46.3	48.3	Paper mill, insects
3	Daytime	3-10-88	11:20 a.m.	58.2	68.4	Wind noise, sewage treatment plant
				65.7	81.9	Wind noise, sewage treatment plant
				62.1	73.8	Wind noise, sewage treatment plant, one car pass
3	Nighttime	7-28-88	1:48 a.m.	51.6	53.3	Insect noise, sewage treatment plant
				51.6	53.1	Insect noise, sewage treatment plant
				51.5	54.7	Insect noise, sewage treatment plant
3	Daytime	7-28-88	4:11 p.m.	49.9	55.8	Insect noise, sewage treatment plant, paper mill
				49.0	50.8	Insect noise, sewage treatment plant, paper mill
				53.3	57.7	Insect noise, sewage treatment plant, paper mill

* Noise Measurement Location. See Figure 3-3 for placement with respect to the plant.



NOISE MONITORING LOCATIONS

FIGURE 3-3

3.11 ENERGY RESOURCES

This section summarizes the energy situation in Florida.

3.11.1 Florida

3.11.1.1 Traditional Energy Sources

In 1987, the state of Florida relied on petroleum and natural gas for 59.3% of its energy needs. Petroleum constituted 48.2% and natural gas constituted 11.1% of the total consumption of primary energy. Coal supplies 20.8% and nuclear 7.2% of Florida's energy needs. The state uses less coal, natural gas, petroleum, and nuclear energy on a per capita basis than the average U.S. citizen. Floridians used 26% less energy than the average U.S. citizen in 1987. Part of this difference may be attributed to the lack of heavy industry in the state. Since most of the energy in Florida must be imported, industries which use less energy or renewable resources have a competitive advantage over more energy intensive industries.

In 1987, coal supplied 23.6% of the nations energy, but only 20.8% of Florida's. Nationwide, 84.3% of all coal consumption is for electric generation, compared with 95.6% in Florida. The state's small industrial sector uses relatively less coal. Florida purchased more interstate electricity in 1987 then in previous years, a direct result of higher prices for residual oil.

In Florida homes, air conditioning and water heating are the primary electrical energy consumers. These uses consume a much higher percentage of total residential energy than in other states. Conversely, heating of Florida homes uses far less energy than the national average for heating (Florida Governors Energy Office 1981).

In 1987, 41.5% of Florida's electricity was generated from coal, more than any other fuel. Until 1984, petroleum was the primary generating fuel. Petroleum supplied only 13.5% of the energy used for generation in 1987, compared to the high of 58.3% in 1972. Nuclear fuel provided another

15% of the energy used for generation, while natural gas accounted for 13.6% , both down from 1986. The use of wood and waste as a generating fuel increased significantly over the 1986 level.

Electricity produced by non-utility generators also contributes to the state's total electric supply. Cogeneration is the combined production of heat and electricity from one energy source. Heat and electricity can be produced together at a lower cost than either alone. Several of Florida's businesses and industries that use process heat also generate electricity. Cogeneration can assist in providing an uninterrupted supply of power.

Cogeneration is encouraged by the Public Utility Regulatory Policies Act of 1978 (PURPA P.I. 95617). This law requires utilities to purchase electricity from qualifying cogenerators at mutually agreeable prices or at the utility's avoided cost ("Avoided cost" is the energy and capacity costs that a utility avoids by purchasing power from the cogenerator.) At this time, Florida has over 800 Mw of cogenerating capacity. Net generation from cogenerators totaled 8.5 million Btu during 1987.

Interstate purchases are an important component of Florida's electric supply. Due to rising petroleum prices these imports increased 44.6% from 1986, but still provided 14.6% of Florida's electricity in 1987. Purchases of out-of-state electricity during 1987 totaled 65 trillion Btu. The majority of interstate purchases are from coal-fired plants located in Georgia, and are frequently referred to as "coal-by-wire."

Electric sales rose 5% in from 1986 to 1987, to a total of 122.128 GWh. The largest increases were in the commercial and industrial sectors both up 6%. Residential sales of electricity were up 4% in 1987.

Within Florida there is a heavier reliance on petroleum in the production of electrical energy than in the nation as a whole. Conversely, coal utilization nationally is significantly higher than in Florida. In the production of electrical energy for Florida's consumers in 1979, petroleum was used for 47.4% and coal was used for 18.6% of the energy production. On a national basis, petroleum was only used to produce 14.5% of the electricity while coal was used to produce 46.1% (Florida Governor's Energy Office 1981).

3.11.1.2 Other Energy Sources

Other energy sources are currently being developed in Florida. These include direct solar, indirect solar (primarily wood burning), alcohol, crop residue, and hydropower. These sources represented only 1.8% (24 trillion Btu's) of the total energy consumption in Florida in 1987. Total energy from direct solar (0.7 trillion Btu's), alcohol (0.2 million Btu's), crop residues, and hydropower (2.7 trillion Btu's) is small. The remainder is attributable to wood and municipal waste burning (21.6 trillion Btu's) (Florida Governor's Energy office 1981).

3.11.2 <u>Peninsular Florida</u>

Peninsular Florida is the portion of Florida east of the Apalachicola River. The utility industry in Peninsular Florida consists of 42 utility systems with 17 utility systems providing nearly 100% of the electric energy generated in the region. In 1987, the net electrical energy capacity in peninsular Florida was 33,913 MW. In order to allow for scheduled and unscheduled interruptions in output from one or more units, reserve margins must be at least between 20% and 25%. Higher reserve margins are suggestive of excess capacity.

3.11.2.1 FP&L

FP&L is an investor owned utility which services retail customers in 35 counties in southern and eastern portions of Florida. As of December 31, 1988, FP&L served a total of 2,953,621 customers. During 1988, the net energy for load generated by FP&L was used as follows (FPSC 1981b):

User Category	% of Net Energy Used
. Residential	46.5%
. Commercial	36.9%
. Industrial	6.4%
. Street and Highway Lighting	0.5%
. Sales and Resale	1.9%
. Utility Use and Losses	7.5%
Total	99.7%

Existing generating capacity and planned additions through 1983 consist of 13 active plants comprised of the following types and numbers of units:

Unit Type	Number of Units
. Nuclear steam	4
. Fossil steam	24
. Solid Waste steam	2
. Gas Turbines	48
. Diesel	2
. Combined cycle	2
. Coal	2
Total	84

Fuels used to produce a total of 45,000 gigawatt hours (GWH) of electricity in 1979 included 23.0% residual oil, 30% nuclear, 2% coal, and 21% natural gas (FP&L 1980a). As discussed in Section 1.5, FP&L is expected to need additional generating capacity by 1989 (FPSC 1981b).

3.11.2.2 JEA

JEA is a municipally-owned electric utility serving retail customers in Duval County and parts of St. Johns and Clay Counties. As of December 31, 1988, JEA served a total of 278,675 customers. During 1988, the net energy for load generated by JEA was used as follows:

User Category	% of Net Energy Uses
. Residential	40.8%
. Commercial	11.1%
. Industrial	39.3%
. Street and Highway Lighting	0.7%
. Sales and Resale	2.2%
. Utility Use and Losses	5.9%
Total	100.0

Existing generating capacity in the JEA system consists of four power plants comprised of 2 coal-fired units, 11 oil-fired steam-generating units and 9 gas turbines. In 1988, 4.5 million barrels of oil were consumed. Total energy production from oil amounted to 2,732 GWh. JEA consumed 2.2 million tons of coal in 1988.

3.12 HUMAN HEALTH

A number of studies on mortality have been carried out on a county-by-county basis for the entire United States and for metropolitan areas of the United States. In addition, analyses have been made on the effects on human health of specific chemical elements and compounds. The results of these studies and analyses are summarized in this baseline health section.

3.12.1 Mortality and Morbidity

The mortality data for Duval, Volusia, and Seminole Counties, State of Florida, and the United States are presented in Table 3-14. The data indicate that mortality rates of selected causes during 1978 in Duval County are comparable to national rates except that deaths due to chronic obstructive lung disease and cirrohsis of the liver are higher for Duval, Seminole, and Volusia Counties. The chronic obstructive lung disease group includes bronchitis, emphysema, asthma, and chronic obstructive pulmonary disease. The four causes combined constituted the fifth leading cause of death in 1978 in Florida and in Duval, Volusia, and Seminole Counties. This cause group is probably more directly related to cigarette smoking and/or air pollution than any other with the exemption of lung cancer (State of Florida 1978). The death rate due to heart disease and stroke for Duval County during 1978 was lower than for Volusia and Seminole Counties and the State of Florida.

3.12.2 Lung Cancer in the Jacksonville Area

A county-by-county survey of mortality in the United States (1950-1969) revealed that Duval County has one of the highest rates of lung cancer in the United States. An update of the same survey for the period 1970 to 1975 also indicated that lung cancer mortality among white males in Duval County was the highest recorded among all metropolitan counties of the United States, and was greater than the national average by more than 50% (Table 3-15). A study (Blot et al. 1981) to identify reasons for the high cancer mortality in Duval County and along the northeast coast of Florida concluded that increased risks on the order of 40% to 50% were associated with employment in the shipbuilding, construction, and lumber/wood industries, particularly among

Table 3-14
Death Rates Per 100,000 Population For Selected Causes During 1978 (National Center for Health Statistics 1978 and State of Florida Department of Health 1978)

Cause	Duval County	Volusia/Seminole Counties	Florida	U.S.A.
Heart Disease	376.0	550.8	530.4	334.3
Cancer	175.4	239.1	241.3	181.9
Stroke	64.6	110.5	99.1	80.5
Accidents	40.1	44.6	47.8	48.4
Chronic Obstructive Lung Disease	28.7	31.4	32.4	23.1
Influenza	23.2	27.9	27.1	26.7
Cirrohsis of Liver	22.8	16.5	18.5	13.8
Arteriosclerosis	8.4	11.7	13.4	13.3
Diabetes	12.4	16.9	17.2	15.5
Suicide	14.6	18.0	17.1	12.5
Homicide	13.6	9.6	11.4	9.4
Prenatal Condition	11.0	5.	7.6	10.1
All Causes	840.0	1,075.0	1,103.7	883.4

Table 3-15
Morality Rates For Lung Cancer (listing of the 10 metropolitan counties (1) in the U.S.A. with the highest age-adjusted rates among white males. 1970-75 (2) (3))

Ranking	County	Mortality Rate (deaths/yr/10)
1	Duval, Fl.	93.2
2	St. Louis City, Mo.	90.9
3	Baltimore City, Md.	88.4
4	Chesapeake, Va.(4)	87.2
5	Orleans, La.	86.1
6	Mobile, Al.	83.8
7	Jefferson, Ky.	82.8
8	James City, Va. (5)	80.4
9	Chesterfield, Va. (6)	79.3
10	Marion, In.	77.6

(1) Includes all counties with at least 500,000 person-years of observation among white males during 1970-75

(2) Deaths for 1972 are excluded since not all were ascertained for this year

(3) Source, Blot et. al. 1981

(4) Includes the independent cities of Norfolk and Portsmouth

(5) Includes the independent city of Newport News

(6) Includes the independent city of Richmond

workers with reported exposures to asbestos or wool dust. Excess risks were also linked to fishing and forestry occupations, although the number of cases involved was small. It should be noted that although Duval County leads the nation in lung cancer incidence, the overall cancer rate is lower than Volusia and Seminole Counties and the nation.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND THE PROPOSED PROJECT

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND THE PROPOSED PROJECT

This chapter summarizes the potential impacts of the No Action Alternative and the proposed CBCP on the natural and man-made environment. Section 4.1 defines the criteria used to analyze the impacts of all alternatives and summarizes the criteria applied to each resource area. The remaining sections summarize potential impacts for each resource area.

4.1 CRITERIA FOR THE EVALUATION OF IMPACTS

This section describes the criteria and general approach used to evaluate the potential impacts of the proposed CBCP and the alternatives on the natural and man-made environment. The potential impacts of all alternatives are discussed in Sections 4.2 through 4.13 on a resource by resource basis.

The potential impacts of the CBCP are analyzed in detail using information presented by the applicant and large amounts of information and other analyses gathered and performed during the course of the preparation of the SAR/EIS including the SAR/EIS performed for the JEA/SJRPP. The large amount of information about the site and details of the proposed project allowed a detailed, relatively quantitative assessment of impacts of the CBCP including estimates of potential changes in the concentration of air and water pollutants in the environment based on modeling. Using this approach, impacts were estimated by comparing the potential changes in the air quality, water quality, and other resource categories to applicable governmental standards. Due to limitations on the amount of information that could be reasonably gathered, however, this approach could not be used to identify impacts of all possible alternatives. Instead, the relative impacts of the alternatives were identified by comparing their resource requirements and general waste generation characteristics to provide indicators of potential harmful effects on each resource category. The general types of criteria used in this analysis are identified in Table 4-1 and their impact is explained in each of the impact analysis sections.

Table 4-1.

Criteria For Estimating Potential Impacts On Resources

Resource Category	Criteria Employed
Air Resources	. Net change in emissions of SO_2, NOx, CO, HC, and particulates.
Surface Water Resources	. Net change in discharge of chlorine, heat, trace metals, oil and grease.
Earth Resources	. Net changes in total amounts of groundwater used. . Net changes in total amount of solid waste generated. . Changes in topography. . Net change in landfill area.
Biological Resources	. Number of acres of habitat required for plant sites and solid waste disposal areas. . Net changes in air emissions and wastewater discharges. . Potential occurrence of rare, threatened, or endangered species. . Potential occurrence of wetlands.
Sound Quality	. Predicted increases in equipment noise levels. . Predicted traffic noise levels.
Cultural Resources	. Potential for occurrence of archaeological, historic, or cultural resources based upon criteria of effect defined in 36 CFR 800.
Socioeconomic Conditions	. Changes in influx of population in relation to housing availability and capacity of community services. . Changes in employment (number of permanent and temporary jobs) . Amount of property tax paid by the utilities and employees. . Amount of State educational aid. . Service demands

Table 4-1.
Criteria For Estimating Potential Impacts On Resources
(con't)

Land Use, Recreation and Aesthetics	. Degree of changes of existing land use patterns . Changes in zoning required. . Consistency with comprehensive land use plans. . Total land required. . Changes in recreational uses. . Changes in aesthetic environment.
Transportation	. Changes in coal train traffic. . Changes in amount of highway traffic. . Changes in barge traffic.
Human Health	. Net changes in air emissions of criteria pollutants.

In order to understand the use of the criteria in the assessment of impacts, it is necessary to understand several basic assumptions and underlying methodologies. The basic alternatives to the CBCP involve maintaining the status quo at the existing pulp mill, constructing new power generation sources at the pulp mill, or purchasing power from another source. It is difficult to ascribe alternatives to cogeneration sites because of the limited industrial plants that require steam as well as electric power and who have sufficient space to allow construction of cogeneration facilities. The CBCP site is a viable location for a cogeneration facility in that it is next to a customer (the SK paper mill) that can economically use the process steam and has a large area available for industrial use. The CBCP will allow the customer to modernize their facilities and reduce adverse environmental impacts.

4.2 AIR QUALITY IMPACTS

This section considers the potential air impacts due to the construction and operation of the CBCP and the alternatives. Included are discussions of impacts of construction-related emissions, uncontrolled operation emissions, and controlled operation emissions.

4.2.1 Construction-Related Impacts

4.2.1.1 CBCP

Emissions of air pollutants associated with the construction of a power generating station result from clearing and grubbing, excavation, material haulage and handling, and open burning. These activities are common to most major construction projects. The CBCP and its alternatives, with the exception of the No Action Alternative and the Purchase Power Alternative, are therefore assumed to have similar construction-related emissions. Because air emissions from construction activities are difficult to quantify and vary significantly depending on the control measures implemented, no attempt has been made to quantify these emissions. The production of actual emissions is not critical since control measures for construction-related air emissions have been shown to be highly effective.

The primary air pollutant emitted during each phase of construction is fugitive dust. Control of fugitive dust is primarily accomplished by watering and soil stabilization. Stabilization includes paving or laying down a surface (such as rock or shell) which will reduce the opportunity for particles to become airborne. Other measures for fugitive dust control include careful operation of on-site equipment, reduction of vehicle speeds on unpaved areas, and rapid revegetation of cleared areas after construction.

Open burning is another source of air emissions during construction. Typical emissions from burning activities include particulate matter, carbon monoxide, hydrocarbons, sulfur oxides, and nitrogen oxides. The quantity of these emissions depends largely on the amount and moisture content of the material burned. There are no specific control measures for open burning, although to reduce impacts, burning should be conducted during periods of good atmospheric dispersion.

Exhausts of heavy machinery and truck traffic also are a source of air pollutants, consisting mainly of carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, and particulate matter. These emissions would be minor due to the small number of pieces of equipment and their wide distribution over the project site.

Construction-related air quality impacts are expected to be minimal and of short duration if standard mitigative measures are implemented. Fugitive dust production should be minimized through the use of watering, stabilization, good equipment operational practices, and rapid revegetation of cleared areas. In addition, fugitive emissions from construction activities generally consist of large particles which rapidly settle rather than remain suspended for long distances. This rapid setting will keep fugitive dust impacts restricted to the project site in most instances.

Only minor short-term air quality impacts are expected to result from burning since these operations will be conducted only during periods of good atmospheric dispersion. Burning should be conducted in compliance with local and State regulations (Section 5.2 outlines appropriate mitigative measures), however, because of the mitigative measures which will be employed, it is not expected that vehicular emissions, fugitive dust, or smoke from burning operations will present any significant air quality problems.

The relative level of construction-related emissions can be correlated with the total amount of land disturbed and the length of time that construction takes place.

4.2.1.2 Alternatives

Alternative 1 - Purchase of Power, assumes that no additional transmission lines would be constructed, therefore local air quality impacts from construction activities would be negligible.

Alternative 2 - Residential Solar Water Heaters, involves the installation of individual residential units over a period of nine years (81,062 units/year). Since installation would occur over a wide area over a nine year period, air quality impacts from construction activities would be negligible. The power plant alternatives (Alternatives 3, 4, and 5) would impact air quality by emitting fugitive dust from excavation, grading, and traffic. Open burning would emit particulate matter, CO, hydrocarbons, SO_x and NO_x. Traffic at and to and from the construction site would also add CO and particulate pollutants to the air.

The No Action Alternative would have no impact.

4.2.2 <u>Operational Impacts</u>

4.2.2.1 CBCP

4.2.2.1.1 Emissions Generated

Pursuant to FAC 17-2, and 40 CFR 52.21, the CBCP units 1 and 2 are subject to a review for the Prevention of Significant Deterioration (PSD) of air quality. The CAAA of 1977 prescribe incremental limitations on the air quality impacts of a new source.

The proposed CBCP will emit seven pollutants in PSD-significant amounts. These includes criteria pollutants CO, NOx, and Pb and non-criteria pollutants Be, Hg, Fl, and H_2SO_4 mist.

The FDER has reviewed the PSD analysis submitted by AES-CB and has found that the cogeneration facility would not violate State PSD regulations as contained in FAC 17-204. Additionally, the Preliminary Determination for the CBCP was completed in December of 1989. Federal regulations on PSD (40 CFR 52.21) require the following air quality impacts to be addressed:

- o National Ambient Air Quality Standards (NAAQS)
- o PSD increment impact
- o Visibility, soils and vegetation impacts
- o Impacts due to growth caused by the proposed source
- o "Good Engineering Practice "(GEP) Stack height
- o Best Available Control Technology (BACT)
- o Class I area impacts

After their review, FDER has made a preliminary determination that the construction can be approved provided certain conditions are met. A discussion of the modeling methodology and required analyses can be found in Appendix L.

The predicted impact of the CBCP on the Okefenokee Wilderness area (PSD Class I area) increments is presented as follows:

	Pollutant	
Increment	Particulate	SO2
Annual	20%	50%
24 Hour	10%	80%
3 Hour	N/A	72%

It appears that the CBCP would not violate the Class I PSD increments in the Okefenokee Wilderness.

The percent consumption of the applicable Class II PSD increments caused by the CBCP and other new sources are as follows:

	Pollutant	
Increment	Particulate	SO2
Annual	12%	12%
24 Hour	46%	46%
3 Hour	N/A	65%

The CBCP should not violate the increments or cause significant deterioration in the Jacksonville area.

Table 4-2 lists the significant and net emission rates for the entire industrial site and Table 4-3 lists the stack parameters and emission rates for each proposed source of the CBCP and for the existing paper mill sources. Carbon monoxide and lead were modeled using the maximum emissions for the facility alone. The NO_2 modeling was based on the net emission change (proposed minus existing) using an emission rate of 0.36 lb/MBtu which is higher than the revised proposed rate of 0.29/MBtu.

The predicted maximum air quality impacts of the proposed CBCP for those pollutants subject to PSD review are listed in Table 4-4. Sulfuric acid mist is not listed because there is no de minimus level for this pollutant.

Given existing air quality in the area of the proposed facility, emissions from the CBCP are not expected to cause or contribute to a violation of an applicable AAQS. The results of the AAQS analysis are contained in Table 4-5.

Of the pollutants subject to review, only the criteria pollutants CO, NOx, and Pb have an AAQS. Dispersion modeling was performed as detailed in Appendix L for the proposed CBCP. The results indicate that, except for Pb, the maximum impacts of these pollutants were less than the significant impact levels defined in Rule 17-2.100 (170), FAC. As such, no modeling of other sources was necessary for CO and NOx. For Pb, there is no significant impact defined in the rule. The maximum 24-hour Pb concentration was used as a conservative estimate of the quarterly concentration. When combined with the background concentration of 0.3 ug/m3 (the highest quarterly average between 1986 and 1987 in Duval County), this results in a total concentration of 0.43 ug/m3 which is well below the Pb AAQS. Therefore, no additional modeling for Pb was required.

The total impact on ambient air is obtained by adding a "background" concentration to the maximum modeled concentration. This "background" concentration takes into account all sources of a particular pollutant that are not explicitly modeled. These "background" concentrations were obtained from Department approved monitors near the CBCP site for 1986 (1985 for NOx).

4.2.2.1.2 Impacts on Soils and Vegetation

The maximum ground-level concentrations predicted to occur for the criteria pollutants as a result of the proposed CBCP and a background concentration will be at or below all applicable AAQS including the national secondary standards developed to protect public welfare-related values. As such, these pollutants are not expected to have a harmful impact on soils and vegetation.

4.2.2.1.3 Impacts on Visibility

The proposed CBCP may have an impact on visibility in the area. Visibility is defined as the greatest distance at which it is possible to see and identify with the unaided eye a prominent dark object against the sky at the horizon in the daytime or a known unfocused moderately intense light source at night. Visibility is diminished by four major processes: light scattering by gas molecules, light scattering by particles, light absorption by gases not naturally occurring in the atmosphere, and light absorption by particles. Coal-fired power plants affect visibility through the three major combustion related pollutants: particulates, sulfur dioxide, and nitrogen dioxide. Visibility is decreased by particulates primarily through light scattering due to conversion of gaseous nitrogen dioxide to particulate nitrites; and by sulfur dioxide when it converts to particulate sulfates.

Table 4-2
Significant And Net Emission Rates (Tons Per Year) (1)

Pollutant	Significant Emission Rates	Emission Basis lb/MBtu(5)	Existing Seminole Kraft Power Boilers	Proposed Maximum Emissions(2)	Net Emissions	Applicable Pollutant
Carbon Monoxide (CO)	100.0	0.19	606	2,470	1864	Yes
Nitrogen Oxides (NO_x)	40.0	0.29	1,201	3,774	2573	Yes
Sulfur Dioxide (SO_2)	40.0	0.60(3)	--	7,796	--	No
		0.31(4)	4,472	4,029	-384	No
Particulate Matter (TSP)	25.0	0.02	325	268	-57	No
Particulate Matter (PM_{10})	15.0	0.02	254	265	11	No
Ozone, Volatile Organic Compounds (NOC)	40.0	0.016	200	208	8	No
Lead (Pb)	0.6	0.007	--	91	91	Yes
Asbestos	0.007	--	--	--	<0.007	No
Berylium (Be)	0.0004	0.00011	--	2	2	Yes
Mercury (Hg)	0.1	0.00026	--	3	3	Yes
Vinylchloride	1.0	--	--	--	<1	No
Fluorides (Fl)	3.0	0.086	--	1,122	1,222	Yes
Sulfuric Acid Mist (H_2SO_4)	7.0	0.024	--	308	308	Yes
Total Reduced Sulfur (TRS)	10.0	(Negligble)	--	--	--	No

(1) Assumes coal within 3.3% sulfur content and 18.0% ash content and a minimum heating value of 11,000 BTU/lb. At 93% capacity the cogeneration plant will consume .93 x 145 = 135 T/hr of coal.

(2) Assumes a 100% capacity factor for the modified paper mill (kraft recovery boiler, smelt dissolving tank, limestone dryers, and the multiple effects evaporator) and a 93% capacity factor for the cogeneration plant. Also operations will continue 24 hr/days 365 days a year.

(3) 3 hour average

(4) 12 month rolling average

(5) Cogeneration plant CFB only

Table 4-3

Stack Parameters and Emission Rates

Source	Stack Hgt. (m)	Exit Temp. (K)	Exit Vel. (m/s)	Stack Dia. (m)	Emission Rates (g/s) NOx	CO	Pb
Proposed Sources							
CFB Boiler	129.5	403	33.22	4.27	145	76.4	2.8
Limestone Dryer	9.1	355	21.34	1.04	0.6	0.1	---
Existing Composite Source Data							
Power Boilers	32.3	433	20.12	1.83	23.2	1.7	---
Bark Boilers	41.5	329	13.72	2.44	11.3	15.7	---

Table 4-4

Maximum Air Quality Impacts Versus the de minimus Ambient Levels

Pollutant Averaging Time	Predicted Impact (ug/m^3)	De minimus Ambient Impact Level (ug/m^3)
CO (8-hour)	25.0	575
NO_2 (Annual)	<0	14
SO_2 (24-hour)	<0	13
Pb (3-month)	0.13 (1)	0.1
Be (24-hour)	0.0017	0.0005
Hg (24-hour)	0.004	0.25
Fl (24-hour)	1.375	0.25

(1) The Pb impact is based on a 24-hour modeling value and, therefore, the 3-month Pb average is expected to be significantly less than this value.

Table 4-5

Comparison Of Total Impacts With The AAQS

Pollutant and Averaging Time	Maximum Predicted Impact (ug/m^3)	Existing Background (ug/m^3)	Maximum Total Impact (ug/m^3)	Florida AAQS (ug/m^3)
CO (1-hour)	94.10	13.0	107.10	40000.0
CO (8-hour)	25.00	6.0	31.00	10000.0
NO_2 (Annual)(1)	3.80	29.0	32.80	60.0
Pb (3-month)	0.13	0.3	0.43	1.5

(1) Modeled at 0.36 lb/MBtu. Revised emission basis = 0.29 lb/MBtu.

The frequency distribution of the visibility observed at the Jacksonville Imeson Airport over a five-year period is summarized in the application. The average quarterly background visibility at Jacksonville Airport is seldom greater than twelve miles or less than two miles. Visibility conditions greater than or equal to those measured at Jacksonville can be expected at St. Augustine (70 km southeast) and the Okefenokee Wilderness (PSD Class I area) (60-70 km northwest). Equations can be used to calculate background conditions and the impacts of SO_4, TSP, and visibility at the Okefenokee (PSD Wilderness Class I area) and the St. Augustine historical area. For purposes of this simplified analysis, it was necessary to assume that SO_4 and TSP are the only pollutants contributing to visibility reduction. It was also assumed that the background visibility is twelve miles. The calculated new visibility due to the CBCP was 11.7 miles.

This corresponds to a reduction of approximately two percent (2%) in the visual range at the Okefenokee Wilderness Class I area during worst-case conditions therefore it was concluded that the emissions from the CBCP will not significantly alter the visibility in this area.

4.2.2.1.4 Nonattainment Areas Impacts

The extent of the contribution of the proposed CBCP to the formation of ozone and, therefore, its' impact on the Jacksonville ozone nonattainment areas cannot be estimated through modelling. However, because of the plant's low emission levels of oxidants and hydrocarbons (the primary precursors of ozone), it was assumed by AES-CB that the impacts of the proposed CBCP on ozone concentrations in the Jacksonville area will not be significant.

The impact of the CBCP on the Jacksonville particulate nonattainment area was estimated through modelling and compared with the EPA "significance levels" which are one ug/m^3 for an annual average and five ug/m^3 for a 24-hour average. The TSP nonattainment area basically covers the central downtown area and is at its' closest point ten kilometers from the proposed CBCP.

The annual average impact was calculated using the total TSP emissions from the operation of the proposed plant including fugitive dust emissions from coal handling, waste disposal and cooling towers. The results of the analysis indicate that the annual average TSP impact on the nonattainment area would be less than one ug/m^3, the EPA significance level. The maximum 24-hour TSP impact would be four ug/m^3, which is less than the five ug/m3 EPA significance level.

It, therefore, appears that the proposed CBCP will not have a significant adverse effect on the downtown Jacksonville area.

4.2.2.1.5 Growth-Related Air Quality Impacts

The proposed CBCP is not expected to significantly change employment, population, housing or commercial/industrial development in the area to the extent that an air quality impact will result.

4.2.2.1.6 GEP Stack Height Determination

PSD regulations state that the degree of emission limitation required for control of air pollutants shall not be affected by that portion of any stack height which exceeds good engineering practice (GEP) or by any other dispersion technique. The determination of the GEP stack height for the CBCP was based on EPA regulations (40 CFR Part 51 Stack Height Regulation, Nov. 9, 1984).

Good Engineering Practice (GEP) stack height means the greater of: 1) 65 meters or 2) the maximum nearby building height plus 1.5 times the building height or width, whichever is less. The GEP stack height determination is dependent on the distance and orientation to the various buildings near the stack because the projected building width can change.

The applicant calculated the GEP heights for each proposed source based on the dimension of nearby buildings. The GEP height of 129.5m was used in the modelling for the CFB boiler. The proposed stack heights for the smelt dissolving tanks is 73.1m, which is less than the calculated GEP height of

129.5m The stacks for the limestone dryers and the lime kilns are below the GEP limit of 65m. Each of the stacks that had proposed heights less than their GEP limits were subjected to modelling downwash routines.

4.2.2.1.7 Best Available Control Technology (BACT)

The CBCP is to consist of three coal/bark fired CFB boilers, coal handling equipment and limestone dryers. The CFB boilers, rated at 3,189 MMBtu, are to burn fuel made up of approximately 96 percent coal and 4 percent bark.

Rule 17-2.500(2)(f)(3) of the FAC requires a BACT review for all regulated pollutants emitted in an amount equal to or greater than the significant emission rates listed in Table 4-2. The NOx emissions from the smelt dissolving tank and the multiple effect evaporators are negligible and were not considered as part of the BACT analysis. The emissions of heavy metals, H_2SO_4, VOC's, and fluorides from the limestone dryers are also negligible compared to that emitted from the CFB boiler and were not considered in the BACT analysis for the CBCP. Details of the BACT Determination procedure and analysis are provided in Appendix L. Generally the air pollutant emissions from cogeneration facilities can be grouped into categories based on what control equipment and techniques that are available to control emissions from the facilities. The emissions are classified as follows:

- o Combustion Products (Particulates and Heavy Metals). Controlled generally by particulate control devices.

- o Products of Incomplete Combustion (CO, VOC, Toxic Organic Compounds). Control is largely achieved by proper combustion techniques.

- o Acid Gases (SOx, NOx, HCl, Fl). Controlled generally by gaseous control devices.

A review of the impacts associated with the proposed CBCP and the recovery boiler installation indicates that there will be a reduction in the maximum annual impacts. This reduction in the impacts will be attributed to the replacement of three old power boilers and there old recovery boilers which are now exhibiting higher impacts than what will be expected from the CBCP.

The FDER has determined that the levels of control proposed by the applicant for the CFB cogeneration facility represents BACT in most cases. The review indicates that the level of particulate control clearly is justified as BACT for particulate matter, PM_{10}, and other heavy metals. In addition, the levels of control proposed for the coal handling facilities, and for products of incomplete combustion is also representative of BACT.

A review of the proposed control for SO_2 indicates that the inherent removal efficiency provided by the CFB boiler represents BACT. The analyses of alternative control technologies indicates that both the cost of using wet scrubbers and switching to a lower sulfur content coal are cost prohibitive based on current BACT cost of control guidelines. In addition to the greater cost of using wet scrubbing, such an alternative has the disadvantage of having to handle and dispose of the scrubber sludge produced.

The CBCP will be located in Duval County which is classified nonattainment for the pollutant Ozone (17-2.16(1)(c) F.A.C.). It will be located in the area of influence of the Jacksonville particulate nonattainment area (17-2.13(1)(b) F.A.C.); however, the plant will not significantly impact the nonattainment area and is, therefore exempt from the requirements of Section 17-2, 17 & 18 & 19 with respect to particulate emissions. The facility must comply with the provisions of PSD (17-2.04 F.A.C.).

The proposed level of control for nitrogen oxides from the CBCP, under some circumstances would not be considered representative of BACT. The review of the costs associated with using post combustion controls indicates that the cost per ton of using SNCR for NO_x removal from a CFB boiler does exceed the $1,000 guideline that is used for NSPS but is well below that which has been justified as BACT for other facilities.

In general, the use of post-combustion NOx controls has been a strategy which has been evaluated in every BACT review since the "top down" BACT policy was introduced by the EPA in December 1987. In each case, the use of post-combustion controls was rejected due to being cost prohibitive, or on the basis that there was not sufficient operating experience for a particular technical application to demonstrate that the specific application was proven.

For the cases in which the use of post-combustion controls was rejected because of being cost prohibitive, the cogeneration unit was being constructed for peaking purposes only. As this was the case, the facility in question would be operated well below full capacity (peaking units), thereby resulting in cost per ton figures which were well above what has been established as justifiable for BACT.

With regard to the technology being proven, both SCR and SNCR have had operating experience in both Japan and Europe. More recently, several facilities in California have been permitted with SNCR. Compliance testing has indicated that one of the facilities which is now operating (Corn Products) has passed its compliance test. Another operating facility (Cogeneration National) has had trouble meeting the NOx emission limitation while also maintaining compliance with the CO and SO_2 emission requirements. This plant has continued with adjustments targeted at achieving coincidental compliance.

Outside of California, the application of SNCR on CFBs is extremely limited. A recent permit for the Panther Creek Partner facility (Carbon County, Pennsylvania), however, determined that BACT for the new CFB boilers would be SNCR to achieve a NO_x limit of 0.2 lb/MMBtu (one hour average).

The applicant has stated that SNCR systems emit various amine compounds formed by unreacted ammonia which represents a potential adverse human health effect. Although it has been demonstrated that ammonia slip does occur, this does not indicate that the technology has not been proven. The use of both SCR and SNCR as representing BACT is becoming more and more prevalent for internal combustion engines, boilers, and turbines.

EPA's recent BACT determinations for other facilities would tend to support incorporation of SNCR as BACT for nitrogen oxides control for the CBCP. Another factor that would support higher than guideline treatment costs is the location of the CBCP. The site is located in an area which is designated as being nonattainment for ozone. Nitrogen oxides are known to be a precursor to ozone.

According to AES, they are locked into a fixed income source due to contracts approved by the Florida PSC; however, at this time this has not been documented to EPA. AES claims the additional costs of SNCR would cause the project to become financially infeasible and result in stopping the project and such an action would be detrimental since the project as proposed will result in overall reductions in air quality impacts.

In determining BACT, a permitting authority must take into account such factors as energy, environmental, economic and other cost concerns. Although the costs determined for the application of SNCR do not, in and of themselves, appear to be clearly unreasonable, they are such that the project would be economically infeasible. Thus, the overall environmental benefits resulting from this project would be lost. It is also apropos in this case to compare the proposed BACT for the AES boilers with BACT determinations made for differing combustion technologies. For example, stoker fired boilers without add-on controls may generally achieve a NOx limit of 0.6 lb/MMBtu. Assuming that SNCR would achieve a 50% reduction in NO_x emissions, a stoker fired boiler could achieve a NOx limit of 0.31b/MMBtu if SNCR were employed. Recently, a new stoker fired cogeneration facility was permitted in Virginia (Cogentrix, Inc.) and is required to meet a NO_x limit of 0.3 lb/MMBtu through SNCR. Because of the superior design of CFBs, the BACT proposed by AES will achieve an even greater reduction in NO_x emissions than a stoker fired boiler with SNCR.

Based on the above discussion, it is unclear at this time whether SNCR should represent BACT for the AES boilers. Therefore, it is important that all available information concerning the proposed level of BACT and the SNCR alternative be submitted prior to the issuance of the final EIS. This information could include, among other things, a comparative analysis between the AES boilers and other CFB's which have been required to install SNCR. This analysis should document any differences in energy, environmental, or economic concerns, between the facilities so that a final BACT recommendation can be made.

Fugitive dust is produced by a number of sources associated with the project. These include the coal handling system, limestone and spent limestone handling system, and pelletized waste handling systems. Also since fresh water cooling towers will be used, EPA has indicated that dissolved and suspended solids in the small droplets fraction (less than 50 microns diameter) of cooling tower drift would be considered fugitive dust in the impact assessment. Appendix L includes descriptions of the control systems and/or methods proposed as BACT for these fugitive dust sources.

The dissolved and suspended solids in the small droplet size fraction of fresh water cooling tower drift is considered by EPA to contribute to total suspended particulates. This contribution is minimized by using high efficiency drift eliminators in the two natural draft towers (which limit drift to approximately .005 percent of circulating water flow) and by maintaining the cycles of concentration of the circulating water to a low level such as a maximum of 1.5. Additionally, a drift eliminator will be provided to mitigate the potential effects of blow-through. Upon reviewing the preceding information, the FDER also finds that the CBCP will not contribute to significant adverse air quality impacts.

4.2.2.1.8 Acid Rain

In recent years the increase of rainfall acidity levels across Florida and other parts of the country has been ascribed in part to the air emissions from coal-fired power plants. Hence the requirement for emission controls on these plants, designed to reduce the potential acid causing factors. Generally, SO_2 and NO_x are believed to be the primary anthropogenic agents contributing to rainfall acidification. However, a great deal remains unknown about the amount that these two gases contribute to the problem, as well as how and where the acidification takes place.

It should be noted that rainfall under unpolluted conditions tends to be somewhat acidic, on the order of pH 5.6 to 5.7. This is due to the absorption of water in the atmosphere. Also, neither SO_2 nor NO_x in and of themselves are acidic. It appears that after a certain amount of time, estimated to be on the order of 3 to 4 days, these gases interact with sunlight, water vapor, ammonia, and many other chemical compounds in the atmosphere, which converts them to sulfuric acid and nitric acid. Scientists around the world are attempting to determine the rate of these reactions, which catalytic aids (sunlight, water, etc.) have the most effect driving the conversion, ways to prevent the acidic end-product from affecting the environment, where the end product eventually makes it's impacts, and numerous other questions relating to the conversion reactions. It is universally agreed that the entire cause-effect-control relationship is very complex.

There are three issues relevant to the licensing of the CBCP as emission sources in relation to acidic rainfall. These are: (1) why is the problem of concern, (2) what will be the projects contribution to the regional, state and country wide problem, and (3) what controls are required to mitigate the problem?

The following effects have been ascribed to above-normal acidic rainfall. Acid rain is listed as a cause for destabilization of clay minerals, reduction of soil cation exchange capacity, promotion of chemical denudation of soils, and promotion of runoff. Vegetational effects tend to be quite varied, ranging from a few cases of reported beneficial effects, to the more prevalent harmful effects. The harmful effects include foilage damage, alteration of responses to pathogens, symbionts and saprophytes, leaching of essential materials from plant surfaces, and destruction of the protective waxy leaf coatings. Impacts to wildlife are generally indirect, but nonetheless potentially significant via habitat alteration. Effects on aquatic ecosystems begin with changes in water quality. The water quality changes are brought about by acidification via direct input of rainfall (or snow melting in the northern states), indirect changes from erosion and previously impacted soil contributions, as well as a cascading effect wherein the addition of acid components and soil-based catalytic materials frees up often-times toxic metals or other wastes which which were previously chemically bound. These problems then effect population balances of aquatic organisms by interfering with breeding and reproduction, poisoning, or elimination of food supplies, which frequently result in termination of particular species within those aquatic ecosystems. These population shifts also occur in the aquatic vegetation, further compounding the problem.

Second, the pH levels in Florida lakes, primarily those in the northern part of the state, have been dropping, e.g., becoming more acidic, over the past two decades. Many Florida's perched sand lakes have little or no buffering capacity and are therefore very susceptible to acid rain.

Trends in data seem to indicate that most of the acidity is derived from SO_2 sources in the northeastern United States. Conversion from SO_2 into sulfuric acid appears to start affecting the environment more than 50 km from the source, and the acid is susceptible to long range transport. Florida is subject to frequent cold fronts moving into the state in the winter months, which are suspected of bringing in northern-based pollutants.

Florida itself has relatively few coal-fired industries at this time, but combustion of oil and gas as well as emissions from heavy industries such as pulp mills and the phosphate industry make significant contributions to SOx and NOx loadings. Normal sources of atmospheric sulfur in this state are derived from sea-salt, a non-polluting source which tends to obscure the acidic sulfur components. Hence, in terms of Florida's impact on other parts of the country, this state tends to be the recipient rather than the donor. As more coal-fired industry is utilized, this balance may begin to shift. The impact from a source such as the CBCP would be to contribute slightly to the problem, but would not be registered until some distance from the plant, perhaps 100 km or more. The degree of impact, as implied earlier, is extremely hard to quantify. Some studies indicate that the majority of acidic fallout impacts may occur 200-300 kilometers from the source.

One feature that will mitigate some of the impact of the CBCP is the use of stringent sulfur emission controls during operation. The CBCP will utilize flue gas desulfurization (FGD) via a fluidized bed of limestone sulfur emissions. NO_x will be controlled by boiler design. Such control will also help mitigate the rainfall acidification problem. The primary source of No_x appears to be automobile emissions.

Construction of new coal fired units may have a slightly positive effect on the acid rain problem in Florida. Data collected during the Florida Sulur Oxides Study indicated that the conversion of SO_2 to sulfuric acid forms two to three times faster in the exhaust plume from an oil fired plant than from a coal fired plant. Oil fired power plants in Florida do not have emission controls for SO_x or NO_x in most instances. As new coal fired power plants are built with pollution control devices, and as these new coal plants replace the oil plants that emit greater quantities of SOx and NOx, then air pollution levels and acidic rainfall may decrease.

4.2.2.1.9 Coal Dust from Trains

The movement of coal supply trains to the proposed CBCP from coal mines outside the state will result in increased fugitive dust levels in areas near the railroad tracks. These increases in fugitive dust levels will be primarily the result of road bed dust emissions and coal dust blowing from the exposed coal contained within each hopper car. The only other quantifiable emissions associated with the coal trains result from the diesel locomotive emissions, which are relatively minor.

For an impact analysis of the coal trains as they move through Jacksonville, it was assumed that trains will travel 500 miles from the mines and that there will be a maximum of one train every three days with 90 cars per train, and a maximum of 106 tons of coal per car. An estimated one percent of coal by weight will be lost as fugitive dust over a journey of about 500 miles with an estimated 90 percent of the total losses escaping during the first few hours of train transit. This implies that only 0.1 percent of the original coal weight will be dispersed as fugitive dust during the rest of the trip, and only a small fraction of the 0.1 percent will be dispersed in the Jacksonville area.

The fugitive dust emissions from agitated road bed dust in the Jacksonville area were estimated using USEPA Publication AP-42 (1979), assuming that the road bed dust emissions are conservatively approximated by emissions from motor vehicles traveling on unpaved roads and that each train will travel at an average speed of ten miles per hour.

The 24-hour average TSP level in the Jacksonville area resulting from the operation of one coal train per day (a conservative estimate) was calculated to be 22 ug/m3 at a distance of 100 meters downwind of the railroad tracks under light wind conditions. When added to the Jacksonville area background level of 50 ug/m3, this total is relatively small compared to the NAAQS secondary standard and Florida standard of 150 ug/m3. It is noteworthy that the amount of the fugitive coal dust which was estimated to blow off the coal cars is about half of the expected emissions resulting from agitation of roadbed dust. This is primarily because of the very conservative method that was employed to estimate roadbed dust emissions.

4.2.2.1.10 Trace Elements

Eighteen trace elements were selected for review on the basis of reported high concentrations in coal, capability for volatilization during combustion, potential for toxicity, and existence of regulatory guidelines. Since a coal source analysis has not been provided, trace element concentrations in coal were obtained from a report on trace elements in coal samples from the eastern United States.

The predicted deposition rates were determined on the basis of coal consumption, trace element concentration, and SO_2 emission rates. Elements considered to be volatile were assumed to exit the stack in an uncontrolled manner. Those trace elements typically occurring as particulates or absorbed on particulates were also assumed to exit in an uncontrolled state. These assumptions were utilized due to the lack of information on the behavior of trace elements passing through an FGD system. In addition, the use of these assumptions introduced a degree of conservatism to the assessment.

Studies of model power plants in most cases predicted increases in soil trace element levels of less than 10 percent of the total endogenous concentrations over the life of the model plant. It was concluded that uptake by vegetation would not increase dramatically unless the forms of deposited trace elements were considerably more available than the endogenous forms.

The estimated increases ranged from 1.5 x 10-5 to 1.2 x 10-2 percent, using average soil background concentrations. The estimated increases over the 40 year life of the cogeneration plant, assuming that the elements remained concentrated in the top 25 cm of soil over this period ranged from 5.9 x 10-4 to 4.7 x 10-1. The assessment of these increases was based on a number of worst case conditions. Under these conditions there should not be a perceptible increase on an annual bases. Over the 40 year cogeneration plant life, those elements exhibiting a higher percent increase relative to the others studied included: As, B, Cd, Pb, Hg, and Mo.

The estimated soil concentration increase for As would be 1.48 x 10-2 mg per kg of soil over the 40 year plant life. Naturally occurring As levels in soils average about 6 ppm. Soil As concentrations greater than 2 ppm, soluble form, have been shown to produce injury symptoms on alfalfa and barley and as such no effect could be expected under worst case conditions.

The estimated soil concentration increase for B would be 2.5 x 10-2 mg per kg of soil over the 40 year plant life under worst case conditions. Naturally occurring B concentrations range from 2-1000 ppm with the highest levels found in saline and alkaline soils. The average value is considered to be about 10 ppm. Using a toxicity level of 0.5-10 ppm for plants sensitive to B as a means for comparison, no adverse effects to sensitive species such as citrus would be expected under worst case operating conditions.

The estimated soil concentration increase for Cd would be 1.43 x 10-4 mg per kg of soil concentration over the average background level of 0.06 ppm, which is high in comparison with the other elements addressed. Toxicity to plants is reported to occur when Cd concentration in plant tissues reaches about 3 ppm and it is unlikely that the estimated soil concentration will be high enough for the accumulation of 2 ppm in leaf tissue within the vicinity of the proposed plant.

The estimated soil increase for Pb would be 3.49 x 10-2 mg per kg of soil over the 40 year plant life. Naturally occurring Pb concentrations in soil averages about 10 ppm. Based on reported threshhold concentrations of 10 ppm lead in solution culture, the addition of 3.49 x 10-2 mg Pb per kg of soil to soils containing as much as 5 ppm Pb should not result in any adverse effects. It is thought that Pb enters the plant primarily through the leaf surface. However, the effect of such accumulations cannot be predicted due to the lack of information concerning the concentration of Pb in plants due to leaf deposition.

The estimated soil increase for Hg would be 1.19 x 10-4 mg per kg of soil. Naturally occurring Hg concentrations in soil average 0.1 ppm. Most higher vascular plants are resistant to toxicity from high Hg concentrations even though high concentrations are present in plant tissue. Concentrations of 0.5-50 ppm are found to inhibit the growth of cauliflower, lettuce, potato, and carrots. The addition of 1.19 x 10-4 mg per kg of soil is not considered to result in any adverse effect.

The estimated soil increase for molybdenum (Mo) would be 2.73 x 10-3 mg per kg of soil over the 40 year life. Naturally occurring background concentrations average about 2 ppm. Mo toxicity is rarely observed in the field since most plants seem to be able to tolerate high tissue concentration. A Mo concentration of 5 ppm in nutrient solution was found to be toxic to clover and lettuce. It would appear to be unlikely that the contribution of Mo from the proposed plant would result in adverse effects.

4.2.2.1.11 Fugutive Dust Impacts

Some of the predominant soils within the boundaries of the proposed CBCP site are highly erodible and as such are considered to have a potential for dust formation.

Various construction activities, including land clearing, open burning, heavy machine operation, vehicle traffic, and road construction will discharge certain amounts of pollutants into the atmosphere. The pollutant generated in greatest quantities by site construction is suspended particulates, also termed fugitive dust. The quantities of dust emitted by the site construction vehicular traffic will be dependent on a number of factors, including the frequency of operations, specific operations being conducted, weather and soil conditions. A large portion of the construction operations, such as land clearing and foundation excavation, will be intermittent and usually of short duration.

Open burning will emit quantities of particulate matter, CO, hydrocarbons, SO_x and NO_x. The burning of cleared land debris will be conducted for short periods. These pollutant emissions will depend on the amount and moisture content of the debris.

Exhausts of heavy machine and truck traffic will be a minor source of air pollutants, consisting of mainly CO, hydrocarbons, NO_x, SO_x, and particulate matter.

The impact of heavy construction activities and site preparation on air quality will be short term and will be confined to the immediate vicinity of the construction activity. This is primarily because most of the fugitive dust created by construction traffic and earthmoving operations consists of relatively large particulates. These large particles tend to settle quickly rather than remaining suspended for long distances. To minimize dust: 1) construction personnel will enter the CBCP site over prepared surfaces and will park in a surfaced lot; 2) there are presently no plans for on-site concrete production; 3) wetting will be employed on dust prone areas, as needed; and 4) laydown areas will be appropriately stabilized. Frequent rain showers will also help to reduce dust levels.

Only minor short-term air quality impacts are expected to result from burning since these operations will be conducted only during periods of good atmospheric dispersion. Burning will be conducted in compliance with local and state regulations.

Since coal unloading, stacking and reclaiming operations can contribute significant pollution problems to the nearby estuary via fallout of airborne emissions, a strong quality assurance program should be implemented. It will be necessary to establish NPDES monitoring stations in the vicinity of the coal facilities at the storm water runoff, sedimentation ponds.

Because of the mitigative measures which will be employed, it is not expected that vehicular emissions, fugitive dust or smoke from burning operations will present any significant air quality problems.

4.2.2.1.12 Global Climate Change

The composition of the earth's atmosphere is changing due to energy and material production and development patterns. Concentrations of greenhouse gases, primarily carbon dioxide, but also, methane, CFC's nitrous oxides, a variety of low-volume gases, are increasing in the lower atmosphere. These green house gases collectively function to retain heat energy, effectively warming the earth's surface.

One option for off-setting increasing concentrations of carbon dioxide in the atmosphere is through reforestation; however, there are no regulations requiring such a program. Mr. Dennis Bakke, President and co-founder of AES, Inc. testified before the State of Florida Division of Administrative Hearings (before the Honorable Robert T. Benton, II, Hearing Officer, on February 5-7, and February 20 and 21, 1990) that AES has set aside money as part of the CBCP to plant trees in order to mitigate CO_2 effects.

4.2.2.2 Alternatives

Alternative 2 - Residential Solar Water Heaters and the No Action Alternative would have no operation-related air quality impacts. Alternative 1 - Purchase Power would have no local inpacts. Air quality impacts at the source of power generation could, however, be very significant not only for the local area but also from a global perspective.

Alternative 3 - Combustion Turbine Power Plant and Alternative 4 - Combined Cycle Power Plant use gasified coal which can be washed and cleaned to remove SO_2 and particulates prior to combustion. NO_x could be controlled during combustion by optimizing the temperature. Significant levels of CO_2 would be emitted and would require control.

Alternative 5 - Conventional Coal-Fired Power Plant has the highest potential air quality impact. Major emissions include SO_2, NO_x, CO, and particulates. All emissions would require extensive post-combustion control mechanisms.

4.2.3 Comparison of Impacts

All power plant alternatives (Alternatives 3, 4, and 5) and CBCP would impact air quality to varying degrees. The new technologies of coal-gasification and CFB systems help to mitigate the air quality impacts, particularly SO_2 emissions, of the respective Alternatives 3 and 4 and CBCP. NO_x emissions would be controlled by all power plants by optimizing combustion temperature, but this technique requires trade-offs between control of NO_x and SO_2 emissions. Post-combustion controls would still be required for particulates and CO/CO_2. The Convention Coal-Fired Power Plant, Alternative 5, would have the most significant air quality impacts and subsequently would require extensive post-combustion control mechanisms. All power plant alternatives, including CBCP, should consider the use of low sulfur coal to deter the high levels of SO_2 emissions generated by fossil fuel power plants.

Alternative 2 and the No Action Alternative are expected to have no air quality impacts. Alternative 1, Purchase Power has no local impact but could have significant impacts at the source of power generation.

4.3 SURFACE WATER RESOURCES

The potential impacts of the proposed CBCP and the alternatives on surface water resources are summarized in this section. The OSN referenced in this section for the various discharges refers to the NPDES outfall serial number. These discharges are summarized in Table 3-3 of the previous chapter.

4.3.1 Construction-Related Impacts

4.3.1.1 CBCP

The construction of the CBCP is expected to have no appreciable impact on any surface waters. There are no bodies of water on the plant construction site. The area is presently a storage area for lime mud from the SK paper mill, with very sparse vegetation. Approximately 35 acres of land west of the SK paper mill will be cleared, grubbed or filled. Approximately 10 acres within this area will be covered by coal, ash and limestone storage and handling facilities. A silt fence will be installed along the western perimeter of the site to prevent the deposition of silt in the Broward River as a result of soil erosion during construction (refer to Appendix I, E&S Plan).

The Storage Areas Runoff Retention Basin (OSN 008), will be built early during construction to serve as a construction runoff retention pond. A system of temporary construction ditches and piping will direct the stormwater runoff to the pond. The pond will initially be used for construction runoff until the Yard Area Runoff Pond (OSN 003) is completed (late in the construction phase). Subsequent to completion of the Yard Area Runoff Pond, the Storage Areas Runoff Retention Basin will be taken out of service, runoff will be routed to the Yard Area Runoff Pond and the basin will be lined prior to receipt of coal. At that time basin effluent will be rerouted to the SK IWTS. Therefore, no increase in runoff to the Broward River is expected, as a result of construction activities.

During construction, temporary sedimentation ponds will be located southwest of the railroad spur. All runoff waters generated within the general boundaries of the rail loop during construction will be directed to these ponds. This runoff is expected to contain little chemical contamination, but will contain suspended solids from soil erosion as well as BOD and nutrients from runoff.

Runoff from areas of the site not disturbed by construction activities will be directed to the natural drainage systems within the area. Runoff from areas of the site disturbed by construction activities or plant operations will be collected in a ditch system and/or catchbasin and underground piping system and directed to ponds as described in the following paragraphs. Drainage systems will be designed for gravity flow wherever site conditions allow.

At present, surface runoff from site areas north of the SK paper mill dewatering building (OSN 005) drains to the lime settling ponds located west of the rail spurs. The supernatent from the final (northernmost) pond is pumped into the SK paper mill sewage collection system. After being routed through the existing clarifier and receiving biological treatment, the runoff is discharged at the outfall structure (OSN 001) located in the St. Johns River south of the site.

The site area between the dewatering building and the clarifier would naturally drain to the Broward River; however, SK has constructed berms along the river to provide containment for potential oil spills. Rainfall on this area collects in localized depressions and eventually percolates to the groundwater table.

Offsite runoff will not be collected in the onsite drainage system. Swales will be provided to direct runoff which originates in offsite, upgradient areas around the site perimeter and into existing drainage patterns. These swales will be designed to preserve the existing drainage conditions and water quality to the maximum extent possible.

During plant construction, the peak manpower is expected to be approximately 990 people. Of this number, approximately 274 people are expected to use portable, self-contained toilet facilities. Wastes from the portable facilities will be disposed of off-site by licensed contractors. The remainder of the work force is expected to use temporary and permanent toilet facilities. Wastewater from these facilities will be collected by the existing SK sanitary system which conveys wastewater to the SK IWTS before discharge to the St. Johns River (OSN 001).

Pre-operational boiler and condensate system metal cleaning wastes will be treated on-site. The waste cleaning solutions, flush waters, and associated debris will be piped to the retention basin for the neutralization and precipitation of iron oxides and other heavy metals. The supernatant will then be treated in the SK IWTS. The effluent will be discharged to the St. Johns River via the SK discharge system (OSN 001).

4.3.1.2 Alternatives

The No Action Alternative and Alternative 2, Residential Solar Water Heaters are expected to have no impacts. Alternative 1, Purchase Power is expected to have no local impact. The power plant alternatives will impact surface waters during construction similar to CBCP. Potential pollution of waters could be caused by sediment-laden storm runoff discharges and dewatering wastewaters. Proper mitigative measures could lessen or eliminate these impacts.

4.3.2 Operation-Related Impacts

4.3.2.1 CBCP

The primary source of water for CBCP is to be groundwater from the Floridan Aquifer. The discharges from cooling tower blowdown (OSN 002) and the Yard Area Runoff Pond (OSN 003) will be through the SK paper mills discharge pipe (OSN 001) to the St. Johns River. Primary concerns with respect to surface water quality are discharges of arsenic, chromium, heat, copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine.

4.3.2.1.1 Area Runoff (OSN 003 and OSN 008)

Generally, the drainage in the area of the new facility will be directed away from the structures and routed to either of the two onsite storage ponds as described below. The drainage along the entrance road for the new facilities will follow the existing drainage pattern, to the south and west. Where required, culverts will be placed under the road to allow for these drainage patterns.

Surface runoff from the coal, limestone, and ash storage areas will be collected and directed into the Storage Areas Runoff Retention Basin (OSN 008) which is located on the western portion of the site. The coal storage pile, limestone storage pile, and the ash storage pile will occupy approximately 3 acres, 1 acre, and 1 acre, respectively.

The Storage Areas Runoff Retention Basin will be designed to contain the runoff resulting from a 10-year, 24-hour rainfall event for the entire storage and associated facilities areas, and the direct precipitation on the pond area. Runoff from precipitation exceeding the 10-year, 24-hour event will be detained and directed to the existing outfall to be discharged at a rate which will not exceed the peak rate of discharge from the undeveloped site resulting from a 25-year, 24-hour storm. Flows which exceed that resulting from the 25-year, 24-hour storm event will be discharged via an emergency overflow chute directly into the Broward River (OSN 008).

Runoff and direct precipitation retained within the Storage Areas Runoff Retention Basin will be directed to the SK IWTS. Controlled drawdown of the runoff pond to its normally empty condition will be accomplished through a buried pressure pipeline routed to the runoff treatment facilities.

Yard runoff will be directed to the Yard Area Runoff Pond (OSN 003) as soon as it is operational (approximately halfway through the 2-year construction period). This sequencing will allow time for the Storage Areas Runoff Retention Basin to be cleaned out and the synthetic liner installed prior to the initial delivery of coal. Once the liner is in place, runoff from storage areas will be collected and treated as discussed above.

Surface runoff from the main plant complex area and yard areas not affected by bulk materials handling will be collected and directed to the Yard Area Runoff Pond which will be located in the western portion of the new facilities area. This pond will be designed to retain, without direct discharge, the volume of stormwater associated with 0.5 inch of runoff from tributary site areas. The Yard Area Runoff Pond will also be sized to detain the runoff volume resulting from the 25-year, 24-hour storm. This volume will be discharged at a rate not to exceed the maximum rate of discharge from the undeveloped site for the 25-year, 24-hour storm. This controlled drainage will be accomplished through a buried pressure pipe system routed to the existing discharge outfall. Any flows in excess of the 25-year, 24-hour storm runoff will be discharged via an emergency overflow chute directly to the Broward River (OSN 003).

4.3.2.1.2 Cooling Tower Blowdown (OSN 002)

Construction of CBCP will result in significant reduction in the amount of heat discharged to the St. John River, since SK will deactivate its steam production plant with associated once-through cooling system. Subsequently, the dilution flow from the SK paper mill will be a main factor in evaluating the impact of the thermal discharge from the CBCP. The discharge from the proposed plant will be mixed with the SK paper mill's discharge water and diluted before being discharged to the St. Johns River. Mathematical modeling was performed to predict the average and extreme characteristics of the thermal plumes in the St. Johns River. Under average conditions, the extent of the plume from the combined discharge is predicted to be less than that for the SK paper mill's discharge alone when operating in the once-through cooling mode. The extent of the thermal plume would decrease over baseline conditions during all months of the year. The modeling performed for the CBCP discharge was based on the assumptions that the CBCP discharged into the SK IWTS, and discharged to the St. Johns River (OSN 001) with the industrial waste effluent. The proposed plan is expected to be in compliance with present regulatory requirements for thermal discharges from the SK IWTS POD to the St. Johns River.

The concentration of chemical and physical constituents in the cooling tower blowdown from CBCP will be directly proportional to those in the makeup water. Individual chemical and physical characteristics of the blowdown were calculated by multiplying the corresponding parameter in the makeup water by the 4.6 or less cycles of concentration estimated for the cooling towers. The circulating water will be treated with chemicals to protect the system and to prevent excessive scaling and corrosion. Sulfuric acid will be added at the cooling tower basin to reduce alkalinity and to control the scaling tendency of the circulating water system. The estimated maximum use of sulfuric acid will be 5,100 pounds per day based on maximum load conditions and expected water quality. Control of sulfuric acid feed will be as needed to maintain an acceptable pH range in the towers. Sulfuric acid reacts with alkalinity present in the well water to produce a circulating water in the desired pH range (7.0 to 8.0). To further inhibit scale deposition, an organic phosphate type scale inhibitor will be automatically fed at the cooling tower basin as a sequestering agent. The estimated maximum use of scale inhibitor based on maximum load conditions is 152 pounds per day as product. Scale inhibitor will be fed automatically on the basis of blowdown flow. The sulfuric acid and organic phosphate will be stored in tanks located in a curbed area beside the cooling towers. The curbed areas will be routed to the existing SK paper mill waste clarifier.

To prevent biofouling of the circulating water system, intermittent shock chlorination will be used. A chlorine solution will be fed into the circulating pump basin through diffusers. The estimated average usage of chlorine will be 493 pounds per day based on a feed rate of 5 mg/l for a total period of one hour per day.

Dechlorination of the cooling tower blowdown will be practiced to preclude discharge of total residual chlorine in excess of discharge limits to the St. Johns River. SO_2 or sodium sulfite will be fed to the blowdown for dechlorination. The estimated use of sodium sulfite is approximately 2.3 pounds per day. If SO_2 is used, the estimated usage will be approximately 1.1 pounds per day.

4.3.2.1.3 Other Plant Effluent Streams

Wastewaters from CBCP will originate from a number of sources other than the cooling towers. These include area runoff, coal handling, ash handling, metal cleaning, sanitary wastes, boiler blowdown, and miscellaneous low volume wastes. Area runoff flows were addressed in Section 4.3.2.1.1. Effluents from boiler blowdown (OSN 004) will be reused as cooling tower water. All effluents not suitable for reuse and not considered yard area runoff (OSN 003) will be treated at the SK IWTS prior to discharge to the paper mill's oxidation pond. The SK IWTS (Section 2.2.7) will be capable of providing treatment for metal cleaning wastes (OSN 007), storage area runoff (OSN 008), and low volume process wastewaters (OSN 006). In addition, facilities will be provided for removal of oil and grease from various waste streams.

Low volume wastewaters and metal cleaning wastewaters are defined by 40 CFR Section 423.11 as follows:

- Low volume waste sources - include, but are not limited to, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes and blowdown from recirulating house service water systems.

- Metal cleaning waste - any wastewater resulting from cleaning (with or without chemical cleaning compounds) any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.

- Chemical metal cleaning waste - any wastewater resulting from the cleaning of any metal process equipment with chemical cleaning compounds, including, but not limited to, boiler tube cleaning (could also include boiler fireside cleaning, air preheater cleaning, etc., if chemical cleaning compounds are used).

- Nonchemical metal cleaning wastes - includes all "metal cleaning wastes" which are not "chemical metal cleaning wastes."

Chemical characteristics of the effluent from the CBCP wastewater treatment systems are difficult to predict since the coal and coal waste characteristics have not been identified. The final effluent quality will depend on the type of coal used, intensity and duration of rainfall, and operating characteristics of the treatment process. Nevertheless, effluent concentrations have been estimated based on conservative values reported in the literature for waste streams resulting from similar plant operations and average treatment levels achieved by similar processes. These are presented as the combined concentration of all wastewater effluents at the pump sump (Table 4-6).

The cooling tower blowdown (OSN 002) will be combined with the main plant discharge (OSN 001) and discharged to the St. Johns River through the SK paper mill's discharge channel. At the point of discharge to the St. Johns River, average concentrations are projected by the applicant to comply with Class III water quality criteria. Maximum iron concentrations may exceed the 0.3 mg/l water quality criteria. A variance has been requested when ambient river conditions exceed 0.29 mg/l which would preclude use of a mixing zone.

4.3.2.1.4 Steam Cycle Water Treatment

The CBCP's steam cycle water will be treated with an oxygen scavenger, such as hydrazine, for dissolved oxygen control and with an amine, such as ammonia, for pH control. Sodium phosphate may also be fed to the cycle. Residual phosphate will react with calcium hardness in the boiler to form a nonadherent precipitate. The oxygen scavenger, amine, and sodium phosphate will be stored in the Generation Building. Estimated maximum usages are 8.6 pounds per day of hydrazine and 17.2 pounds per day of ammonia, based on maximum load conditions. The estimated sodium phosphate usage will be approximately 3.9 pounds per day. Boiler blowdown will be reused by routing to the cooling towers for use as makeup.

Table 4-6

ESTIMATED QUALITY OF CBCP DISCHARGE TO SK IWTS

Constituent	Average Concentration mg/l	Maximum Concentration mg/l
Five Day BOD	11	11
COD	32	83
TOC	17	32
TSS	39	58
Ammonia	1.1	1.1
pH (in pH units)	7.1	9.0
Oil and Grease	10	12
Calcium	77	81
Magnesium	141	141
Sodium	1,441	1,492
Potassium	4.2	4.3
M-Alk as $CaCO_3$	203	210
Sulfate	3,264	3,264
Chloride	151	157
Nitrate	5.6	6.5
Fluoride	3.0	3.2
Silica	183	190
Chlorine	0.00	0.02
P Total	0.06	0.07
Cyanide	0.00054	0.0016
Fe	2.2	6.6
Mn	0.27	0.94
Al	1.8	6.3
Ni	0.01	0.04
Zn	0.05	0.16
Cu	0.005	0.05
Cd	0.0002	0.00069
Cr	0.006	0.02
Be	0.00015	0.00052
As	0.000045	0.00015
Se	0.00004	0.00014
Sb	0.000018	0.000063
Hg	0.000037	0.00013
Ba	0.02	0.067
Ag	0.0001	0.0004
Pb	0.01	0.027
Tl	0.000018	0.000063

4.3.2.1.5 Sanitary Wastewater Treatment

The sanitary wastewater produced by the CBCP will be routed to the existing sanitary facilities at the SK paper mill. The annual average expected flow of sanitary wastewater is 4,100 gpd (3 gpm) based on an average plant staff of 75 people and an average requirement of 55 gallons per capita per day. The average expected biological loading is 5.6 pounds of BOD_5 per day, based on 0.075 pound of BOD_5 per capita per day.

4.3.2.1.6 Makeup Water Demineralization

The makeup water to the steam cycle will be demineralized using three ion exchanger type demineralizer trains. The demineralizer system will use sulfuric acid for cation resin regeneration and sodium hydroxide for anion resin regeneration. The sulfuric acid and sodium hydroxide will be stored in tanks located in or adjacent to the Water Treatment Building. The use of these chemicals will be on an intermittal basis dependent on demineralizer operation. Based on the maximum plant capacity and makeup requirements, the estimated usage rate for 66 degree Baume' sulfuric acid will be 5,660 pounds per day, and the rate of 100 percent sodium hydroxide will be 4,717 pounds per day. The wastes from this system will be regenerant water containing unreacted sulfuric acid and caustic plus sodium and sulfate salts of the ions removed from the ion exchange resins during regeneration. The estimated regenerant waste flow will average 147,000 gpd based on maximum load conditions. These wastes will be routed to the neutralization basin for pH adjustment and then to the existing SK waste clarifier.

4.3.2.1.7 Return Condensate Polishing

A powered resin type condensate polishing system will be used to remove both suspended and dissolved solids from the process condensate being returned from the SK paper mill. The wastes from this system will consist of condensate quality water containing the spent powered resin. The production of these wastes will be on an intermittent basis and will depend on the quality and quantity of the condensate being returned. The estimated wastewater flow will average 730 gpd. This wastewater, which contains high suspended solids, is not suitable for reuse within the water system and will be routed to the existing SK paper mill wastewater clarifier.

4.3.2.1.8 Metal Cleaning (Chemical and Nonchemical Wastes)

Chemical Metal Cleaning

The boiler and preboiler cycle piping will be chemically cleaned initially commissioning and also periodically during the life of the plant. The chemicals used will not be stored onsite and will be administered by means of a temporary system. The chemical cleaning solutions to be used for acid and alkaline cleaning of the boiler will be somewhat dependent on the boiler manufacturer selected. The actual cleaning solutions used must be consistent with the boiler manufacturer's recommendations. Chemicals typically used in boiler and preboiler cleaning include the following.

- Inhibited hydrochloric acid.
- Ammonia bifluoride.
- Hydroxyacetic acid.
- Formic acid.
- Disodium phosphate.
- Trisodium phosphate.
- Soda ash.
- Nonfoaming wetting agents.
- Foam inhibitors.

Wastewaters will consist of the cleaning solutions and material removed during the cleaning process. Since cleaning the metal piping is an infrequent maintenance operation, it does not contribute to the liquid wastes produced by the normal operation of the plant. However, it has very high concentrations of dissolved heavy metals (iron may be as high as 10,000 mg/l or more) The preoperational chemical cleaning wastes are estimated to be approximately 180,000 gallons, with subsequent acid cleaning resulting in an estimated additional 105,000 gallons for each cleaning operation. AES has indicated on-site treatment facilities (portable) as well. The chemical cleaning contractor will be required to haul offsite and properly dispose of the wastes resulting from chemical cleaning which have metal concentrations in excess of the requirements of 40 CFR Part 423 for new sources. Chemical cleaning wastes that meet the requirements of 40 CFR Part 423 for new sources will be routed to the SK IWTS, with pretreatment provided as necessary.

Nonchemical Metal Cleaning

Nonchemical metal cleaning wastes will result from periodic washing of the boiler firesides and air preheaters. The frequency of these cleaning operations will be a function of the cleanliness of the equipment and will be determined once the plant is in operation. The air preheater wash water and the boiler fireside wash water will contain dissolved and suspended solids in high concentrations due to ash washed from the plant components. It is anticipated that both fireside wash water and air preheater wash water will tend to be basic because of the injection of limestone into the fluidized bed boiler and the resulting reaction of sulfur with the limestone to form calcium sulfate. Because the wash waters will not be acidic, the metal content of the wash waters will be minimal. Nonchemical cleaning wastes will be routed to a neutralization basin for pH adjustment and then to the SK IWTS facility.

4.3.2.1.9 Miscellaneous Chemical Drains

Chemical wastewater can result from draining a chemical storage tank, overflowing a chemical tank during a filling operation, or from maintenance operations such as hosing down chemical storage areas. These wastes will be routed to the neutralization basin via the chemical drains system. Flows from the miscellaneous chemical drains will be intermittent and will not normally contribute to the wastewater flows.

4.3.2.1.10 Neutralization Basin

A neutralization basin of approximately 150,000 gallons capacity will be provided for treatment of chemical wastes (excluding metal cleaning wastes) prior to their ultimate disposal. A basin of this capacity will be sufficient to accommodate the wastewaters produced during regeneration of the makeup demineralizer. The neutralization basin will be a reinforced concrete basin lined with chemical resistant membrane, brick, and mortar. A chemical waste mixer, mounted on a walkway spanning the basin, will be provided to hasten pH adjustment of the chemical wastes. Sulfuric acid and sodium hydroxide will be added, as required to neutralize the pH.

4.3.2.2 Alternatives

All power plant alternatives and CBCP would impact surface water quality in much the same way. Operation discharges would contain significant levels of arsenic, chromium, heat, copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine.

The No-Action Alternative and Alternative 2, Residential Solar Water Heaters, would have no surface water impacts. Alternative 1, Purchase Power would have no local impacts.

4.3.3 Comparison of Impacts

All power plant alternatives would have impacts similar to CBCP, whereas the other alternative would have none or negligible local impacts. The treatment facilities and mitigative measures proposed in Section 4.3.2.1 for CBCP could, for the most part, be employed by any of the power plant alternatives to significantly reduce surface water impacts.

4.4 GROUNDWATER IMPACTS

4.4.1 Construction - Related Impacts

4.4.1.1 CBCP

4.4.1.1.1 Water Table Zone

Groundwater quality impacts due to construction activities will be neglible. Studies show that, water that infiltrates the soil at the site flows to the water table, then nearly horizontally towards the Broward River and the St. Johns River. As stated in Section 4.3.1.1, during construction runoff will be directed to the Storage Area Runoff Retention Basin for discharge to surface waters. Seepage from this basin to the ground will flow to the water table, then to the Broward River.

4.4.1.1.2 Shallow Aquifer

Dewatering for the coal receiving structure will be required. It is estimated that 2,000 gpm will be needed from the shallow aquifer for 6 months during excavation and structural construction. It is expected that there will be no effect on any off-site shallow wells.

4.4.1.1.3 Floridian Aquifer

Construction water will be withdrawn from the existing SK paper mill wells. The additional quantity of water required for construction is not expected to cause the SK wells to exceed permitted withdrawal rates.

4.4.1.2 Alternatives

None of the alternatives should significantly impact groundwater resources during operations. The only exceptions would be possible infiltration of polluted leachate from storage areas and the short-lived impact of pumping large quantities of groundwater during dewatering efforts for constructing the power plants of Alternatives 3, 4, and 5.

4.4.2 <u>Operation - Related Impacts</u>

4.4.2.1 CBCP

Any increased production from the Floridan aquifer in Duval County, including the CBCP has the potential for inducing increased chloride concentrations within the aquifer. As noted in the application, on a regional basis higher chloride concentrations in the Floridan aquifer can generally be correlated with high rates of production from the aquifer, particularly from deeper zones (i.e., the lower part of the upper permeable zone of the Floridan aquifer). There is correlation of higher chloride concentrations in the Floridan aquifer with areas of higher production, such as Fernandina Beach, the City of Jacksonville well field, and the Eastport area west of the Seminole Kraft site.

Within the immediate site vicinity, chloride concentrations in Floridan aquifer wells are generally about 40 mg/l. There are exceptions such as a well located on Blount Island where the chloride concentration was 71 mg/l in 1978. This well is 1051 feet deep. Increases in chloride concentrations with time have been observed at other wells near the site (from about 25 mg/l in 1973 to 40 mg/l in 1979; from 23 mg/l in 1973 to 40 mg/l in 1975). One such well is 1025 feet deep, while the depth of the southwestern well is unreported.

Current plans call for using SK paper mill's Florida aquifer production well network consisting of seven (7) wells. CBCP groundwater usage for plant operation and cooling is expected to average 5.44 mgd with an instantaneous maximum demand of 7.0 mgd.

Freshwater use in Duval County is 173.5 Mgal/day, with 158.01 Mgal/day from the Floridan Aquifer. Power generation in Duval County requires 3.09 Mgal/day. The CBCP would increase the daily requirement for power generation to 10 Mgal/day.

Total water withdrawn from the Floridan Aquifer for power generation within the St. Johns Water Management District was 133.72 Mgal/day in 1986. The CBCP would increase the total withdrawn for power generation to 143.72 Mgal/day.

The increased withdrawal from the Floridan Aquifer by the CBCP will increase the core of depression in the piezometric surface of the Floridan aquifer in the area of the present paper mill's well field. The free flowing production capacity of each of the seven wells is approximately 7,500 gpm. Wells 1 & 2 are equipped with pumps; however, they are used on a standby emergency basis. Wells 4, 5, 7, 8, and 9 are used on a rotating basis to produce 20 mgd with a maximum 25 mgd. At maximum individual well production, this would require utilization of two wells at 7,500 gpm and one well at 2,400 gpm.

The CBCP's requirement of an additional withdrawal of 7 mgd (4,900 gpm) from the well field would be equivalent to three wells at a full design withdrawal rate of 7,500 gpm per well. This assumes the paper mill is at maximum usage and would require full capacity of Wells 7, 8, and 9. Since the paper mill will at times use Wells 9 and 8 at full capacity, the additional CBCP usage would be to add full capacity usage of Well 7.

The calculated radius of influence of Well 7 is approximately 800 feet at full capacity production. SK has noted no drawdown effects from adjacent production wells during actual pump operation at a well spacing of approximately 1,000 feet. No wells other than the paper mill's wells are included in a mile radius of influence of Well 7. No wells outside the paper mills well field will therefore be affected. The additional drawdown at the existing wells, due to the added usage of Well 7, will not affect the production capacity of the paper mill's wells.

It should be emphasized that the maximum drawdown effect will be a very short term effect lasting for a period of less than 24 hours.

It would appear that only limited groundwater impacts may be felt by the homes and farms located north and west of the plant site. Due to existing drought conditions the water pressure in artesian wells has dropped significantly. The drawdown caused by the paper mill's production wells could cause an additional slight reduction in artesian flow.

4.4.2.2 Alternatives

The major impact on groundwater resources during operations would be the use of large quantities of potable water for cooling needed for the power plants of Alternatives 3, 4, and 5 (this impact evaluation assumes the use of mechanical draft cooling towers by the power plants). Large consumption of potable water from the Floridan Aquifer could significantly lower the levels in nearby residential wells and could encourage salt water intrusion.

The No-Action Alternative and Alternatives 2, Residential Solar Water Heaters, would have no groundwater impacts. Alternative 1, Purchase Power, would have no local impacts.

4.4.3 Comparison of Impacts

All power plant alternatives would have impacts similar to CBCP, whereas the other alternatives would have none or negligible local impacts.

4.5 GEOLOGICAL RESOURCES

4.5.1 Construction - Related Impacts

4.5.1.1 CBCP

Construction activities, such as clearing of the site, building temporary or permanent roads, waste disposal and laydown areas for building materials, are all phases of construction that will affect the site area.

Clearing the site of natural vegetation will be kept to a minimum to minimize erosion and to reduce the negative impacts to terrestrial communities. A relatively small buffer approximately fifty feet wide will be placed around each of the wetland areas contiguous with the Broward River. The natural buffer which results will serve to slightly filter any noise from plant operations and will serve as a slight visual barrier to the plant itself. However, the validity of using such a small buffer to protect the adjacent wetlands and estuary remains dubious.

The SK paper mill operation has already affected much of the site. Construction areas will be cleared and grubbed. Clearing and grubbing wastes will be disposed of either by burning or burial. If burning is chosen as the best approach, burning operations will be conducted in accordance with local and state requirements. After clearing and grubbing, the construction areas will be graded and appropriate measures will be employed to control erosion such as seeding and grassing the lightly traveled laydown areas. Heavily traveled construction areas and roads will be stabilized with shell or rock. Dust from high traffic areas will be controlled with water sprinkling.

The entrance from East Port Road during construction will be a paved or coated surface road used primarily by construction personnel. It will provide a route to the employee parking area which is to be located to the east of the boiler building.

The access road from Eastport Road will be paved both during and after construction. During construction, this entrance will be for material receiving. The road will be 20 to 24 feet wide. Once the CBCP is complete, this access road will be rerouted and will serve as the main entrance for the proposed plant.

The railroad spur will come off the existing SCX spur to the paper mill. The spur will approach the plant from the north.

Waste materials will be disposed of in accordance with applicable rules and regulations. A number of waste materials such as scrap wood and iron will be taken to a specified open area of the site where they will be separated and stock piled for possible salvage. General waste materials will be disposed of in dumpsters for collection and possible disposal at the city landfill adjacent to the site or other suitable and approved local landfill areas. Lime mud waste will be excavated and moved to a secured landfill on the north of the SK paper mill property.

4.5.1.2 Alternatives

None of the alternatives are expected to have any significant impacts on geological resources during construction.

4.5.2 Operation-Related Impacts

4.5.2.1 CBCP

Solid waste is generated from a number of sources at a power plant. The largest quantity of solid wastes produced by the operation of CBCP is generated by the fluidized bed system. Coal combustion ash, in the form of fly ash, is the other major solid waste. Collectively, spent fluidized bed media and coal ash are referred to as "high volume solid wastes". Other comparatively small quantities of solid wastes, generated on an infrequent basis by the operation of the plant, include sludges from the sedimentation ponds, retention basins, cooling towers, and wastewater treatment facilities.

Ash is the residue produced by the combustion of coal. It consists of the unburned organic matter and the inorganic mineral constituents present in the coal. The quantity and chemical characteristics of ash depend on the coal, boiler operating conditions, and air pollution control devices among others. Two types of ash are produced during combustion, fly ash and bottom ash. Fly ash consists of the finer particles that are entrained in the flue gas stream. Bottom ash is the coarser, heavier material that accumulates in the fluidized bed media in the form of a loose ash or slag.

Approximately 315,000 million tons per year of bottom ash and spent media are expected to be generated. Maximum rate of production of spent fluidized bed media is expected to be about 56 tons/hour for all units. The spent media will be transported to the pelletizing facility. After pelletizing, the material will be transported to the solid waste holding area.

Fly ash will be generated at a maximum rate of about 38 tons/hour for three units. Fly ash will be pneumatically conveyed to temporary storage silos, before mixing with spent fluidized bed media and water to form pellets.

Compared to the high volume solid wastes, quantities of other miscellaneous solid wastes will be insignificant. These miscellaneous solid wastes will be disposed of in SK engineered landfill on-site section.

Periodic removal of sediments from the sedimentation pond will generate a solid waste. Due to the number of variables involved, such as rainfall frequency and duration, concentration of suspended solids in the influent, etc., it is difficult to predict the quantities of sediment removed. Frequency of sediment removal should be once per year or less. Removed solids will consist mainly of coal dust and ash.

Suspended solids in the metal cleaning wastes that settle in the retention basin will also be removed periodically. Solids will consist primarily of ash and iron particles. Removal is expected to occur once every three to five years.

Cooling towers are expected to be drained approximately once per year and the accumulated solids removed. The solids will contain suspended solids from the makeup water and particulates from the atmosphere.

Sludge from the chemical wastewater treatment facility, produced during treatment of metal cleaning wastes, will primarily consist of calcium carbonate and magnesium hydroxide. Quantities will depend on the influent wastewater characteristics and length of operation of the facility. The sludge will be removed as required.

Oil-bearing wastes from the oil-water separators will be collected for off-site disposal or reused by licensed vendors. These wastes may also be incinerated in the boilers along with the coal at selected times.

4.5.2.2 Alternatives

None of the alternatives are expected to have any significant impacts on geological resources during construction.

4.5.3 Comparison of Alternatives

Impacts on geological resources are expected to be none or neglible for all alternatives, including CBCP.

4.6 IMPACTS ON SOUND QUALITY

4.6.1 Construction - Related Impacts

4.6.1.1 CBCP

Noise impact projections were made for construction activities. The highest noise levels will result from earthmoving activities, which will be conducted concurrently for all units.

Estimated construction noise levels (excluding pile driving and steam blowout) at the nearest residence will vary throughout the course of the construction period. The maximum daytime noise level predicted at that residence is 65 dBA. This level will be attained only during normal working hours for approximately 1 and 1/2 years and will be in compliance with the Jacksonville noise control ordinance. The construction noise impact at this location will be noticeable. However, this 65 dBA level is above EPA's guideline of 55 dBA for protecting against outdoor activity interference. This means that occasionally there may be some interference of outdoor activity at this location. There should be less of an effect on indoor activity since about a 15 dBA reduction in noise levels can be achieved by closing windows and doors. If nighttime construction is necessary, noise impacts are expected to be less than 60 dBA.

Two other construction activities which will have noise impacts are pile driving and blowout of the steam lines just prior to start-up of the plant. One pile driver operating intermittently during the first year will produce peak impact levels of 101 dB at 50 feet as the hammer strikes the pile. This level will be reduced to between 60 and 65 dB at the nearest residence and will sound like a distant thumping at a frequency of several blows per minute.

Steam blowout is the procedure whereby the steam lines in the plant will be cleared of welding and any other debris by blowing them out with high pressure steam prior to plant start-up. This activity will generate the greatest noise levels, 129 dBA at 50 feet, associated with plant construction. However, the duration is short, less than 3 minutes per blow, and the total number of blows is estimated to be 20.

4.6.1.2 Alternatives

The power plant alternatives would generate noise during construction. This noise would primarily be caused by pile driving and steam blowout.

The No-Action Alternative and Alternative 2, Residential Solar Water Heaters, would have no sound quality impacts. Alternative 1, Purchase Power, would have no local impacts.

4.6.2 Operation-Related Impacts

4.6.2.1 CBCP

In the SCA, AES identifies the major sources of operational noise for CBCP. These include the Generation Building, boiler draft fan, cooling tower, coal and limestone delivery and processing, vehicular traffic to and from the plant, and the chemical recovery complex. Other less significant sources include various electric motors, transformers, and fans used for dust collection. Trains are estimated to arrive every three days. It is anticipated that coal and limestone processing, which includes reclaim, transfer, and crushing, will operate during daytime hours (10:00 a.m. to 7:00 p.m.) only. This will tend to minimize any impact from the project. Using a computer model, AES predicted that operational noise impacts during worst case conditions will be less than 65 dBA and 70 dBA at the property lines and less than 60 dBA at the nearest residence.

4.6.2.2 Alternatives

The power plant alternatives would generate sporadic sound quality impact due to coal train deliveries and vehicular traffic to and from the plant. Minor power plant operation noises would be masked by traffic.

The No-Action Alternative and Alternative 2, Residential Solar Water Heaters, would have no sound quality impacts. Alternative 1, Purchase Power, would have no local impacts.

4.6.3 Comparism of Impacts

The only major sound quality impacts would occur during the construction of power plants of Alternatives 3, 4, and 5, and CBCP. This impact would be temporary and consists mainly of pile driving and steam blowoff. Operation-related impacts for the power plant alternatives and CBCP would be sporadic noises caused by coal deliveries by train.

4.7 AQUATIC AND TERRESTRIAL ECOLOGY

4.7.1 Construction - Related Impacts

4.7.1.1 CBCP

4.7.1.1.1 Terrestrial Wildlife

Construction of the proposed CBCP and it's associated disposal areas will disturb or eliminate approximately thirty acres of poor quality, previously disturbed wildlife habitat, with the pine flatwoods being most affected. Since the paper mill operations have cleared most of the area already, and thereby reduced the value of this community as a habitat for wildlife, additional destruction of these areas will certainly hasten the demise of the biota associated with these areas. Site preparation will also destroy smaller, less mobile mammalian, reptilian, and amphibian populations in those areas designated for development. Based upon the applicant's field studies, these groups generally exhibited low population densities, and few species were encountered in each taxa. However, no data were provided on how important these animals are in relation to the ecology and the trophic structure of various communities at the site.

No wide-spread negative impacts on ecologically sensitive areas can be expected. Mitigative measures will be utilized to minimize adverse impacts such as the construction of a storage area runoff pond to intercept runoffs from site preparation and plant construction which will prevent significant impacts resulting from increased turbidity and TSS inputs to the river populations dependent on the marsh and river for food or cover. The ponds will be designed to provide a 24-hour retention of runoff produced by a 10-year, 24-hour design storm and retain accumulated solids. Effluent from the pond is to overflow a weir into the Broward River.

The construction will impact some of the resident gopher tortoise (Gopherus polyphemus) population. The den of a Gopher Tortoise is extremely important as a retreat or hibernaculum to no less than 30 vertebrate and invertebrate species, and many of these organisms rely exclusively on the tortoise burrow. While the Eastern Indigo Snake (Drymarchon corais;

Threatened) and Florida Gopher Frog (Rana aroleata aesopus; Rare) were not encountered on the site, no studies were designed to determine whether or not these species were present. The Gopher Frog is a nocturnal amphibian which emerges from it's retreat only after dark, and hence, may be more abundant than previously indicated. Moler (1980) has noted, however, that the Indigo snake populations are quite low in Duval County, but no data are available for the CBCP site. Because tortoise populations have already been significantly reduced as a result of operations which are currently underway, and because the significance of the impacts incurred by this species due to additional disturbances cannot be firmly predicted, it is important that maximum protection be afforded the gopher tortoise. It may be necessary to relocate gopher tortoise populations as well as some of the associated commensal species.

The marshes adjacent to the site appear to be ecologically important as feeding grounds for numerous aquatic and terrestrial species. Many wading birds such as the Great Blue Heron (Ardea herodias), Great Egret (Casmerodius albus), Louisiana and Night Herons (Hydranassa tricolor and Nicticoraz spp, respectively), and Wood Stork (Mycteria americana), which are commonly observed in the marsh areas, are increasingly faced with widespread habitat losses in Duval County (over 200,000 acres of marsh have already been diked or drained along the St. John's).

4.7.1.1.2 Aquatic Life

Site preparation and plant construction activities may adversely affect aquatic biota encountered in one on-site freshwater pond. While this area is only a directly important habitat to those species with short life cycles (due to the ephemeral nature of ponds), such organisms are essential components of the terrestrial food webs. Although no commercially important, rare, or endangered species were observed in the freshwater habitat, American alligator (Alligator mississippiensis) could, theoretically, be expected to inhabit this area occasionally.

Aquatic organisms inhabiting rivers bordering potentially be affected by increased turbidity resulting from surface runoff. Smaller, non-motile organisms would be expected to incur the greatest damage, and it is not clear how the loss of this food source would affect predators in aquatic food webs. If adequate storm water runoff controls are exercised as proposed by the applicant, these effects could be minimized. Surface water drainage from the site will be controlled in order to insure that drainage waters will conform to applicable standards.

Estuarine areas adjacent to the CBCP site provide valuable feeding and nursery grounds for numerous finfish and shellfish, some of which are commercially important. The American Alligator (Alligator missippiensis), a threatened species, regularly frequents the area. Marine mammals observed in the are protected by federal, state and international law and include the West Indian Manatee (Trichechus manatus) and common dolphin (Delphinus delphus). Since these nearshore estuarine environments and the biota which inhabit them would ultimately receive the brunt of the runoff wastewaters associated with plant activities, it is crucial that extensive precautionary measures be seriously considered and implemented. Site preparation and plant construction are not expected to adversely affect biota encountered in the Broward River or St. Johns River since this area is well removed from the construction activities. Furthermore, these waters are not expected to receive storm water or sanitary waste discharges or other effluents resulting from construction-related activities.

4.7.1.2 Alternatives

The No-Action Alternative and Alternative 2, Residential Solar Water Heaters would have no impacts on aquatic or terrestrial ecology. Alternative 1, Purchase Power, would have no local impact.

Since it is assumed that the power plant alternatives (3, 4, and 5) would be constructed at the CBCP site, the impacts would be the same for the alternatives as those expected by CBCP. The primary concern would be for the preservation of wildlife, particularly the gopher tortoise, during the construction for the railway spur.

4.7.2 Operation-Related Impacts

4.7.2.1 CBCP

4.7.2.1.1 Terrestrial Wildlife

CBCP operations in themselves should have only minimal adverse impacts on terrestrial wildlife. The construction activities of a power plant, which are addressed in section 4.7.1, are the primary impact activities in that they have potential to destroy natural wildlife habitats if they exist.

4.7.2.1.2 Aquatic Life

The thermal effluent from CBCP will combine with the SK discharge. At worst it could slightly raise the temperature of the combined wastewater discharge during winter months. At best, CBCP cooling tower blowdown could decrease the temperature of the SK wastewater discharge by 0.3°F. Adverse thermal impacts on estuarine organisms should be minimal.

The metal cleaning wastewaters conveyed to the SK IWTS for treatment and discharge to the St. Johns River may exceed the State water quality limits for iron. This increase of iron concentration will exacerbate the existing pollution conditions of the river and will have an adverse impact on aquatic life.

4.7.2.2 Alternatives

None of the alternatives should significantly impact the aquatic and terrestrial ecology during operations. The power plant alternatives (3, 4, and 5) would have minor impact on wildlife habitats because of additional site development and on fish because of wastewater discharges that exacerbate existing water quality problems in the St. Johns River.

4.7.3 Comparison of Impacts

The only major impact would be the impact on wildlife habitat, particularly the gopher tortoise, by the power plant alternatives (3, 4, and 5) during construction as is the case for CBCP. It is recognized that the proposed power plant site, which is zoned for industrial use, is already changed from its natural state due to pulp mill activities, therefore the impact is considered minor.

4.8 IMPACTS ON CULTURAL RESOURCES

4.8.1 Construction-Related Impacts

4.8.1.1 CBCP

There are presently no areas on, nominated to, or declared eligible for the National Register of Historic Places of the National Registry of Natural Landmarks within the boundaries of the CBCP site, or the preferred transmission line corridor. These same locations contain neither lands specially designated under state programs, nor known areas valued as natural landmarks or for their historic (excluding archaeological), scenic or cultural significance. Subsequently, CBCP construction activities will have no known impacts on cultural resources.

4.8.1.2 Alternatives

None of the alternatives are expected to have significant impacts on cultural resources during construction.

4.8.2 Operation-Related Impacts

4.8.2.1 CBCP

Since no cultural resources are known to exist within the site boundaries (refer to section 4.8.1.1), no adverse impacts on cultural resources are expected to occur due to operation activities. In considering off-site cultural resources, the site facilities should not be visible from the Fort Caroline National Monument or the Kingsley Plantation on Ft. George Island. There does exist some potential for CBCP air emissions to contribute to the formulation of acidic rain which has been documented to contribute to the degradation of building facades, particularly historic buildings made of easily corrodible materials.

4.8.2.2 Alternatives

None of the alternatives are expected to have significant impacts on cultural resources during operations.

4.8.3 Comparison of Impacts

Impacts on cultural resources are expected to be negligible for all alternatives and the CBCP.

4.9 SOCIOECONOMIC IMPACTS

4.9.1 Population Impacts

4.9.1.1 CBCP

The number and pattern of settlement of the immigrant construction workers will have certain positive and negative effects on the Jacksonville area. Immigrant workers are defined as those skilled or semi-skilled workers who will immigrate to the Jacksonville area to work on the proposed project and will remain in the area as long as project work is available. It is assumed by the applicant that the secondary employment generated by the proposed CBCP will be filled by local employables. The only population increase attributable to the proposed CBCP was assumed to be the immigrant construction and operational workers and their families.

During the peak construction year of 1991, the immigrant population would total approximately 300 persons. The greatest concentration of immigrant population in the region during the construction phase would occur in Duval County. During the peak construction year, most immigrants are expected to locate in Duval County. Clay and Nassau Counties would have the second and third most significant total population effects, respectively. The remaining four counties in the region are projected to experience minimal population impacts as a result of the construction phase.

4.9.1.2 Alternatives

The only alternative that may have a potential population impact is the No Action Alternative. No Action would lower the availability of power supply and subsequently may discourage development which in turns discourages population growth.

4.9.2 Economic Impacts

4.9.2.1 CBCP

During the peak construction year of 1991, the proposed CBCP is expected to generate a total of 633 new basic jobs and 1000 new non-basis secondary jobs. The cumulative income effect of the proposed facility during the entire construction period (1982-1987) is projected to be in excess of $288 million.

4.9.2.2 Alternatives

The No Action Alternative may have an adverse economic impact because the lack of available power supply may discourage development in the area.

The power plant alternatives (alternatives 3, 4, and 5) and the Residential Solar Heater Alternative would have a positive impact on the economy because not only do they provide additional power generating capacity but they also create jobs for construction, operation, and maintenance of facilities.

4.9.3 Community Services Impacts

4.9.3.1 CBCP

Construction activities associated with the proposed CBCP will induce additional public costs for Duval County. The most significant of these costs will be road repair and improvements. Due to increased traffic during construction, the roads and major intersections in the vicinity of the proposed CBCP may need upgrading. There will also be public costs incurred because of the additional demand on various public services by the immigrant work force and their families. Providing reclaimed water to the facility will be an initial cost to the city that could be reclaimed via fees charged to CBCP.

4.9.3.2 Alternatives

None of the alternatives are expected to have a significant impact on community services.

4.9.4 Comparison of Impacts

All alternatives except the No Action Alternative and Alternative 1, Purchase Power, would impact the area by providing jobs for constructing/installing and operating/maintaining power generation facilities. The power plant alternatives (Alternatives 3, 4, and 5) and CBCP may also impact the local socioeconomic conditions because the centralized generation of additional electrical power may encourage development and growth in the area. It is recognized that, though these are considered "positive" impacts, development and population growth can in themselves create negative secondary impacts on the area's environment.

The No Action Alternative would have an negative impact. Not only would the lack of additional power generation discourage future development but it could also effect the existing service area by reducing supply reliability which could cause periodic brown-outs and black-outs.

4.10 IMPACTS ON LAND USE, RECREATION, AND AESTHETIC CONDITIONS

4.10.1 CBCP

The adopted comprehensive land use plan for Duval County, City of Jacksonville, is the 2005 Comprehensive Plan. The CBCP site lies in an area designated for Heavy Industrial - IH. Power plants are permissible uses by exception in IH zones. A zoning expection to allow CBCP to use the SK wastewater treatment lagoon information was presented at the Land Use and Zoning Hearing on February 14, 1989. The exception was approved. The hearing produced a recommendation that the CBCP certification be found incompliance with the existing City of Jacksonville land use plan and zoning ordinance.

The area about the site is partly developed. South of the site, about 3,000 feet across the Broward River, is the Gulf Oil tank farm and dock. About 8,000 feet west of the site, across the Broward River, is the developing Imeson Industrial Park, comprising a number of large corporate warehouses and storage areas, and a municipal waste treatment plant. Northwest, north and northeast of the site are residential areas, ranging from low to moderate density. The closest homes are about 2,500 feet to the northwest, across the Broward River from the site. About 9,000 feet to the northwest of the site is the built-out, moderate-density San Mateo subdivision. The closest homes to the north and the northeast are about 6,000 feet away, separated from the site and surrounding 425-acres Seminole Kraft property by pinewoods and wetlands. No residential areas are adjacent to the site or to the SK property. Just east of the site and the SK property is undeveloped land and a large cleared area. Southeast of the site about 3,000 feet is the Hess Oil tank farm and dock.

The Jacksonville Generalized Existing Land Use Map (1985) depicts the larger are around the site as comprising river-oriented industrial, limited commercial, residential, undeveloped and agricultural areas. Jacksonville International Airport is about 4 miles northwest of the site. The new SJRPP coal-fired power plants are about 3 miles east of the site. This part of Jacksonville appears to be developing at an increasing rate. Since the CBCP site is within the existing SK industrial site and since much of the larger area around the site and near the St. Johns River is industrial, it appears to be consistent with existing land use in the vicinity and therefore should not degrade the character of the surrounding area.

The construction and operation of the CBCP will adversely impact residential areas west of the site due to increased levels of noise and dust, salt drift from cooling towers, stack emissions, coal trains, and traffic. Aesthetically, the new plant and plant facilities will be an intrusion on the exisitng view, but the new plant will also look more modern and attractive than the old SK paper mill.

Salt drift from the cooling towers may slightly affect some ornamental plants that are salt-sensitive around homes to the west of the Broward River. Groundwater drawdown by the plant may slightly reduce the yield of wells of homes and farms in the immediate plant area.

4.10.2 Alternatives

The No Action Alternative and Alternative 2, Residential Solar Water Heaters would have no impact on land use, recreation, and aethetics. Alternative 1, Purchase Power, would have no local impact.

The power plant alternatives (3, 4, and 5) would have temporary minimal impact on aesthetics during construction. Operation-related impacts are considered minor because the site is an existing industrial site that has been previously disturbed by development activities.

4.10.3 Comparison of Impacts

The only impacts are those of the power plant alternatives which are similar to those expected for CBCP and are considered minor.

4.11 TRANSPORTATION IMPACTS

4.11.1 Construction - Related Impacts

4.11.1.1 CBCP

The impacts of construction related traffic in the site area will affect Heckscher Drive, Main Street, and Eastport Road. Little or no barge traffic is expected on the St. Johns River during construction.

The year of 1991 will be the peak employment period (633 workers) with 90 percent of the workforce expected to arrive between the hours of 7:00 and 8:00 A.M. and leave between 3:30 and 4:30 p.m. Assuming an average of 1.2 persons riding in each car, approximately 522 trips. These 1044 daily trips were assigned to the roadways based on the projected location of the work force, and the area from which it would be coming. In addition to the work force, many trucks are expected to enter and leave the site during 1991, the peak construction year.

Based on the comparison between the peak hour volume and th capacity, two of the roadways, Hechscher Drive and Eastport Road, will be exceeding the level permitting free flowing traffic. This would indicate that the intersections along Heckscher Drive, particularly the intersection with Eastport Road, will probably exceed intersection capacity.

The influx of the CBCP work force and the continued growth in this particular area will temporarily (through the construction period) affect traffic conditions along these roadways. The existing intersections of the I-95 spur to Heckscher Road and it's intersection with Hechscher Drive going toward Main Street are presently experiencing some congestion during peak periods. With additional traffic, this problem will become more severe as will the left turn lane from the north at the intersections of Heckscher Drive and Main Street. Additionally, turning traffic at the intersection of Eastport Road and Hechscher Drive, presently an intersection of two-lane roads, will also experience delays. Traffic control will become necessary.

4.11.1.2 Alternatives

Minor traffic congestion would occur during construction of power plants for Alternatives 3, 4, and 5.

4.11.2 Operation-Related Impacts

4.11.2.1 CBCP

The effects of coal trains entering and leaving the CBCP site will be the most significant traffic impact during CBCP operation. All railroad traffic to and from site must cross Baisen Road, Eastport Road, and Main Street at grade level crossings. The present infrequent passage of trains at these crossings does not cause a traffic problem. The resulting stoppage of vehicular traffic on Main Street or New Berlin Road by coal trains to or from the CBCP site will impair vehicular traffic two times a week on average. Individual intersections are expected to experience delays of approximately 8 minutes. Simultaneous blocking of all intersections would only delay traffic by approximately 3 minutes. Particular concern has been expressed for the passage of emergency vehicles to the San Mateo subdivision. Access to the development for ambulance services and the fire department will always be available from the south.

4.11.2.2 Alternatives

The major transportation impact during operations would be caused by the rail delivery of coal to the power plant for Alternatives 3, 4, and 5. The trains would be expected to block public roadways when they come and go from the plant site similar to the conditions expected for CBCP. Also vehicular traffic to and from the power plant site could conjest the traffic on local public roads.

4.11.3 Comparison of Impacts

The power plant alternatives (Alternatives 3, 4, and 5) would have impacts similar to CBCP resulting from coal deliveries by rail and traffic coming to and from the plant site.

The No Action Alternative and Alternative 2, Residential Solar Water Heaters would have no impacts. Alternative 1, Purchase Power, would have no local impact.

4.12 ENERGY IMPACTS

4.12.1 CBCP

Cogeneration means the simultaneous production of electricity and useful thermal energy from the same fuel. Generally speaking, cogeneration is a more efficient use of a given quantity of fuel than would be two separate facilities, one producing electricity and the other producing useful thermal energy. CBCP will burn coal to produce electricity for sale to FP&L and steam for the adjacent SK paper mill. In so doing it has the potential to make more efficient use of fuel than would the combination of a freestanding power plant of the same design and capacity and the SK paper mill.

Efficiency of fuel use itself, however, is not a sufficient reason to certify a proposed power plant; it is also necessary, under Section 403.519, FS, that there exist a need for the electricity to be produced by the pwer plant. This need, or lack of it, is determined by the FPSC. The FPSC has heard AES argument that a need exists for the power to be produced by CBCP, and has rendered a judgment that there is a need.

It is conceivable that CBCP might not be as efficient a producer of electricity, overall, as a modern base-load power plant, which would ordinarily be the means chosen by an electric utility to meet a demand for more electricity. The AES does state in the SCA that CBCP will be more efficient (8200 Btu/KWh), than the FPSC avoided unit heat rate (9790 Btu/KWh).

4.12.2 Alternatives

The residential solar heaters of Alternative 2 would have a positive energy impact because they generate power using an inexhaustible energy source, the sun. The power plant alternatives (Alternatives 3, 4, and 5) all proposed to use coal as a fuel. Though domestic coal supplies are plentiful, coal is considered a nonrenewable fossil fuel. Subsequently, the energy impact of the power plant alternatives is considered negative.

4.12.3 Comparison of Impacts

The power plant alternatives (Alternatives 3, 4, and 5) would, like CBCP, be considered to have a negative energy impact because of their use of fossil fuel, coal. The Residential Solar Heater Alternative is considered to have a positive impact because of its use of the sun.

CHAPTER 5
SUMMARY OF POTENTIAL ADVERSE IMPACTS OF THE PROPOSED PROJECT AND APPLICABLE MITIGATIVE MEASURES

5.0 SUMMARY OF POTENTIAL ADVERSE IMPACTS OF THE PROPOSED PROJECT AND APPLICABLE MITIGATIVE MEASURES

This chapter summarizes the potential adverse impacts which could result from CBCP (Section 5.1) and appropriate measures which are available to mitigate these impacts (Section 5.2). Sections 5.3, 5.4, and 5.5 summarize unavoidable adverse impacts, effects of CBCP on short- and long-term productivity, and those resources which would be permanently committed by implementation of CBCP.

5.1 SUMMARY OF ADVERSE IMPACTS

This section summarizes the adverse impacts which could result from the construction and operation phases of CBCP.

5.1.1 Air Resources

The primary air pollutant emitted during construction is fugitive dust and open burning emissions (particulates, CO, hydrocarbons, SO_x and NO_x). These impacts are expected to be minimal and of short duration.

CBCP units will burn coal and wood waste. Impacts on air quality will include emissions such as SO_2, NO_x, CO, particulate matter and other minor constituents. These emissions will be limited by use of control technology considered to be the best available. Fugitive dust from coal, limestone, and ash handling will be controlled by a variety of methods to reduce adverse impacts. It is expected that the CBCP will not contribute significantly to violations of ambient air quality standards and PSD increment restrictions.

5.1.2 Surface Water Resources

Construction activities will impact surface waters in the St. Johns River. The primary activities affecting these water bodies are the construction dewatering and stormwater runoff overflow. Storage areas runoff and yard area runoff will go to the SK discharge system which outfalls to the river. Dewatering wastes will be discharged to the SK discharge system via the SK once-through cooling water effluent line. Operation-related discharges include cooling tower blowdown and yard area runoff which will go to the SK discharge system. In addition there will be boiler blowdown which will be discharged to the cooling tower for reuse and low volume wastes, metal cleaning wastes, and storage area runoff which will be discharged to the SK IWTS. Cooling tower blowdown effluent and construction dewatering effluent will go to the SK discharge system and may on occasion violate or exacerbate existing violations of state water quality criteria for the parameters aluminum, total residual chlorine, copper, iron, mercury and silver. Water quality sampling has indicated that the St. Johns River occasionally contains these parameters in concentrations approaching or exceeding the criteria. The cooling tower will increase the chemical concentrations of the cooling water up to 4.6 times the original concentration. The coal pile runoff and metal cleaning wastes may all contain quantities of the above mentioned parameters. AES has requested a mixing zone for iron to allow compliance when ambient water quality is better than the criteria and variances when ambient levels of iron exceed the criteria.

CBCP solid waste holding area will cover no more than two acres. The pelletized ash/limestone will be stored in a lined area. Coal pile runoff will be collected and treated. Leachate from the SK paper mill lime mud piles which has contributed amounts of heavy metals to the groundwater on the site is proposed to be eliminated by moving the lime mud to an unlined location on-site where it will then be covered.

5.1.3 Groundwater Resources

Groundwater elevations will be lowered during construction due to dewatering around deep foundation excavations. The dewatering should not cause any noticeable effects on private or agricultural wells in the area. These construction impacts will be temporary.

Groundwater withdrawals during operations are expected to average 5.44 mgd with an instantaneous maximum demand of 7.0 mgd. Groundwater modeling efforts done under the direction of AES concluded that the proposed withdrawal of 7.0 mgd will not cause adverse impacts to existing legal users or cause adverse water quality problems. USEPA review of the groundwater modeling documents found that a more sensitive analysis is needed to justify the stated conclusions (refer to Section 3.3.2).

5.1.4 Geological Resources

Solid waste will be generated by CBCP from a number of sources. The largest quantity of solid waste will be generated by the CFB system, referred to as bed ash. Coal combustion ash, in the form of fly ash, is the other major solid waste. Bed ash is to be pelletized and transported to a solid waste holding area. Fly ash will be pneumatically conveyed to temporary storage silos. Both solid wastes are expected to be transported to a landfill outside the State of Florida. Subsequently local geological resources will not be impacted.

5.1.5 Aquatic and Terrestrial Ecology

In general, the use of the existing SK paper mill site and the proposed rail spur off the existing rail line does not constitute an important loss of wildlife habitat. However, the construction of the rail spur and new line mud disposal area will affect some of the resident gopher tortoise (Gopherus polyphemus) population. It should be noted that the den of the gopher tortoise is extremely important as a retreat or hibernaculum to no less than 30 vertebrate an invertebrate species, and many of these organisms rely exclusively on the tortoise borrow for shelter. Because the area designated for CBCP has been previously cleared for pulp mill operations, thereby reducing the value of this community as a habitat for wildlife, impact on the surrounding areas from this project should be minimal.

5.1.6 Sound Quality

Construction noise levels (excluding pile driving and steam blowout of boiler tubes) will be less than 65 dB(A) which is above EPA's guideline of 55 dB(A) at the nearest residential area. This could be an annoyance to outside activities at residences near the plant. Steam blowout will cause high noise levels at the nearest residence. Steam blowout will occur intermittently over a two week period. Noise levels of 80-90 db(A) will definitely startle residents.

Noise from operation of CBCP should not greatly increase noise levels in the area. The operation of SK paper mill and traffic along Heckscher Drive will tend to mask operational noise of CBCP. Noise of increased rail traffic delivering coal will temporarily disturb some neighborhoods.

5.1.7 Cultural Resources

The Division of Historical Resources determined that the site is unlikely to contain significantly archaeological or historical sites. In addition, the CBCP site should be far enough away from the Fort Caroline National Monument, Kingsley Plantation, and other historic, scenic, and cultural areas as well as state parks and recreation areas that they should not be affected by the construction of the plant or coal unloading facility.

5.1.8 Socioeconomic Conditions

Since the SK site already has a paper mill operating, the addition of a new cogeneration plant on adjacent property is not expected to create significant sociological impacts other than induced traffic delays caused by coal trains. For this reason, the economic impacts should primarily be felt in terms of financing rather than in area wide support service demands or other local costs.

5.1.9 Land Use, Recreation, and Aesthetics

The CBCP site has been found by the Governor and Cabinet of the State of Florida to be in compliance with local land use plans and zoning regulations. In addition, the JPD found the project to be consistent with the North District Plan. Subsequently, no adverse impacts are noted for land use, recreation, and aesthetics.

5.1.10 Transportation

The roadways that are most likely to be impacted by CBCP are Heckscher Drive, Main Street, Eastport Road and New Berlin Road. The most severe impact is expected to occur at the intersection of Eastport Road and Heckscher Drive, presently an intersection of two-lane roads. Construction traffic to and from the CBCP site will likely cause congestion at this intersection. The turning traffic, from Heckscher onto Eastport is expected to significantly increase.

The effects of coal trains entering and leaving the plant site will be the most significant traffic impact during plant operations. All railroad traffic to and from CBCP must cross Baisden Road, Eastport Road, and Main Street at grade level crossings in the San Mateo development. It is estimated that CBCP will receive two train loads per week on average. The three roads would be blocked for approximately eight minutes each but all three streets will only be simultaneously blocked for approximately four minutes. Even when all three roads are blocked, access to the San Mateo development from the south is still available. Ambulance services and the fire department will always have access, should that be necessary, at the time the train is either entering or leaving CBCP.

5.1.11 Energy Resource

The use of CFB boilers and the production of process steam during the generation of electrical power makes the CBCP an efficient user of energy. In view of these items and given the large domestic supply of coal, no adverse impacts on energy resources are anticipated.

5.2 IDENTIFICATION AND EVALUATION OF AVAILABLE MITIGATIVE MEASURES

This section summarizes the measures which are available to mitigate potential impacts of the construction and operation of CBCP on the natural and man-made environment.

5.2.1 Air Resources

Appropriate methods of dust control and dust emission prevention will be used to mitigate effects of construction in the vicinity of CBCP. Air quality control rules of the State of Florida for fugitive dust emissions and open burning will also be met (Chapter 17-2.04(3) and Chapter 51-2 FAC). To comply with these regulations, all reasonable precautions will be taken to prevent fugitive dust emissions during construction. Such precautions will include using asphalt, rock or shell, oil, water, or dust-suppression chemicals for the control of dust from grading and clearing operations and on dirt roads. Other measures of fugutive dust control include careful operation of on-site equipment, reduction of vehicle speeds on unpaved areas and rapid revegetation of cleared areas after construction.

During construction, vegetation will be cleared. Open burning of debris must comply with the following conditions:

- Burning will be performed between 9:00 a.m. Eastern Standard Time (EST) and one hour before sunset; at other times, a forced draft system will be used;
- The burning location will be at least 45 meters (50 yards) from the nearest occupied building or public highway;
- Piles will be no larger than can be burned within the designated time;
- Moisture content and composition will be favorable for good burning; and
- Smoke emissions will not exceed 40% capacity or Number 2 on the Ringelmann chart except during startup.

In addition, burning should be conducted during periods of good atmospheric dispersion.

Operation-related air emissions will be controlled with fabric filters and boiler design. Fugitive coal dust, limestone dust, fly ash, and spent limestone will be controlled with water spray dust suppression systems, enclosed conveyors, and fabric filters (filters for coal dust only at conveyor transfer points). Total suspended particulates in the cooling tower drift will be controlled by the use of drift eliminators and by limiting the cycles of concentration in the cooling system. AES has set aside money as part of CBCP to plant trees in order to mitigate carbon dioxide "greenhouse" effects.

5.2.2. Surface Water Resources

Potential impacts on surface water resources during the construction phase will be related primarily to erosion and sedimentation. Accelerated erosion can be controlled by compaction of embankments, early soil stabilization, limiting the size of exposed areas, maintenance of relatively flat grades, stabilization of stormwater flat grades, and stabilization of stormwater outlets and flat bottom ditches as well as other appropriate erosion control techniques.

Sedimentation can be controlled during construction by use of sediment control basins and traps, filter berms, straw bales, perforated riser pipes at drainage structures, or other applicable devices as appropriate. Also included for controlling runoff and sedimentation is the use of a construction runoff retention pond (Storage Area Runoff Retention Pond) and temporary sedimentation ponds. An additional mitigative measure could include the construction of a sand/gravel filter as a part of the retention pond for improved removal of silt.

Discharges from the wastewater treatment system can contribute contaminants to the St. Johns River which already contains excessive amounts of those contaminants. Proper operation of the wastewater treatment facility, use of mixing zones and approval of variances for some metals should mitigate the impacts of the discharges.

5.2.3 Groundwater Resources

CBCP will have an adequate supply of fresh water from the SK wells for its cooling tower system. Because there is concern about the adequacy of the fresh water supply in Duval County and potential salt water intrusion into the drinking water aquifer, the future use of reclaimed water from the Jacksonville sewage treatment system and/or CBCP process waters is recommended. It is also recommended that AES consider treatment and use of brackish river water as a source for cooling.

5.2.4 Geological Resources

Disposal of solid waste is expected to be done off-site by the coal supplier. Subsequently no adverse impacts are expected to occur locally and no mitigative measures are presented.

5.2.5 Aquatic and Terrestrial Ecology

Clearing the site of natural vegetation should be kept to a minimum to minimize erosion and to reduce the negative impacts to terrestrial communities. A small buffer should be maintained around each of the wetlands contiguous with the Broward River. The natural buffer should serve to slightly filter any noise from plant operations and provide a slight visual barrier to CBCP. However, the validity of using a small buffer to protect the adjacent wetlands and estuary remains dubious.

No wide-spread negative impacts on ecologically sensitive areas are expected. Mitigative measures should be utilized to minimize adverse impacts such as the use of sedimentation ponds to intercept runoffs from site preparation and plant construction which will prevent significant impacts resulting from increased turbidity and TSS inputs to the river populations dependent on the marsh and river for food or cover. The pond will be designed to provide a 24 hour retention of runoff produced by a 10 year, 24 hour design storm and retain accumulated solids. Fresh-water effluent from the sedimentation pond will overflow a weir in the river. It is recommended that a sand/gravel filter be added to the retention pond for improved removal of silt.

Of special concern is the protection of the gopher tortoise populations which have already been significantly reduced as a result of operations which are currently underway. Because the significance of the impacts incurred by this species due to additional disturbances cannot be firmly predicted, it is important that maximum protection be afforded the gopher tortoise. It may be necessary to relocate gopher tortoise populations as well as some of the associated commensal species. The relocation of affected animals should be done in consultation and conformance with the Game and Freshwater Fish

Commission requirements. Also it is recommended that with the exception of that area occupied by CBCP components, exposed areas be revegetated with pines and other vegetation native to the site and beneficial to wildlife.

5.2.6 Sound Quality

Noise levels due to the operation of construction equipment should be minimized by requesting contractors to make use of modern low noise level equipment. Most construction activities should take place during daylight hours which would further reduce noise impacts. Steam blowout at the start-up of each unit is expected to present the greatest noise impact. Such operations will occur intermittently over a two week period per unit. Steam blowout should be restricted to daylight hours with prior notice made to the public.

5.2.7 Cultural Resources

No adverse impact are expected, subsequently no mitigative measures are presented.

5.2.8 Socioeconomic Conditions

No adverse impacts are expected, subsequently no mitigative measures are presented.

5.2.9 Land Use, Recreation, and Aesthetics

Since land use impacts are negligible, no mitigative measures are proposed.

5.2.10 Transportation

Traffic should be controlled by limiting site access to required delivery vehicles. Employee parking should be restricted to a designated area located near the construction office. Any damage to the public road surfaces resulting directly from CBCP-related traffic should be repaired.

Rail deliveries of coal should also be scheduled to avoid "rush-hour" traffic between 7:00-9:00 a.m. and 4:00-6:00 p.m.

5.2.11 Energy Resources

No adverse impacts are expected, subsequently no mitigative measures are presented.

5.3 UNAVOIDABLE ADVERSE IMPACTS

CBCP would result in certain adverse environmental impacts despite the emphasis on state-of-the-art impact control technology in all project phases. Some of the impacts are unavoidable consequences of a commitment to project objectives. Others, while avoidable, are regarded as insignificant compared to the cost of their elimination. Every effort should be made to ensure the most environmentally favorable trade-offs between construction and operation of the generating units and the use of air, land, and water resources.

5.3.1 Atmosphere Resources

An increase in pollutants released to the atmosphere as a result of the CBCP would result. The emissions of NO_x, SO_2, CO and particulates from CBCP would not result in a violation of Federal or State ambient air quality standards. Air emissions would use up portions of available Prevention of Significant Deterioration Class II increments at points close to the facility This would not preclude future industrial development in the site region. No adverse effects on the nearby Okefenokee Class I area are projected.

Emissions of SO_2 and NO_x have been associated with acid precipitation. To date, however, only a general relationship has been established. The relationship between emissions of the precursor pollutants from a particular source and acid in a particular area remains speculative. The most highly publicized relationship is that between acid rain in the northeastern United States and Canada. It is therefore difficult to determine how much of an adverse impact CBCP would produce with respect to acid rain.

Emissions of CO_2, methane, CFC's, NOx and a variety of low-volume gases have been associated with global climate change referred to as the greenhouse effect. These greenhouse gases collectively function to retain heat energy, effectively warming the earth's surface. A mitigative measure to off-set the increasing concentrations of these gases in the atmosphere, particularly CO_2, is through reforestation.

One feature that will mitigate some of the impact of CBCP is the use of stringent sulfur emission controls during operation. CBCP will utilize flue gas desulfurization (FGD) via a fluidized bed of limestone sulfur emissions. NOx will be controlled by boiler design. Such control will also help mitigate the rainfall acidification problem. The primary source of NO_x appears to be automobile emissions.

5.3.2 Land Resources

A total of 35 acres of previously disturbed land would be preempted from other uses during the life of the project. Since this site does not include significant areas of wildlife habitat and is zoned for industrial use no unavoidable adverse impacts are anticipated.

5.3.3. Water

Discharge of cooling tower blowdown and wastewater treatment plant effluent would cause or exacerbate additional violations of Florida Class III water quality standards for several trace metals when water quality of the River approaches or exceeds the applicable standards. This would have an adverse impact on water quality and aquatic life in the St. Johns River estuary. Also the use of large amounts of potable groundwater (average of 5.44 MGD) from the Floridan Aquifer, which is already experiencing decreasing levels, could have an adverse impact on local water supply and quality.

5.3.4 Sensitive Areas

No sensitive areas are located within the CBCP site boundaries therefore no unavoidable adverse impacts are expected.

5.4 RELATIONSHIP OF SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

During the proposed 30-year life of CBCP, the air, water, and land resources of the site will be committed to the production of electric power.

The production of electricity during the operating life of CBCP will contribute to tourism and other industries within FPL service area, the utility purchasing power from CBCP. This electric power will accommodate the projected increase in the population of the region and the projected electrical needs for the FP&L system.

5.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed plant will consume an estimated 33.15 million tons of coal during its 30-year life. The consumption of fuel oil for start-up and flame stabilization is expected to be 4.80 million gallons over the life of the facility.

The CBCP will use an estimated 3.0 million tons of limestone during plant life which will be irretrievably committed.

Materials like concrete cannot be recycled and thus will be irretrievably committed to the construction of CBCP. Other materials such as steel and aluminum may be reclaimed if it is economically feasible. Other construction requirements such as labor and capital will also be irretrievably committed to CBCP.

Land containing a variety of habitat types would be permanently committed in areas to be used as solid waste disposal areas.

CHAPTER 6
SUMMARY OF SAR / EIS FINDINGS

6.0 SUMMARY OF SAR/EIS FINDINGS

The basic level of detailed information available for the alternatives to CBCP and the broad economic and environmental assumptions required to make comparisons among the alternatives prevents the identification of any one of the alternatives as being clearly superior. However, certain generalizations regarding the evaluation of the No Action Alternative, the proposed project (CBCP), and Alternatives 1 through 5 can be stated along with a recommended course of action.

6.1 SUMMARY OF ECONOMIC ANALYSIS

The economic screening of the alternatives and the proposed project (Section 2.8.4) focused primarily on the cost savings that could be realized by displacing oil-fired generating capacity. This analysis was based solely on the construction/installation and operating costs of each alternative and did not take into account variations in fuel costs and transmission costs. Consequently, the findings of this analysis serve primarily as an indicator of the economic comparability of the alternatives of oil savings rather than as an indication of the most cost-effective alternative overall.

With respect to the primary issue on which the project is currently being proposed (generation of 225 MW of electrical power that is not dependent on oil or natural gas) several of the alternatives appear to be attractive, particularly the gasified coal-fueled combustion turbine and combined cycle power plants (Alternatives 3 and 4, respectively).

6.2 SUMMARY OF ENVIRONMENTAL ANALYSIS

The environmental analysis of CBCP and the alternatives (Chapter 4.0) focuses on the potential impacts of implementing the projects on eleven resource areas. This analysis was based on site- and project-specific data and detailed analyses for the CBCP site and impact area while more general data and analyses were utilized for the alternatives. Consequently, although impact analyses were carried out for each alternative, the level of detail provided in these analyses varies significantly between CBCP and the alternatives.

Tables 6-1 and 6-2 were prepared to summarize the environmental impacts expected to occur during construction/installation and operations. It is estimated that construction activities for the power plant alternatives including CBCP, will take place over a 30 month period and that their operational life will be 30 years. It should be noted, the construction and maintenance of transmission lines for the purchase power alternative and the power plant alternative are not addressed in this evaluation.

6.2.1 Construction-Related Impacts

Table 6-1, environmental impact during construction, shows the No Action Alternative to have no impact. The Purchase Power alternative is stated to have "impact shifted away from local areas". This is because the evaluation only addresses local (Jacksonville/Duval County area) impacts and not impacts at the site of purchase power generation which in turn could be as significant as those impacts created by the power plant alternatives and CBCP. Alternative 2, Residential Solar Water Heaters, appears to have a positive impact during construction because of the creation of jobs. Construction and installation would create localized noise and traffic problems at the individual residences for this alternative and energy consumption is required to make the units but these impacts would be extremely minor in comparison to the power plant alternatives. The impacts for the remaining power plant alternatives are equivalent to those expected by CBCP construction. It should be noted that these impacts would be temporary (for the life of the construction phase) and with appropriate mitigation, the impacts could be lessened if not eliminated.

6.2.2 Operation-Related Impacts

Table 6-2 summarizes the impacts expected during the operations of the various alternatives. As was the case for construction activities, the Purchase Power Alternative (Alternative 1) shifts any environmental impacts away from the local area. As noted in Section 2.8.3.2 this alternative also

TABLE 6-1
POWER SUPPLY ALTERNATIVES
SUMMARY OF ENVIRONMENTAL IMPACTS DURING CONSTRUCTION/INSTALLATION

Alternative	Air Quality	Surface Water Quality	Groundwater Quantity and Quality	Aquatic and Terrestrial Ecology	Sound Quality	Cultural Resources	Socioeconomic Conditions	Land Use, Recreation, and Aesthetics	Transportation	Energy Resources	Conclusions (1)
1 - Purchase Power	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	Impacts shifted away from local area
2 - Residential Solar Water Heaters	Minimal Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Creates jobs	No Impact	No Impact	Minimal Impact	Decentralized impacts at point of use
3 - Combustion Turbine Power Plant (gasified coal-fueled)	Emits fugitive dust and particulates due to excavation, grading, burning, & traffic	Discharges storm and dewatering runoff	Minimal Impact	Disrupts wildlife habitat (gopher tortise)	Generates noise due to pile driving and steam blowout	No Impact	Creates jobs	Temporary Aesthetic Impact	Increases vehicular traffic on public roads	Minimal Impact	With appropriate mitigation (BMP's) no long-term local impact
4 - Combined Cycle Power Plant (gasified coal-fueled)	Emits fugitive dust and particulates due to excavation, grading, burning, & traffic	Discharges storm and dewatering runoff	Minimal Impact	Disrupts wildlife habitat (gopher tortise)	Generates noise due to pile driving and steam blowout	No Impact	Creates jobs	Temporary Aesthetic Impact	Increases vehicular traffic on public roads	Minimal Impact	With appropriate mitigation (BMP's) no long-term local impact
5 - Conventional Coal-fired Power Plant	Emits fugitive dust and particulates due to excavation, grading, burning, & traffic	Discharges storm and dewatering runoff	Minimal Impact	Disrupts wildlife habitat (gopher tortise)	Generates noise due to pile driving and steam blowout	No Impact	Creates jobs	Temporary Aesthetic Impact	Increases vehicular traffic on public roads	Minimal Impact	With appropriate mitigation (BMP's) no long-term local impact
6 - No Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
7 - CBCP	Emits fugitive dust and particulates due to excavation, grading, burning, & traffic	Discharges storm and dewatering runoff	Minimal Impact	Disrupts wildlife habitat (gopher tortise)	Generates noise due to pile driving and steam blowout	No Impact	Creates jobs	Temporary Aesthetic Impact	Increases vehicular traffic on public roads	Minimal Impact	With appropriate mitigation (BMP's) no long-term local impact

(1) BMP - Best Management Practices

TABLE 6-2
POWER SUPPLY ALTERNATIVES
SUMMARY OF ENVIRONMENTAL IMPACTS DURING OPERATIONS

Alternative	Air Quality	Surface Water Quality	Groundwater Quantity and Quality	Aquatic and Terrestrial Ecology	Sound Quality	Cultural Resources	Socioeconomic Conditions (1)	Land Use, Recreation, and Aesthetics	Transportation	Energy Resources	Conclusion
1 - Purchase Power	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	No Local Impact	Potentially provides jobs away from local area	No Local Impact	No Local Impact	No Local Impact	Impact shifted away from local area but may have high transmission costs and low reliability and does not produce steam for SK
2 - Residential Solar Water Heaters	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Create maintenance jobs at point of use	No Impact	No Impact	Uses a renewable energy source	Coordination of implementation complex, high maintenance requirements, requires a backup system, and does not produce steam for SK
3 - Combustion Turbine Power Plant (gasified coal-fueled)	Gas is cleaned to remove SO_2 and particulates prior to use NO_x is controlled by combustion temperature May emit significant levels of CO_2	Discharges include significant levels of arsenic, chromium, heat copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine	Large consumption of potable groundwater could lower supply and increase salt water intrusion	Development of land impacts habitats of wildlife and wastewater effluent impacts fish	Sporadic impact due to train deliveries and traffic	No effect per consultation	Provides O&M jobs locally	Minimal impact to existing industrial site	Coal deliveries by rail may cause traffic conjection at public road crossings and vehicular traffic would be increased to and from the site	Uses a non-renewable fossil fuel but provides pollutant control before combustion by washing gas and is very fuel efficient	Coal-gasification is just becoming commercially viable, high maintenance, and does not produce steam for SK
4 - Combined Cycle Power Plant (gasified coal-fueled)	Gas is cleaned to remove SO_2 and particulates prior to use NO_x is controlled by combustion temperature May emit significant levels of CO_2	Discharges include significant levels of arsenic, chromium, heat, copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine.	Large consumption of potable groundwater could lower supply and increase salt water intrusion	Development of land impacts habitats of wildlife and wastewater effluent impacts fish	Sporadic impact due to train deliveries and traffic	No effect per consultation	Provides O&M jobs locally	Minimal impact to existing industrial site	Coal deliveries by rail may cause traffic conjection at public road crossings and vehicular traffic would be increased to and from the site	Uses a non-renewable fossil fuel but provides pollutant control before combustion by washing gas and is very fuel efficient	Coal-gasification is just becoming commercially viable, high maintenance, and can produce process steam for SK
5 - Conventional Coal-fired Power Plant	May emit significant levels of SO_2, NO_x, CO and particulates requiring extensive post-combustion pollutant control	Discharges include significant levels of arsenic, chromium, heat, copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine.	Large consumption of potable groundwater could lower supply and increase salt water intrusion	Development of land impacts habitats of wildlife and wastewater effluent impacts fish	Sporadic impact due to train deliveries and traffic	No effect per consultation	Provides O&M jobs locally	Minimal impact to existing industrial site	Coal deliveries by rail may cause traffic conjection at public road crossings and vehicular traffic would be increased to and from the site	Uses a non-renewable fossil fuel and is less fuel efficient than new technologies	Requires expensive pollution control facilities, and can produce process steam for SK
6 - No Action	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	Continued use of old technology at SK will see continued air emission problems
7 - CBCP	SO_2 and NO_x are controlled during combustion May emit significant levels of CO and particulates requiring post-combustion control	Discharges include significant levels of arsenic, chromium, heat, copper, iron, mercury, silver, oil and grease, cadmium, aluminum, lead, zinc, pH, and residual chlorine	Large consumption of potable groundwater could lower supply and increase salt water intrusion	Development of land impacts habitats of wildlife and wastewater effluent impacts fish	Sporadic impact due to train deliveries and traffic	No effect per consultation	Provides O&M jobs locally	Minimal impact to existing industrial site	Coal deliveries by rail may cause traffic conjection at public road crossings and vehicular traffic would be increased to and from the site	Uses a non-renewable fossil fuel but is very fuel efficient	Proven commercially viable technology but CFB units this size are new, and can produce steam for SK

may require the need for additional transmission facilities at a very high cost and that outside utilities (utilities other than FP&L) may not have the extra power to sell. Subsequently, the alternative has low reliability. Also this alternative can not supply process steam to the SK paper mill and result in the continued use of old and pollutant-generating technologies at the SK paper mill.

Alternative 2, Residential Solar Water Heaters seems very attractive because it is environmentally benign in that it has very minimal if no adverse impacts and uses an inexhaustible energy source, the sun. The major drawbacks to this alternative is the complexity of coordinating implementation efforts, the question of who finances and installs the units, and more importantly, who is responsible for maintaining the units. Though these units require minimal operational efforts they have a history of high maintenance needs. If maintenance is left to the individual residents, the quality control of maintenance efforts, and subsequently the useability of the units would be in question. On the other hand, requiring the utility, in this case FP&L, to be responsible for maintaining 730,000 decentralized units (refer to Table 2-4) would make this alternative managerially and economically unattractive. In addition, this alternative would require a 100% backup system for inclement weather conditions. Heated water storage in the units would not last much beyond 3 days. A week-long period of inclement weather blocking the sun could put a strain on the utility supplying the backup power. Consequently this alternative does not necessarily increase the utility's reserve margin. Also this alternative can not supply process steam to the SK paper mill and result in the continued use of old and pollutant-generating technologies at the SK paper mill.

Alternative 3, the Combustion Turbine Power Plant fueled by gasified coal has environmental impacts equivalent to the proposed project, CBCP, but is the only power plant alternative that does not include the production of process steam for the SK paper mill and result in the continued use of old and pollutant-generating technologies at the SK paper mill. Combustion turbine technology is a proven power production technology but coal gasification, though environmentally desirable, is a new refining process which is just starting to come out of the demonstrative stage for commercial applications. Major environmental impacts include CO_2 air emissions during operations.

Alternative 4, the Combined Cycle Power Plant fueled by gasified coal has environmental impacts equivalent to the proposed project, CBCP, and can also produce process steam for SK. Like Alternative 3, the power production technology has been commercially proven but the coal gasification technology is still relatively new for commercial applications. Major environmental impacts include CO_2 air emissions during operations.

Alternative 5, the Conventional Coal-fired Power Plant can provide process steam for the SK paper mill but has the most adverse environmental impacts in comparison to the other alternatives. Its use would require extensive, expensive post-combustion pollutant controls. Major environmental impacts include SO_2, NO_x CO, and particulates.

The No-Action Alternative would have no obvious environmental impacts, but this alternative could result in the continued use of old and pollutant-generating technologies at the SK paper mill. In addition, if additional power is not generated for FP&L as proposed by CBCP, the utility's reserve margin could fall below acceptable standards resulting in future, periodic brown-outs or black-outs.

The proposed project, CBCP, consists of a proven technology, CFB units, but the size proposed is relatively new for commercial applications. This technology, along with Alternatives 3 and 4, are all considered environmentally low-impact power plant technologies. Many of the adverse impacts of CBCP which cannot be completely mitigated are a function of its location. The impact on transportation systems, wildlife habitats, and the exacerbation of existing water quality problems may not have occurred at another alternative site. Due to the need to have CBCP close to the SK paper mill for process steam transport, alternate sites were not considered economically feasible for operations. Because of this AES has been willing to exert additional effort toward mitigation of the project impacts.

6.3 ALTERNATIVES TO THE PROPOSED PROJECT

Based on the preceding discussions, it is apparent that viable alternatives to the construction and operation of CBCP exist. Alternatives were developed based on their ability to meet the same economic goals which were identified by the FPSC as the reasons for approving the construction of CBCP. The alternatives were judged to equal the economic benefits to the CBCP by satisfying the following criteria:

- o the alternative would replace or save oil and natural gas equivalent to or greater than the oil displaced by the proposed project;

- o the alternative would provide 225 KW of electrical power; and

- o the alternative must be implementable within the proposed time frame of CBCP (1996)

The selection of one of the alternatives over the proposed project would satisfy the economic need but it would not necessarily satisfy the need for process steam at the SK paper mill.

6.4 RECOMMENDED COURSE OF ACTION

6.4.1 USEPA's Preferred Alternative and Recommended Action

It is anticipated that AES-CB and SK will resolve the outstanding environmental issues associated with the CBCP. Based on preliminary findings, USEPA tentatively proposes to issue the NPDES Permit with conditions (See Appendix B - Draft NPDES Permit). CBCP appears to be an economically advantageous project for Jacksonville, its citizens, and FPL and its customers. Not only does it displace oil and/or natural gas, but by providing steam to the SK paper mill, it allows for removal of old boilers, thereby producing a net decrease in emissions of air pollutants. In addition, it provides additional generating capacity for the utilities which would have to be constructed at a later time as system demand rises and older units are phased out of use. Given the advantages offered by CBCP and pending resolution of the outstanding issues, USEPA finds the proposed project, CBCP, to be the preferred alternative. The environmentally preferable components of CBCP are:

- o Ambient air quality will be improved in the Jacksonville area and in the Okeefenokee Swamp area.

- Thermal water discharges as a result of the existing SK once-through cooling system will be significantly reduced. Elimination of this system will also eliminate entrainment and impingement of aquatic species into the SK cooling system.

- Existing contamination near the site will be cleaned up, or monitored for potential remedial actions, as appropriate.

- Utilizing a previously impacted industrial site makes impacts on wildlife and wildlife habitat from the project minimal.

It must be noted that based on the initial findings of this SAR/EIS, various system alternatives to the proposed project are available which appear to be environmentally sound as well as economically feasible. These are:

- SNRC is the preferable alternative for NO_x control unless it can be shown clearly that it does not represent BACT.

- At the time the City of Jacksonville can provide treated wastewater of sufficient quality, the CBCP will use reclaimed water in the cooling towers, with groundwater used only as a backup. AES-CB has agreed to the SJRWMD's condition that calls for the use of reclaimed water.

- The addition of sand/gravel filters in the retention ponds for improved removal of silt is a viable alternative.

6.4.2 FDER's Recommendations

FDER has recommended certification of CBCP. This recommendation is based on the following rationale:

- Replacement of old pulp mill facilities by the CBCP will reduce existing ambient air quality impacts.

- Relocation of old lime mud piles to a proper area could alleviate an existing situation causing a violation of groundwater quality standards and reduce an additional loading of heavy metals to the St. Johns Estuary.

- Discharges from the wastewater treatment system can contribute contaminants to the St. Johns River which already contains excessive amounts of those contaminants. Proper operation of the wastewater treatment facility, use of mixing zones and approval of variances from some metals would allow certification to be granted.

If the CBCP should receive State of Florida Certification, FDER recommends that the Conditions of Certification (Appendix D) be imposed to ensure that the construction and operation of CBCP is in conformance with the applicable standards, regulations and laws of this State and that the facility have minimal adverse impacts on the environment.

6.4.3 Unresolved Issues

Numerous changes to the project scope and the SK paper mill processes have occurred during the preparation of this EIS. The following unresolved issues need to be addressed before completion of the FEIS.

Air Quality - It is unclear at this time whether SNCR should represent BACT for the AES boilers. Therefore, it is important that all available information concerning the proposed level of BACT and the SNCR alternative be submitted by AES prior to the issuance of the final FEIS. This information should include, among other things, a comparative analysis between the AES boilers and other CFB's which have been required to install SNCR. This analysis should document any differences in energy, environmental, or economic concerns, between the facilities so that a final BACT recommendation can be made.

Erosion and Sediment Control Plan - Revisions to the Erosion and Sediment Control Plan submitted by AES-CB will be necessary before it is consistent with requirements of Part III.D of the draft NPDES permit and can be considered an acceptable Plan. Specific concerns include: absence of inspection, monitoring and reporting requirements; potential runoff from the lime mud storage area; potential runoff from unusable material which is to be stockpiled on the north end of the SK site; and apparently inadequate size of the Yard Area Runoff Pond.

SK Conversion to Recycled Paperboard - SK is planning to convert their facilities to accommodate recycled paperboard, replacing wood as a raw material in their operations. SK conversion to recycled paperboard will significantly reduce the SK waste flow and will change the characteristics of the combined SK/CBCP effluent from that which has presently been provided in the SCA. Re-evaluation of the waste flow is needed in the FEIS. In addition, it is unclear whether or not wood wastes will be burned at CBCP after conversion to recycled paperboard. This could affect air quality evaluations. Clarification is needed in the Final EIS.

Toxicity of CBCP Waste Stream - Some agreement will have to be established between AES-CB and SK as to how resolution of future toxicity problems will be effected, should they occur, if CBCP wastes discharge into the SK system prove to be more toxic than presently anticipated and result in the SK effluent being acutely toxic. Present evaluation indicates that additional treatment and/or dilution in the SK treatment system may render the combined waste not acutely toxic. However, the SK manufacturing process is being modified and dilution flow will decrease in the future. SK is (and will remain) subject to toxicity monitoring of the total effluent exiting its treatment system. In addition, facilities at SK (some of which may have been in operation for 10 to 20 years or more) may be approaching useful life expectancy. EPA has no assurance that SK will be in operation over the useful lifetime of the CBCP. Assurances on these points prior to the FEIS issuance are desirable.

Waste Effluent Treatment Systems - Details on treatment systems proposed for dewatering wastes and metal cleaning wastes (both chemical and nonchemical) have not been provided by AES-CB and therefore cannot be evaluated to determine if adequate treatment can be provided to meet NPDES requirements. A thorough description of these treatment systems is needed prior to FEIS issuance.

Groundwater - SJRWMD required AES-CB to use the USGS groundwater flow and transport models to perform a hydrologic investigation to determine the impacts of the proposed withdrawals on existing legal users and the impacts to the groundwater resources itself. Concerns related to the limitations of this modeling effort include the following: 1) large grid size used may have masked significant localized effects; 2) normal faults neglected in the model could possibly, on a smaller scale, allow chloride contamination to increase in the upper water bearing zone; 3) apparently existing pumpage rates were used rather than full permitted pumpage rates for the existing permitted uses; and 4) assumption of constant head boundary conditions could bias the piezometric head in the upper water bearing zone. It is recommended that sensitivity analyses be conducted to evaluate the effects of these concerns. Results of these analyses need to be included in the FEIS. In addition, if estimates of anticipated future applications for groundwater withdrawals are available, it is recommended that this information be included in the analysis described above.

CHAPTER 7
LIST OF PREPARERS

7.0 LIST OF PREPARERS

7.1 US ENVIRONMENTAL PROTECTION AGENCY, REGION IV

Heinz Meuller	Chief, Environmental Policy Section Federal Activities Branch
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Charles H. Kaplan, P.E.	NPDES Permit Coordinator National Expert, Steam Electric/Water
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7.2 FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

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Barry Andrews	Division of Air Resources Management
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Bob Leetch	Northeast Florida District Office
Frank Watkins	Northeast Florida District Office
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7.3 GANNETT FLEMING, INC.

Thomas M. Rachford, P.E., Ph.D.	Program Manager
Marintha K. Bower, P.E.	Project Director
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John Vaklyes, P.E.	Air Quality Specialist
Katherine Rothdeutsch	Land Use Planner
Mark Mummert, Ph.D.	Water Resource Specialist

CHAPTER 8
PUBLIC PARTICIPATION AND COORDINATION EFFORTS

8.0 PUBLIC PARTICIPATION AND COORDINATION EFFORTS

8.1 PUBLIC PARTICIPATION

In accordance with State and Federal regulations, USEPA and FDER have conducted a public participation program in conjunction with the preparation of this SAR/EIS. This program consists of: (1) an initial publicly announced scoping meeting of citizens and leaders from Jacksonville/Duval County and State and Federal government agencies at which the scope of the proposed SAR/EIS was discussed and the central issues identified; (2) institution of changes in the scope of the SAR/EIS which were identified as a result of the meeting; (3) a formal public hearing to present the results of the Draft SAR/EIS and receive public comments; (4) distribution of the DEIS for public review; and (5) publication of comments in the final SAR/EIS.

The public scoping meeting was held on January 24, 1989 at the San Mateo Elementary School in Jacksonville, Florida. Areas of concern which were identified at the time included:

- the need for producing power in Jacksonville that would be sold to FP&L for other areas of the State;
- impacts of coal conveyor proposed to be constructed across the Broward River below the Hecksher Street Bridge;
- impacts of increased truck and rail car traffic on transportation corridors;
- potential deterioration of water quality in the Broward River and the effect that it may have on recreational fishing;
- use of large volumes of high quality groundwater for cooling makeup water;
- disposal of the waste products that would be produced by plant operation, and of the lime sludge located on the plant site;
- impacts on the air quality around the Jacksonville area from plant emissions, especially SO_2, CO_2, NO_x, TRS, and particulates;
- potential for producing acid rain from emissions which in turn would slowly dissolve or deteriorate structures such as those made from coquina in Historic St. Augustine.

- impacts on wetlands particularly the possible violations of the objectives of the Conservation Coastal Management Element of the Comprehensive 2010 Plan prepared by the City of Jacksonville Planning Department (October 1988); and

- impacts on sound quality due to increased rail traffic and plant construction and operation.

At this meeting, representatives of USEPA and FDER also explained aspects of the Memorandum of Understaing between the two agencies and the purpose of coordinating the review efforts. The representatives identified the basic responsibilities of each agency. Other meetings have also been held regarding the proposed CBCP project. On February 14, 1989, a Land Use and Zoning Hearing was held. The Hearing Officer's recommendation of April 14, 1989, was that the application for Power Plant Site Certification be found in compliance with existing City of Jacksonville land use plans and zoning ordinances. The Florida Public Service Commission held a hearing on April 24 and 25, 1989 in Tallahasee regarding the need for the project. The Commission issued an order granting the determination of need on June 30, 1989. The State Certification Hearings were held in Jacksonville during the weeks of February 5 and 19, 1990. Through these mechanisms and continual day-to-day contact with local, State, and Federal officials as well as informed individuals, USEPA and FDER have consistently incorporated the public in this review process.

8.2 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS INCLUDED IN THE DRAFT/SAR/EIS REVIEW PROCESS

The comments of the following agencies and organizations are directly requested in the review of this project.

Federal Agencies

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Federal Highway Adminstration

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Department of the Interior

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National Park Service
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State Agencies

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Department of Adminstration

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Florida Department of Community Affairs

Bureau of State Planning
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Florida Department of State

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State Historic Preservation Officer

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Florida Game and Fresh Water Fish Commission

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Florida Public Service Commission

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Northeast Florida Regional Planning Council

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Private Interest Groups

Sierra Club, Power Plant Siting Committee, Florida Chapter
Sierra Club, Jacksonville Chapter
City of Jacksonville Chamber of Commerce
Duval Audubon Society, Inc.
City of Jacksonville Citizens Committee
City of Jacksonville Council

CHAPTER 9
BIBLIOGRAPHY

9.0 BIBLIOGRAPHY

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