United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta, GA 30365

EPA 904/9-93-001A
November 1993

Environmental Impact Statement

Final

Cedar Bay Cogeneration Project
Jacksonville, Florida

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

PUBLIC NOTICE

TO: ALL INTERESTED AGENCIES, PUBLIC GROUPS, AND CITIZENS

Availability of the Final Environmental Impact Statement (EIS) on the "Cedar Bay Cogeneration Project" is being noticed in the Federal Register on December 17, 1993, by the U.S. Environmental Protection Agency (EPA). The Final EIS is available for public/agency comment during a 30-day review period. Availability of the Draft EIS was previously noticed on June 8, 1990.

Cedar Bay Cogeneration, Inc. (CBC), proposes to operate a coal-fired power and steam producing facility known as the Cedar Bay Cogeneration Project currently under construction in Jacksonville, Florida. CBC applied to EPA for a minor National Pollutant Discharge Elimination System (NPDES) permit to discharge excess stormwater runoff from the site. This NPDES permit (Number FL0061204) was released on August 3, 1993, for public/agency comments during a 30-day comment period. EPA will accept comments on this permit again during the Final EIS review period.

Comments on the Final EIS and proposed NPDES permit should be provided to Heinz J. Mueller at the address given above. Comments should be in writing and must be postmarked on or before January 18, 1994. Facsimile transmittals are only acceptable if followed by a hard copy postmarked within the comment period.

The Final EIS and its Appendix (EPA 904/9-93-001 A and B) are available for review at the following locations in Jacksonville:
(1) Public Library, Main Branch, 122 N. Ocean Street;
(2) Highland Branch Public Library, 1826 Dunn Avenue; and
(3) San Mateo Elementary School, 600 Baisden Road.

A limited number of copies of the Final EIS are also available upon request from EPA at the aforementioned address. Or contact Marion Hopkins at 404/347-3776.

Following the 30-day comment period, EPA will consider comments on the Final EIS and proposed NPDES permit in making its decision on the issuance/non-issuance of the EPA final NPDES permit.

EPA
NPDES Application Number:
FL 0061204

Florida Power Plant Siting
Application Number:
778PA 88-25

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

to

Cedar Bay Cogeneration, Inc.
Cedar Bay Cogeneration Project

Prepared by:
U.S. Environmental Protection Agency Region IV

Cedar Bay Cogeneration, Inc. (CBC) proposes to operate a coal-fired power and steam producing facility known as the Cedar Bay Cogeneration Project (CBCP) currently under construction in Jacksonville, Florida. The CBCP will provide electricity for sale to Florida Power and Light Company and steam to the adjacent Seminole Kraft recycle mill. AES/Cedar Bay, Inc. (AES-CB) initially applied to the United States Environmental Protection Agency (EPA) and the Florida Department of Environmental Regulation (FDER, now the Florida Department of Environmental Protection) in November 1988 for permits necessary to operate the CBCP. Project ownership/ management changed in October 1992 from AES-CB to CBC.

A Draft Environmental Impact Statement (EIS) was prepared in May 1990 in conjunction with FDER. Since that time, numerous project design changes were made which will lessen the environmental impacts. The CBCP also received Site Certification from the Florida Power Plant Siting Board in May 1993. A National Pollutant Discharge Elimination System (NPDES) permit is required for stormwater discharges from the site. This Final EIS is the decision document for the NPDES permit.

Comments or inquiries should be directed to:

Heinz Mueller, Chief
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EPA, Region IV
345 Courtland St., N.E.
Atlanta, Georgia 30365
(404) 347-3776

Approved by:

Patrick M Tobin
Patrick M. Tobin
Acting Regional Administrator

November 18, 1993
Date

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

FINAL
ENVIRONMENTAL IMPACT STATEMENT

Cedar Bay Cogeneration Project

( ) Draft
(X) Final

US Environmental Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

1. TYPE OF ACTION

Administrative (X) Legislative ( )

2. DESCRIPTION OF ACTION

Cedar Bay Cogeneration, Inc. (CBC) proposes to operate a coal-fired power and steam producing facility known as the Cedar Bay Cogeneration Project (CBCP) currently under construction in Jacksonville, Florida. The CBCP will provide electricity for sale to Florida Power and Light Company and steam to the adjacent Seminole Kraft (SK) recycle mill. Steam supplied to the mill will allow SK to discontinue use of five old boilers.

AES/Cedar Bay, Inc. (AES-CB) initially applied to the United States Environmental Protection Agency (EPA) and the Florida Department of Environmental Regulation (FDER) (now the Florida Department of Environmental Protection) in November 1988 for permits necessary to operate the CBCP. Project ownership/management changed in October 1992 from AES-CB to CBC.

The CBCP received Site Certification from the Florida Power Plant Siting Board on May 11, 1993. Construction of the CBCP is nearing completion and commercial operation is expected to begin in December 1993.

On May 14, 1993, CBC applied to EPA for a permit to discharge overflows of stormwater runoff from the materials (eg., coal, limestone) storage area and yard area during facility operation. This permit is part of the Clean Water Act's (CWA's) National Pollutant Discharge Elimination System (NPDES) and is subject to New Source Performance Standards.

EPA must comply with the National Environmental Policy Act (NEPA) before issuance of this new source NPDES permit. This Environmental Impact Statement (EIS) is part of the NEPA process. A Draft EIS/State Analysis Report (EIS/SAR) was issued in May 1990 in conjunction with FDER.

EPA's action choices in this case are to issue, issue with conditions, or deny the new source NPDES permit. Issuance of the new source NPDES permit for the CBCP would allow CBC to discharge stormwater overflows to the Broward River up to the limits in the permit. Denial of the NPDES permit is the No Federal Action Alternative.

3. ALTERNATIVES

NEPA requires that an EIS describe project alternatives including (1) regulatory alternatives available to EPA, including the No Federal Action Alternative, and (2) project design alternatives considered by the applicant. Original project design alternatives were described in the Draft EIS/SAR.

This Final EIS presents the originally-proposed CBCP as an alternative for comparison with the CBCP as certified. The no-build scenario (the SK-only Alternative) was also considered.

Regulatory Alternatives

CBC has received all permits necessary to begin operation of the CBCP except an NPDES permit which is required for stormwater discharges from the site.

The alternatives available to EPA under Section 402 of the CWA are to issue, issue with conditions, or to deny the new source NPDES permit requested for the CBCP stormwater discharges due to high rainfall runoff. Denial of the NPDES permit would be the No Federal Action Alternative.

Issuance of the NPDES permit will allow CBC to discharge overflows to the Broward River up to the limits in the permit. The permit may be modified by certain conditions, such as additional monitoring and reporting, to evaluate the effectiveness of the pollution control systems.

EPA would deny the NPDES permit if the discharge was likely to violate water quality standards. Furthermore, EPA could deny the permit if environmental resources such as air quality, endangered species, archaeological or historic sites, wetlands, or floodplains would be significantly impacted by the project and measures proposed for mitigating the impacts are unacceptable.

AES Alternative (CBCP as originally proposed)

In 1988, AES-CB proposed to construct and operate the CBCP at the SK site. The project as originally proposed and project alternatives were described in the Draft EIS/SAR. Copies of this document are available on request (see inside cover). Since the Draft EIS/SAR was issued, the CBCP has undergone several changes in project design.

Some of the major elements of the originally proposed project which have since changed included: was to use up to 7 million gallons of groundwater per day for cooling; was to discharge several NPDES-regulated wastewater streams to the St. Johns and Broward Rivers (including construction dewatering, cooling tower blowdown, boiler blowdown, metal cleaning wastes); no control for nitrogen oxides (NO_x) or mercury was proposed other than proper boiler design and operation and fabric filtration; and possible construction of a coal conveyor across the Broward River.

Also, SK was to permanently shut down 5 antiquated boilers when CBCP came on line. SK also had plans to replace three old chemical recovery boilers with one large, state-of-the art, recovery boiler. Plans to convert to a recycle operation, which eliminated the need for recovery boilers altogether, were not revealed until mid-1990.

CBC Alternative (CBCP as certified)

Facility Description

The CBCP site is located approximately seven miles north-northeast of downtown Jacksonville in Duval County, Florida near the confluence of the Broward and St. Johns Rivers.

The site, which is at the corner of Eastport Road and Hecksher Drive, is owned by SK and historically was used for storage of lime mud from the mill. The Broward River forms the western boundary of the site.

The CBCP will consist of three circulating fluidized bed (CFB) boilers, a turbine driven electrical generator, steam pipelines to supply SK, mechanical draft cooling towers, coal handling facilities, coal and limestone storage facilities, ash storage and pelletizing facilities, stormwater runoff ponds, and a short transmission line to transfer the power from the plant to the power network system (substation is adjacent to SK site). The CBCP has been designed to blend in with the profile of the SK mill, with the exception of the exhaust stack which is much taller (425 feet).

Emission Offsets

Once the CBCP begins operation, SK is required to surrender operation permits on five antiquated boilers which are not subject to current air quality standards. Shut down of these boilers will significantly reduce emissions from the SK site. SK's conversion to a recycle facility eliminated their need for a new recovery boiler (a device used in pulp processes). This resulted in a shortfall in required steam supply. SK will install three new gas-fired power boilers to supply this steam. In accordance with the state Siting Board's Final Order, the CBCP plus the SK package boilers will have fewer environmental impacts than those associated with the SK recycling operation without the CBCP. This will be the case for air emissions as well as for water resources. Elimination of the three old recovery boilers also eliminated the need for SK's once-through cooling system, reducing impacts on the Broward and St. Johns Rivers (e.g., impingement/ entrainment of aquatic organisms at the intake, thermal dishcarge).

Materials Handling

The CBCP is permitted to burn a total of 1.17 million tons of eastern Kentucky coal per year. The coal will be delivered by train. There will be a maximum of one 90-car train every three days. Limestone will be used during boiler operation to control sulfur emissions. Limestone will be delivered to the site by truck via the Blount Island barge terminal. These materials will be stored on a lined storage area on site. Bed and fly ash from boiler operation will be pelletized on site and stored in silos.

Air Emission Controls

The CBCP boilers are designed to control emissions of the major criteria pollutants, namely sulfur oxides, nitrogen oxides, carbon monoxide, volatile organic compounds, particulates and other trace pollutants. The state Conditions of Certification place limits on these emissions and specify monitoring requirements.

Many air emissions are controlled within the combustion chamber by limestone injection and efficient combustion. Particulates from the boilers will be controlled by a fabric filter system (baghouse). Sulfur and acid gases are removed during combustion by the absorbent limestone. Also, CBC will use coal with a low sulfur content (1.2% by weight on an annual basis). Nitrogen oxides will be controlled by a selective non-catalytic reduction process (injection of ammonia).

A carbon injection system designed to remove mercury vapor will be placed on one boiler for testing. Test results will be examined by FDER. Mercury emissions from power plants are typically controlled by fabric filters.

Drift eliminators will control cooling tower drift. Particulates from materials handling operations will be controlled by various methods including: enclosed conveyance lines, enclosed handling areas, fabric filters, and wet suppression techniques. Emissions from the limestone dryers are limited by the state Conditions of Certification.

Water Systems

The CBCP requires water for several plant processes. The primary water demand is for cooling purposes. A smaller amount of high quality water is required for boiler makeup, plant service, and potable water. The CBCP will employ a zero-discharge system that will eliminate all process wastewater discharges. All wastewater streams will be reused or recycled within the system.

The primary external source of water for the CBCP will be reuse of treated process wastewater from the SK mill. The other external sources will be the existing SK wells, which will supply a daily maximum of 1.45 million gallons of groundwater from the Floridan aquifer, and potable water from SK. Other water demands will be met by recycling internal wastewater steams.

CBC will minimize the use of fresh water, primarily relying on SK wastewater to meet cooling needs. Water discharges will be eliminated with a zero-discharge water treatment system, except for stormwater runoff in an extreme storm event. All process wastewater and collected stormwater will be internally recycled, treated for reuse or processed in the zero-discharge post treatment system. Also, note that the CBCP will recycle some treated water back to SK for use in their cooling tower, reducing SK's demand for groundwater.

Groundwater will be used at the CBCP for boiler makeup, service water, fire protection, metal cleaning, and potable water. These uses require a high quality water to prevent scaling and corrosion in the storage and distribution systems.

Water Treatment System

The cooling water pretreatment system consists of a premix tank, a combination clarifier/sludge thickener, chemical storage and feed equipment, and a sludge dewatering system. The system will be operated to provide a softened effluent suitable for use in the cooling towers.

The cooling tower blowdown zero discharge handling system is designed to maximize reuse of process water as cooling tower makeup. This post treatment system consists of clarification and softening, filtration, reverse osmosis, evaporation and crystallization.

Stormwater Management

Site stormwater runoff will be collected and conveyed to one of two on-site retention ponds. Runoff from the materials storage area will be collected in a common sump and discharged to a lined Storage Area Runoff Pond. Runoff from the yard and power block areas will be collected and conveyed via gravity flow to the Yard Area Runoff Pond. Stormwater retained in the ponds will be pumped to the CBCP treatment system for reuse as cooling tower makeup. The ponds are designed to hold runoff from a 50-year, 24-hour storm event. In severe storm events, there is a possibility of discharge of contaminated runoff.

Solid Waste Handling and Disposal

Construction activities resulted in the relocation of lime mud which had been stored on site. The lime mud was moved to a storage area on the SK site, covered with a geomembrane cap and seeded earth cover. The cap inhibits rainfall infiltration from leaching contaminants into the groundwater.

Solid waste generated by operation of the CBCP will consist of fly ash, bed ash, and sludge. The ash will be pelletized and loaded onto those rail cars used to deliver the coal to the site. The ash will be disposed of near the Kentucky mine site. The zero-water discharge facility will create an average 80 tons per day of sludge wastes. The sludge will be sent to a recycling facility or a licensed landfill.

SK-only Alternative

This alternative assumes that SK would operate as a recycling facility with its existing oil and bark fired boilers. This scenario also assumes that the CBCP would not have been constructed.

4. SUMMARY AND COMPARISON OF THE MAJOR ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT AND THE ALTERNATIVES

Construction-Related Impacts (AES and CBC Alternatives)

Emissions from construction of the CBCP result from activities common to most large construction projects, such as excavation, material hauling and handling. Use of standard control measures should minimize air quality impacts.

The AES Alternative was to have two discharges during construction: stormwater runoff and groundwater dewatering (pumping out excavations to keep them dry). Dewatered groundwater was to have been discharged directly to the St. Johns River. Because of existing contamination on the site, this discharge could have caused adverse impacts to surface water. Dewatering also could have caused migration of petroleum from leaking underground storage tanks on the SK site (mitigation was proposed). These impacts were avoided because dewatering was eliminated from project design. Stormwater is the only discharge expected from the CBC Alternative. Adherence to the approved erosion and sedimentation control plan should result in minimal impacts to surface water.

The original project proposal (AES Alternative) included construction of a coal conveyor across the Broward River to bring coal in by barge. Impacts of this conveyance structure would have included river traffic impedance, disturbance of potentially contaminated sediments with subsequent impacts to local aquatic ecology, and potential for coal spillage. The coal conveyor is not part of the CBC Alternative as coal will be brought to the site by rail.

As the CBCP construction area originally contained poor quality wildlife habitat due to past SK activities, impacts were minimal. Construction of a rail spur was to disturb a gopher tortoise habitat. Both the AES and CBC Alternatives included mitigation, through relocation, of the species. As originally proposed (AES Alternative), the rail spur may have also impacted a small wetland on site; the CBC Alternative avoided the wetland.

Relocation and capping of lime mud to another part of the SK site has prevented stormwater infiltration of the mud. This mitigative measure prevents contamination of the shallow aquifer which drains directly to adjacent surface waters. Therefore, construction of the CBCP may provide greater protection to aquatic biota.

Noise levels from construction activities such as site preparation, concrete paving, equipment installation have been in compliance with local ordinances at residential areas (less than 65 decibels). With mitigation, intrusive single-event noise levels (e.g., pile drivers and steam blow-out cleaning) which have occurred have also been in compliance with these ordinances.

Traffic counts indicated that all signalized locations and roadways in the area operate at the standard minimum acceptable level and have additional available capacity. Local traffic patterns are not expected to experience any substantial problems because of construction. The height of the flue gas stack is 425 feet, but no impacts on air traffic are anticipated because a non-directional radio beacon was installed on site.

Operation-Related Impacts

Operation-related impacts on air quality would be due to materials handling and release of combustion products. Fugitive dust from materials handling operations will be minimized through standard mitigative measures.

A thorough analysis of air quality impacts showed that the CBCP as certified (CBC Alternative) will have fewer total impacts on air quality than the AES or SK-only Alternatives. Expected emissions of SK's three new gas-fired boilers were included in the CBC Alternative air quality analysis. The CBCP will be in compliance with ambient air quality standards. Maximum predicted impacts (due to the limestone dryers) will occur on the CBCP site.

The CBCP will emit a significant amount of carbon dioxide, a "greenhouse gas" of concern. AES-CB originally announced plans to provide some offsets to these greenhouse gas emissions (probably through afforestation). This commitment made by former applicant AES-CB does not obligate CBC (current applicant).

A human health risk assessment on the combustion product emissions showed that operation of the CBCP (as certified) should not pose significant health effects on the local population. The highest estimated risk of cancer (less than 1 chance in 100,000) would occur in the nearest residential area (Cedar Bay Road). Compared with the AES and SK-only Alternatives, the CBC Alternative will have the least impact on human health. An ecological risk assessment on the combustion product emissions also showed that the CBCP should not pose a significant threat to ecological resources.

Operation of the CBCP as originally proposed (AES Alternative) would have included several discharges to adjacent surface waters. The SK-only Alternative (no CBCP) would have continued to discharge process wastewater and runoff from the lime mud area (eliminated by CBCP construction). The CBC Alternative (as certified) will have fewer surface water impacts than either the AES or SK-only Alternatives. The CBCP water system will use SK wastewater and internal wastewater streams, thereby reducing SK's existing discharge. The only discharge from the CBC Alternative will be infrequent stormwater discharges from the yard and storage areas.

Groundwater impacts of the CBC Alternative are greatly reduced from the AES Alternative which was proposed to use groundwater for cooling water makeup. The maximum permitted withdrawal of 1.45 MGD of groundwater from the Floridan aquifer is not expected to have any adverse impacts on groundwater quantity or quality. Relocation and capping of the lime mud has improved groundwater quality on site.

Potential operational noise impacts include the CBCP boilers, steam turbine driven electrical generator, cooling towers, water treatment system, ash pelletizer, limestone and coal crushers, and unloading activities. It is likely that the CBCP will be audible to Cedar Bay Road residents; however, the increase in noise levels from existing levels will be small and within compliance with local ordinances. The applicant will monitor noise levels as the CBCP begins operation to determine actual compliance and will mitigate problems if necessary.

Operational impacts to geologic resources will occur primarily from mineral extraction (i.e., coal and limestone), and waste disposal. Impacts of mineral extraction should be minimized if suppliers comply with state and/or federal mining and reclamation regulations. Both CBC and AES Alternatives would involve disposal of ash pellets. Unless another use can be found for them, the ash pellets will be returned to the coal supplier (in Kentucky) in the railcars delivering coal to the site. The pellets will be disposed of at a site close to the mining operations. If landfilled, the material would take up between five and six acres of capacity over the 30 year life of the CBCP (assuming a 30 foot landfill depth). The CBC Alternative will produce more solid waste than the AES Alternative because of the sludge and solids from the water treatment system. These wastes will average 80 tons per day and will be sent to a recycling facility and/or to a permitted non-hazardous landfill.

Additional train traffic during operation may cause temporary access problems to communities at road crossings. This impact will be reduced by scheduling of trains during off-peak traffic hours. Train traffic is not expected to limit emergency vehicle accessibility to affected communities.

5. EPA'S RECOMMENDATION

Based on the environmental review of the CBCP, EPA finds that environmental impacts of the CBCP, with proposed mitigation, will be minimized. Furthermore, the CBCP as certified by the state is preferable to the project as it was originally proposed (AES Alternative) and to the SK-only Alternative (no CBCP).

The CBCP has gone through the state's Site Certification process and, after several modifications, has received Certification from the Siting Board. Most modifications have been improvements to project design that lessen environmental impacts. It should also be noted that, historically, the site has been used for industrial activities. The site is zoned for heavy industrial use (IH).

Environmental improvements offered by the CBCP include:

- The CBCP will produce steam for the SK mill, allowing for removal of old boilers. This will reduce existing ambient air quality impacts.

- Relocation and capping of SK lime mud has improved groundwater and surface water quality at the site.

- The CBCP zero discharge system will make use of SK and internal wastewaters, reducing the existing SK discharge to the St. Johns River. Stormwater runoff will be the only potential discharge. This discharge is expected to happen only in high rainfall events; otherwise the collected stormwater will be treated and used in the CBCP water system.

- The CBCP will provide cooling water to SK, reducing SK's existing groundwater withdrawals.

Unavoidable adverse environmental impacts of the project include: impacts of coal and limestone extraction; disposal of solid wastes; increased rail traffic and noise; and contribution to global climate change.

EPA proposes to issue the NPDES permit for the CBCP. Permit issuance would allow stormwater overflow discharges to the Broward River up to the limits specified in the permit. All proposed limitations of the draft NPDES permit are tentative and subject to comment from all reviewers during the public comment period.

If EPA were to deny the NPDES permit (No Federal Action), the applicant could still operate the CBCP if confident that no discharges would occur. The CBCP is considered a zero discharge facility with the infrequent possibility of a stormwater discharge. Without an NPDES permit, any discharge from the site would be considered a violation of the Clean Water Act.

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LIST OF ACRONYMS AND ABBREVIATIONS

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
BESD	The Bio-Environmental Services Department for the City of Jacksonville (now the Regulatory/Environmental Services Department)
BMP	Best Management Practices
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
CBC	Cedar Bay Cogeneration, Inc.
CBCP	Cedar Bay Cogeneration Project
CCA	Chromated Copper Arsenate
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
CSX	Classic System Express
CWA	Clean Water Act
dBA	Decibels (A-weighted)
DNL	Day-night average sound level
DOAH	The Florida Division of Administrative Hearings

ECFRPC	The Eastern Central Florida Regional Planning Commission
EHS	Extremely Hazardous Substance
EID	Environmental Information Document
EIS	Environmental Impact Statement
EIS/SAR	Environmental Impact Statement/State Analysis Report
EPA	U.S. Environmental Protection Agency
EPRI	The Electrical Power Research Institute
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 Coordination Group
FCREPA	The Florida Committee on Rare & Endangered Plants & Animals
FDA	The Florida Department of Agriculture
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
FDS DHR	The Florida Department of State, Division of Historical Resources
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 Siting Act)
FERC	The Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
FGFWFC	The Florida Game and Fresh Water Fish Commission
FGT	Florida Gas Transmission
FICON	Federal Interagency committee on Noise
Fl	Fluoride
FPC	The Florida Power Corporation
FPL	The Florida Power & Light Company
FPS	Feet per second
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
gpd	Gallons per day
gpm	Gallons per minute
gr/dscf	Grains per dry standard cubic foot of air
GU	Government Use
GWh	Gigawatts - hours = one billion watt-hours

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

HC	Hydrocarbons
HCl	Hydrochloric acid
Hg	Mercury
HRSG	Heat recovery steam generators
H_2SO_4	Sulfuric Acid
HUD	U.S. Department of Housing and Urban Development
IH	Industrial Heavy Zone
ISCST	Industrial Source Complex Short Term (air pollutant dispersion model)
IW	Industrial Waterfront Zone
IWTP	Industrial Wastewater Treatment Plant
IWTS	Industrial Wastewater Treatment System
JAPB	The Jacksonville Area Planning Board
JEA	The Jacksonville Electric Authority
JEPB	Jacksonville Environmental Protection Board
JPD	The Jacksonville Planning & Development Department
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
Ldn	Day-night average sound level
Leq	Equivalent sound level over 24-hour periods (time weighted average)
LWBZ	Lower water bearing zone, refers to the Oldsmar Limestone Stratigraphic Unit of the Floridan Aquifer System
Mcf/d	Million cubic feet per day
MGD	Million gallons per day
mg/l	Milligrams per liter (~ parts per million)
mg/m^3	Milligrams per cubic meter
Mo	Molybdenum
MW	Megawatts
MWBZ	Middle Water Bearing Zone, refers to the Ocala Group Stratigraphic Unit of the Floridan Aquifer System
MWh	Megawatt hour = one million watt-hours

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

NAA	Non-Attainment Area
NAAQS	National Ambient Air Quality Standards
NaCl	Sodium Chloride
NaOH	Sodium Hydroxide
NCA	Noise Control Act
NDP	North District Plan
NEA	National Energy Act of 1978
NEPA	National Environmental Policy Act of 1969
NERC	The National Electric Reliability Council
NGVD	National Geodetic Vertical Datum
NO_x	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollution Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
OR	Open Rural
OSN	NPDES Outfall Serial Number
Pb	Lead
pCi/l	Piccauries per liter
PG&E	Pacific Gas & Electric Company
PM	Particulate Matter
PM 10	Particulate Matter Less Than 10 Micrometers in Diameter
POD	Point of Discharge
ppm	Parts per million ($\simeq$ milligrams per liter)
PPSA	Florida Electrical Power Plant Siting Act
PSC	Florida Power Service Commission
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
psig	Pounds per square inch gauge
PURPA	Public Utility Regulatory Policies Act of 1978
RDF	Refuse Derived Fuel
RESD	The City of Jacksonville Regulatory/Environmental Services Department
RO	Recommended Order
ROD	Record of Decision

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

SAR	State Analysis Report
SARP	Storage Area Runoff Pond
SCA/EID	Site Certification Application/Environmental Information Document prepared by AES-CB
SCL	Seaboard Coast Line
SCR	Selective Catalytic Reduction
SERC	Southeastern Electric Reliability Council
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
Siting Act	Florida Electrical Power Plant Siting Act (see FEPPSA)
SJRPP	The St. Johns River Power Park
SJRWMD	The St. Johns River Water Management District
SK	The Seminole-Kraft Corporation
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SOU	The Southern Company
tcf	Trillion Cubic Feet
TDS	Total Dissolved Solids
TPY	Tons per year
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
USGen	U.S. Generating Company
USGS	The U.S. Geological Survey
USSCS	The U.S. Department of Agriculture Soil Conservation Service
UWBZ	Upper water bearing zone, refers to the Ocala Group Stratigraphic Unit of the Floridan Aquifer System
VOC	Volatile Organic Compounds
WTP	Wastewater Treatment Plant
YARP	Yard Area Runoff Pond

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Cedar Bay Cogeneration, Inc. (CBC) proposes to operate a coal-fired power and steam producing facility known as the Cedar Bay Cogeneration Project (CBCP) currently under construction in Jacksonville, Florida. The CBCP will provide electricity for sale to Florida Power and Light Company (FPL) and steam to the adjacent Seminole Kraft (SK) recycle mill. AES/Cedar Bay, Inc. (AES-CB) initially applied to the United States Environmental Protection Agency (EPA) and the Florida Department of Environmental Regulation (FDER) (now the Florida Department for Environmental Protection) in November, 1988, for permits necessary to operate the CBCP. Project ownership/management changed in October, 1992, from AES-CB to CBC.

CBC has applied to EPA for a permit to discharge overflows of stormwater runoff from the materials (eg., coal, limestone) storage area and yard area during facility operation. This permit is part of the Clean Water Act's (CWA's) National Pollutant Discharge Elimination System (NPDES). The CBCP NPDES permit is considered a "new source" permit because the discharge is subject to New Source Performance Standards (see Section 1.2.1). EPA administers the NPDES permit program in Florida.

EPA must comply with the National Environmental Policy Act (NEPA) before issuance of a new source NPDES permit. This Environmental Impact Statement (EIS) was prepared as part of the NEPA process.

A Draft EIS/State Analysis Report (EIS/SAR) was issued by EPA and FDER in June 1990 (Executive Summary included in Appendix C). At that time, the CBCP was designed to discharge various NPDES-regulated construction and operational wastewaters. Since then, the applicant modified the project design to eliminate all discharges except stormwater overflows.

The Florida Power Plant Siting Board granted Site Certification to the CBCP on May 11, 1993 (Appendix B). On May 14, 1993, the applicant withdrew the obsolete NPDES permit application for process wastewaters; they then submitted a new NPDES permit application to EPA for stormwater discharges during CBCP operations. The new permit application reactivated EPA's NEPA process and, as part of the NEPA process, this Final EIS was prepared.

At this time, EPA's decision is whether to issue, issue with conditions, or deny the new source NPDES permit. This Final EIS will serve as a tool in EPA's decision-making process.

Permit issuance would allow stormwater overflow discharges to the Broward River up to the limits specified in the permit. Denial of the NPDES permit would be the No Federal Action Alternative.

AES-CB began construction of the CBCP in June 1991 before receiving all required permits. Except for the NPDES permit for stormwater, the applicant has now received all permits necessary for operation of the facility for which construction is nearly complete.

The CBCP received conditional Site Certification from the state Siting Board in February, 1991, the principal condition being that AES-CB was prohibited from using groundwater for cooling purposes. The applicant was required to submit project modifications for FDER and EPA approval before operating the facility. Nevertheless, the Siting Board's action provided the state approval necessary for construction.

The state also issued a permit for air pollution emissions, with EPA concurrence, in March, 1991 (Appendix D). This permit, which is not subject to NEPA requirements, limits air emissions from the CBCP and also requires the permanent shutdown of five antiquated boilers at the SK facility.

Another change which enabled the applicant to proceed with construction before final project approval was the elimination of a "dewatering" discharge. (Dewatering involves pumping groundwater out of an excavation to keep it dry during construction.) Elimination of this discharge made unnecessary an EPA new source NPDES permit, and therefore completion of the NEPA process, for construction activities. The CBCP did require an NPDES permit for discharge of construction-related stormwater (Appendix H); however, this permit is exempt from NEPA requirements.

Subsequent changes to the project, including lower air emissions, use of SK and CBCP wastewater for cooling, and a zero discharge system, led the Siting Board to grant final Site Certification on May 11, 1993. In the zero discharge system, the only potential discharge is stormwater overflows from the Yard Area Runoff Pond and the Materials Storage Area Runoff Pond. This implied that a only a stormwater NPDES permit, similar to that for construction-related runoff, was needed and thus exempt from NEPA.

However, based on the permit application submitted on May 14, 1993, EPA determined that the stormwater discharge is a new source. The runoff from the coal pile will contain contaminants that are subject to New Source Performance Standards. This new source permit action, as mentioned above, reactivated the NEPA process (For more information, the reader is referred to Section 1.3, History of the CBCP, Section 1.2.1. EPA Responsibilities, and Appendix A)

EPA proposes to issue the NPDES permit for the CBCP. All proposed limitations of the draft NPDES permit are tentative and subject to comment from all reviewers during the public comment period. A copy of the NPDES permit (No. FL0061204) is in Appendix A.

1.1 THE CEDAR BAY COGENERATION PROJECT

1.1.1 Purpose and Need of Project

The CBCP will produce up to 380,000 pounds per hour of steam for the adjacent SK recycle mill and up to 250 megawatts (MW) of electricity for sale to FPL.

The CBCP-produced steam will allow SK to shutdown five antiquated boilers (3 oil-fired, 2 bark-fired) that currently power their operations. These boilers are not subject to stringent air quality standards because they were installed before the standards were issued. When SK converted to a recycling operation in summer 1992, they eliminated three recovery boilers that provided additional steam. SK will install three new gas-fired boilers to make up for this loss. With the three new boilers and CBCP operation, elimination of the five old boilers will result in a net reduction in most air pollutant emissions.

Elimination of the five old boilers will also eliminate current SK withdrawals from the Broward River for once-through cooling water. The new SK gas-fired boilers will be cooled with water from the CBCP "zero-discharge" system which uses recycled water (see Section 2.3.3.4, Water Systems).

Based on power supply planning, FPL has identified a need for additional capacity resources. FPL experienced an average annual compound growth in summer peak demand of approximately 4.0 percent from 1978 through 1988. Furthermore, demands within the FPL service territory were projected to grow at a rate of approximately 2.4 percent per year over the next 20 years (1988 - 2008). According to FPL, this growth in electric power demand is primarily the result of population growth within FPL service territory (EPA, 1991).

FPL means for meeting power demand include alternatives such as construction (by FPL) of new generating facilities, conservation, interruptible load, residential load control, purchasing power from other utilities, and purchasing power from "qualifying" cogeneration facilities. Qualifying facilities are defined by the Public Utility Regulatory Policies Act of 1978 (PURPA).

The Florida Public Service Commission (FPSC) is the regulatory authority that makes the determination of need for a new steam electric generating facility in Florida. 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 cogeneration facility as defined in PURPA guidelines. AES-CB had negotiated a contract with FPL for the sale of capacity and energy at less than the statewide avoided cost; therefore FPSC determined the CBCP to be a cost-effective alternative. Avoided cost is the energy and capacity costs that a utility avoids by purchasing power from a cogenerator.

On October 23, 1990, the FPSC granted approval of an Amended Cogeneration Agreement between FPL and AES-CB in the FPSC Order No. 23651. The Amended Contract allows for the sale of additional electricity to FPL available as a result of SK's conversion to a recycling operation. The Order states, "Since the language in the amended agreement allows for a range of committed capacity, just like the original agreement, we find that the amended agreement is consistent with the determination of need granted by this Commission pursuant to Order No. 21491."

The FPSC issued Order No. 23907 on December 20, 1990 in response to an FPL petition on Order No. 21491. The petition disputed the correctness of certain statements in the Order concerning the standard of comparison for negotiated contracts for the sale of firm capacity and energy. See Appendix E.

1.1.2 Project Location

The CBCP site is located approximately seven miles north-northeast of downtown Jacksonville in Duval County, Florida near the confluence of the Broward and St. Johns Rivers (Figures 1-1 and 1-2). The CBCP will be situated adjacent to their steam customer, SK. SK owns a 425-acre site at the intersection of Hecksher Drive and Eastport Road. Hecksher Drive is the southern boundary of the SK site; Eastport Road bisects the SK property from north to south. The Broward River forms the western boundary of the SK/CBCP site.

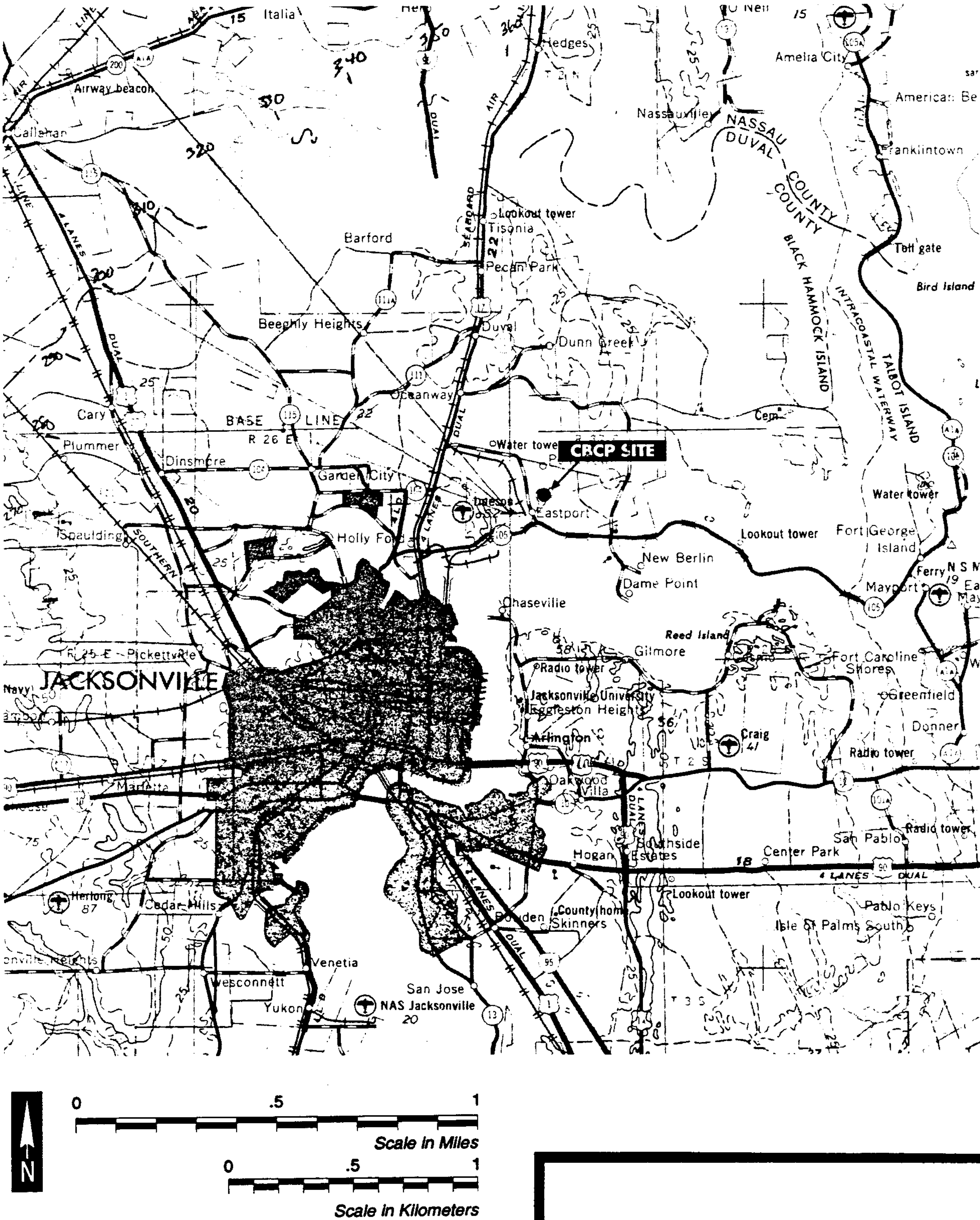


FIGURE 1-1

SITE LOCATION

Cedar Bay Cogeneration Project

SOURCE: ENSR

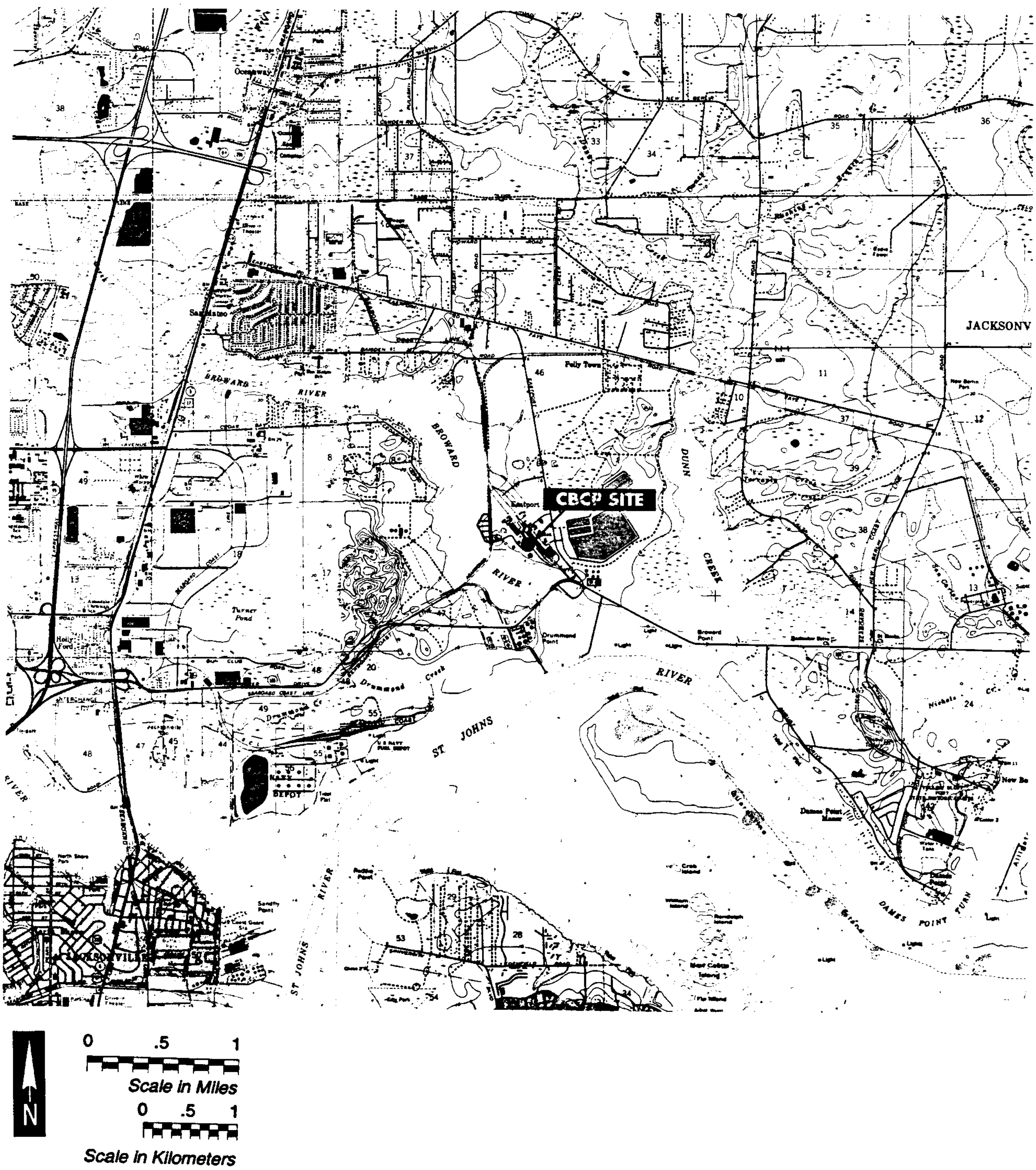


FIGURE 1-2

SITE VICINITY

Cedar Bay Cogeneration Project

SOURCE: ENSR

The CBCP site will occupy approximately 35 acres of SK property and is located west of the SK mill, east of the Broward River. The area occupied by CBCP was formerly used for storage of construction debris and lime mud from the mill. A rail yard is located to the north and west of the CBCP site.

1.1.3 Identification of Applicants

The proposed project is a joint venture between CBC and SK. CBC is the lead applicant for the necessary permits.

1.1.3.1 Cedar Bay Generating Company, Limited Partnership

Cedar Bay Generating Company, Limited Partnership is a Delaware limited partnership that owns one hundred percent (100%) of the CBCP. CBC is the permit holder for the project. It is also a general partner for Cedar Bay Generating Company, Limited Partnership.

The general partners of CBC are wholly-owned subsidiaries of Pacific Gas and Electric Company (PG&E) and the Bechtel Group. Other CBCP participants have certain ownership interest in these wholly-owned subsidiaries. U.S. Generating Company (USGen), a California general partnership also comprised of wholly-owned subsidiaries of PG&E and the Bechtel Group, manages the construction and operation of the CBCP.

In addition to CBCP, USGen manages the development, construction and operation of a number of other power generation projects for other limited partnerships created by wholly-owned subsidiaries of PG&E and the Bechtel Group. Currently, USGen has other projects either in operation or construction in Pennsylvania, New Jersey, New York, Montana, and Massachusetts that total more than 1,500 MW.

1.1.3.2 Seminole Kraft Corporation

SK is a privately held corporation which owns and operates the SK mill. St. Regis' Jacksonville Kraft Mill was built in 1952 at Hecksher Drive and Eastport Road. The mill, which produced liner-board and kraft paperboard, ceased operation in 1985. SK purchased the facility, rehabilitated it, and reopened it in 1987. The SK paper mill continued to produce unbleached liner-board and kraft paper from wood.

Stone Container Corporation, which owns 80 percent of SK common stock, has management responsibility for the mill and buys all the mill's output. The mill currently employs approximately 350 people.

SK initiated conversion of their kraft operation in the summer of 1992 to a 100% waste paperboard recycle operation. This new process produces unbleached liner-board from old corrugated containers. The post-conversion production rate of product output is to remain at the present level of 1,700 tons per day of liner-board.

1.1.4 Description of Project

The Cedar Bay Cogeneration Project is a 250-megawatt (MW), coal-fueled cogeneration plant, producing two forms of energy: electricity and steam. It will provide electricity--enough for about 190,000 homes--to Florida Power and Light Company, and steam, approximately 380,000 lb/hr, to Seminole Kraft Corporation's adjacent recycled linerboard plant. CBCP will be fueled by low-sulfur coal. It will have three circulating fluidized-bed (CFB) boilers. A "fluidized-bed" is a suspension of crushed limestone and coal in a flow of hot air. The limestone strips the sulfur from the coal during combustion, minimizing sulfur emissions. CBCP will use selective non-catalytic reduction (SNCR) to reduce nitrogen oxides (NO_x). The SNCR process introduces an ammonia and water solution into the exhaust stream, reducing NO_x emissions. CBCP will use SK wastewater for cooling and plant make-up. A zero-discharge water treatment system will recycle wastewater internally, eliminating any wastewater discharges to the Broward/St. Johns Rivers. CBCP has also implemented a variety of measures, including retention ponds and an emergency storage tank, to allow stormwater runoff only in the event of an extreme storm event (50 year/24 hour rainfall).

1.1.5 Permits Required

The Federal Energy Regulatory Commission (FERC) has granted a Certification to CBCP as a Qualifying Facility under PURPA and the Florida Power Service Commission (PSC) has determined a Need for Power (Appendix E). In order to construct the Project, CBC has had to address permit requirements at the Federal, State, and local levels. In the State of Florida, under the Florida Electrical Power Plant Siting Act (PPSA, Chapter 403.501-519, Florida Statutes), CBCP has received a site certification from the State DER that encompasses the majority of permits required to begin construction (see Section 1.2.2), including a PSD permit for air emissions (Appendix D). At the Federal level, FAA has granted a Stack Height Waiver (Appendix F). EPA has issued a NPDES permit to cover water discharges during construction

(Appendix H). A NPDES permit for operations (Appendix A) is pending upon the successful completion of this EIS.

1.2 ROLE OF FEDERAL AND STATE AGENCIES

1.2.1 EPA Responsibilities

1.2.1.1 NPDES Permit

The 1972 amendments to the Federal Water Pollution Control Act, called the CWA (Title 33 of the United States Code, Part 1251 et seq.), created the NPDES. This system requires that any discharger of pollutants to the waters of the United States obtain a permit. The NPDES permit, the basic enforcement tool for water pollutant abatement under federal law, imposes legally enforceable limitations on the discharger. Once the permit is issued, the discharger is legally bound to meet its requirements. Any permit violation is subject to criminal and civil penalties. EPA administers the NPDES permit program in Florida.

The CWA and associated regulations created three kinds of NPDES permits: existing dischargers, new sources, and new dischargers. Existing dischargers are parties who were dischargers of pollutants to waters of the United States before enactment of the NPDES program. New sources are dischargers who initiate construction of a facility after EPA has developed New Source Performance Standards (NSPS) for that particular industry. A new discharger is a discharger who initiated construction of a discharging facility after the NPDES permit program was initiated but before the issuance of the applicable NSPS.

NSPS have been issued for the steam electric generating industry at Title 40 of the Code of Federal Regulations, Part 423.15 (written 40 CFR 423.15). The CBCP is determined to be a new source covered by these NSPS. New source NPDES permits are subject to NEPA requirements (see Section 1.2.1.2 EIS, below).

An NPDES permit sets limits on pollutants that could be generated by the permitted activity. The permit may also contain monitoring and reporting conditions that help evaluate the effectiveness of the pollution control systems. Only conditions related to water quality may be added to the NPDES permit.

If it is determined that a proposed discharge will not be in compliance with NSPS or water quality standards, EPA would deny the NPDES permit. Furthermore, EPA could deny the permit if environmental resources such as air quality, endangered species, or wetlands are significantly impacted and measures proposed for mitigating the impacts are unacceptable.

If the permit is denied by EPA, an applicant would have the options of legally disputing the determination; redesigning the project to respond to stated deficiencies and resubmitting the application; locating and evaluating another site; redesigning the project to eliminate water discharges and the consequent need for the NPDES permit; or discontinuing their permit request.

The applicant has received all permits necessary to begin operation of the CBCP except a new source NPDES permit which is required for stormwater discharges from the site during plant operation. The CBCP is a zero discharge facility with the potential to discharge stormwater runoff in a high rainfall event. Thus, the applicant may operate the facility without the NPDES permit if confident no discharges will occur. However, any discharge of wastewater or runoff from the site would be a violation of the CWA.

Issuance of the new source NPDES permit for the CBCP would allow for stormwater overflows discharges to the Broward River up to the limits in the permit. EPA proposes to issue the NPDES permit for the CBCP. All proposed limitations of the draft NPDES permit are tentative and subject to comment from all reviewers during the public comment period. A copy of the NPDES permit (No. FL0061204) is in Appendix A.

1.2.1.2 EIS

EPA must comply with NEPA environmental review procedures in 40 CFR 6.600 et seq. before issuance of a new source NPDES permit. NEPA requires that federal agencies prepare an EIS on every major federal action which significantly affects the quality of the human environment. (Note: A new source under the Clean Air Act is not subject to independent NEPA review.)

Under NEPA regulatory guidelines, a federal agency must consider all environmental impacts of a proposed action in their decision-making process. NEPA also requires coordination of other federal laws such as the Endangered Species Act, the National Historic Preservation Act, and Executive Order 11990 for the Protection of Wetlands. Public involvement is an integral part of the NEPA process.

EPA's NEPA regulations outline procedures for preparing an EIS. The EIS preparation process begins with a Notice of Intent to prepare an EIS. Then an agency conducts project "scoping," often including a public scoping meeting, to determine what key issues are to be addressed in the document. A Draft EIS is prepared which includes discussions of:

- the purpose of and need for the action,
- alternatives,
- the affected environment,
- the environmental consequences, and
- mitigative measures for the proposed project.

Distribution of the Draft EIS to interested parties initiates a public comment period of no less than 45 days, during which EPA accepts written comments on the document. After at least 30 days into the comment period, EPA may hold a Public Hearing to receive comments on the Draft EIS.

All comments received on the Draft EIS are considered and documented in a Final EIS. The Final EIS is distributed and comments are again welcomed during a period of no less than 30 days.

Assuming resolution of all outstanding issues, EPA would then issue a Record of Decision (ROD) (and, in this case, the NPDES permit). The ROD, which is a formal approval of the proposed action, would include EPA's response to any comments received during the Final EIS comment period. Any interested person may contest EPA's decision by submitting a timely request for an evidentiary hearing (procedures given in 40 CFR 124.74).

The Florida Power Plant Siting Board granted Site Certification to the CBCP on May 11, 1993 (Appendix B). On May 14, 1993, the applicant withdrew the obsolete NPDES permit application for process wastewaters. They also submitted a new NPDES permit application to EPA for stormwater discharges during CBCP operations. The new permit application reactivated EPA's NEPA process and this Final EIS was prepared.

EPA typically addresses all comments on a Draft EIS in the Final EIS. Most comments made on the 1990 Draft EIS/SAR have been addressed at the state and local levels as evidenced by the subsequent changes to the project. Any comments not resolved by project changes as described in this Final EIS have been addressed in Chapter 7, Public Participation. Chapter 7 also contains an summary of oral and written comments that EPA received during the EIS process.

No additional public meetings are planned in conjunction with this Final EIS unless there is significant public demand for it or important issues are raised which were not addressed in previous meetings or in this document. Written comments are encouraged and will be considered in the NEPA process.

Under NEPA, EPA would hold a Public Hearing if (1) there is substantial environmental controversy concerning the proposed action or substantial interest in holding the meeting; or (2) EPA receives a request for a Hearing by another agency with jurisdiction over the action supported by reasons why a Hearing would be helpful [CEQ regulations 36 CFR 1506.6(c) (1,2)]. Criteria for holding a Public Hearing under the NPDES regulations are given in the Draft NPDES permit in Appendix A.

1.2.1.3 PSD Permit

The Clean Air Act requires that a facility receive a Prevention of Significant Deterioration (PSD) permit before construction. A PSD permit typically addresses emission controls (including NSPS and Best Available Control Technology, or BACT); existing ambient air quality; projected impacts on air quality due to the proposed facility; impacts on soils and vegetation; impacts on visibility--especially at PSD Class I areas; and secondary impacts due to population growth resulting from the project.

FDER has full PSD permitting authority through its State Implementation Plan. EPA's role is one of program oversight and technical assistance. FDER's permitting process is discussed in Section 1.1.2.2.

1.2.2 Florida DEP Responsibilities

1.2.2.1 Power Plant Siting Act

Under the Florida Electrical Power Plant Siting Act (PPSA, Chapter 403.501-519, Florida Statutes), FDER must prepare an SAR upon which the State's decision to license any new steam electric power plant will be made. Accordance to the PPSA, no construction or expansion of a new electrical power plant may be initiated without Site Certification by the State. The objective of the PPSA program is to provide a comprehensive, coordinated, one-stop permitting approach to the state's evaluation of electric power plant location and operation.

To obtain Site Certification, an applicant files a SCA with FDER pursuant to Chapter 17-17, Florida Administrative Code (FAC). Following its review of the SCA, FDER develops the SAR including Conditions of Certification in consultation with EPA and other state and local agencies. The 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 a Site Certification SCA on matters within their jurisdiction. Copies of the SCA are also sent to other State, regional, and municipal agencies with a request for comments. The Jacksonville Regulatory/ Environmental Services Department (RESD) was involved in the CBCP SCA review.

The SAR and Conditions of Certification are considered by a state Hearing Officer appointed by the Florida Division of Administrative Hearings (DOAH) and a state hearing is held. The purpose of the hearing is to determine whether the state Siting Board should approve in whole, approve with modifications, or deny the issuance of Certification. If Certification is to be approved, the proper Conditions of Certification would be developed during the hearing. If Certification is to be denied, the action(s) the applicant would have to take to secure approval are decided.

The hearing officer prepares a Recommended Order (RO) for consideration by the Florida Governor and Cabinet who comprise the Power Plant Siting Board. The Siting Board makes the final decision regarding Site Certification of the proposed project.

The CBCP was granted conditional Site Certification in February 1991, and full Certification in May 1993. The reader is referred to Section 1.3, History of the CBCP, for more information. Appendix B contains a copy of the Siting Board's Final Order and the state's Conditions of Certification.

1.2.2.2 401 Certification

FDER administers a wastewater discharge permit program under the Florida Air and Water Pollution Control Act. For the CBCP, however, EPA is responsible for writing the NPDES permit. Before the NPDES permit becomes effective, FDER must certify it under Section 401 of the CWA.

1.2.2.3 PSD Permit

The PSD permit application review occurs concurrently with review of the SCA. FDER issues a preliminary determination on the PSD permit at the same time as the SAR issuance. This includes a public notice which initiates a public comment period during which a PSD public hearing may be requested. The State Certification Hearing proceedings on the SCA often includes a PSD summary and must include PSD information if a PSD hearing is requested. If the Hearing Officer recommends Certification of the project in the RO, PSD permit issuance (with a final determination) would follow Siting Board concurrence with the RO.

Should FDER recommend denial of the PSD permit, an applicant could redesign the facility to reduce emissions or attempt to reduce emissions from other facilities. Further, the PSD permit and the Site Certification cannot be issued if the NAAQS are predicted to be exceeded in the impact area of the project. If exceedences are predicted to occur, or if there will be a significant increase in the level of a pollutant in a non-attainment area, the applicant would be given the opportunity to mitigate those impacts (see Section 3.1.3).

FDER issued a PSD permit for the CBCP (Appendix D), with EPA concurrence, on March 28, 1991. Subsequent modifications to project design are expected to lower emissions. The state Conditions of Certification (May 1993) now impose lower emission limits than those stated in the 1991 PSD permit. The applicant has requested that the 1991 PSD permit be modified to reflect the lower limits.

1.2.3 Other Federal and State Requirements

Because of the CBCP's proximity to Jacksonville International Airport, the applicant was required to notify the Federal Aviation Administration (FAA) of construction activities. The FAA found that "the proposed construction would not exceed FAA obstruction standards and would not be hazard to air navigation." The FAA does require that the 425 foot stack be marked and lighted (Appendix F).

The Clean Air Act Amendments of 1990, signed into law in November 1990 may have an impact on the CBCP in the future but does not affect the current permitting process. Title IV, Acid Deposition Control, of this act is designed specifically for coal burning plants. The goal of reducing the total emissions of sulfur and nitrogen oxides from power plants may affect the CBCP facility. The schedule dates for these reductions are the year 1997 for nitrogen oxides and 2000 for sulfur oxides. Refer to Section 3.1.3 for more detailed information on this topic.

1.3 HISTORY OF PROJECT

Table 1-1 presents a summary of major events by date.

St. Regis' Jacksonville Kraft Mill was built in 1952 at Hecksher Drive and Eastport Road, east of the Broward River. The mill, which produced liner-board and kraft paperboard, ceased operation in 1985. SK purchased the facility, rehabilitated it, and reopened it in 1987. The SK paper mill continued to produce unbleached liner-board and kraft paper.

The CBCP was developed after a series of studies conducted by AES-CB and SK. AES-CB was searching for a suitable cogeneration site. SK was seeking to modernize the paper mill and to replace their chemical recovery boilers to comply with new air emission limitations on total reduced sulfur (TRS), a significant source of odors.

Steam provided by the CBCP would allow SK to shut down five antiquated boilers not subject to current air quality standards. Initial plans also included replacement of three recovery boilers with one larger recovery boiler. The reduction in air emissions from these modernization efforts was expected to offset CBCP emissions at the SK site.

On November 14, 1988, AES-CB and SK submitted a SCA and an NPDES permit application to FDER and EPA, respectively. The NPDES application triggered the EIS process (see Section 1.2.1). EPA and FDER sponsored a public scoping meeting on January 25, 1989, in Jacksonville, Florida, to obtain public input on key issues to be addressed in the joint EIS/SAR. Issues of concern raised at the scoping meeting included air and water pollution, groundwater usage, ecological impacts, export of power to south Florida, noise and traffic impacts, solid waste disposal, and impacts of a coal conveyor across the Broward River. Refer to Chapter 7, Public Participation, for a complete list of issues.

TABLE 1-1

CEDAR BAY COGENERATION PROJECT HISTORY TIMELINE

Date	Event
November 1988	AES-CB and SK submit SCA and NPDES permit
January 1989	Draft EIS/SAR Scoping Meeting
June 1989	FPSC Determination of Need for power
February 1990	State Site Certification Hearing
July 1990	Draft EIS/SAR Public Hearing
August 1990	Siting Board RO Remand to DOAH
October 1990	Supplemental Site Certification Hearings
February 1991	Conditional Site Certification granted
March 1991	PSD (air emissions) permit issued
June 1991	Construction initiated
July 1991	AES-CB submits revised NPDES permit application with request to bifurcate (construction separate from operation discharges)
November 1991	SK announces plans to refurbish boilers
March 1992	Special Council appointed to investigate whether Siting Board was misled on the boiler issue
March 1992	EPA public meetings on EIS and construction discharge permit
April 1992	SK plans to install new boilers instead of refurbishing old ones
May 1992	Siting Board votes to revoke Certification
June 1992	Siting Board agrees to modified approach rather than revocation
October 1992	EPA construction stormwater discharge permit effective
October 1992	USGen takes over project management
March 1993	FDER approval of project modifications
April 1993	Site Certification Hearing on modifications canceled after settlement reached
May 1993	Siting Board grants Site Certification
May 1993	Applicant withdrawal of NPDES permit; submits revised application
December 1993	CBCP scheduled to begin operation

In the ensuing months, EPA and FDER prepared the Draft EIS/SAR, which described the proposed project, alternatives, impacts, and mitigative measures. (The PPSA requires FDER to prepare an SAR containing information similar to that required in an EIS. This requirement led EPA and FDER to enter into a Memorandum of Understanding and to agree to prepare a single document.)

Also during this time, local opposition to the project was growing. The Jacksonville City Council passed a Resolution on June 27, 1989, opposing the CBCP. A Citizen's Committee, which was set up to investigate the project's environmental impacts, became leaders of the opposition movement. Several local civic and environmental groups joined forces with the Citizen's Committee. Some of these groups eventually became formal intervenors in the state's Site Certification process.

As required by the PPSA (see Section 1.2.2), the Florida DOAH conducted State Certification Hearings (February 5-7, 1990). The Hearing Officer prepared an RO for consideration by the State Siting Board. The RO recommended that the Siting Board certify the project with the proper Conditions of Certification.

The joint Draft EIS/SAR, which included a draft NPDES permit, was issued on June 8, 1990. EPA held a Public Hearing in Jacksonville, Florida on July 12, 1990 to receive comments on the document and permit. Several issues were raised during the Draft EIS/SAR comment period. Many of the concerns that had been raised at the scoping meeting were reiterated. Air and water pollution and groundwater usage were the issues of most concern. Noise, traffic, solid waste disposal, and export of power were still concerns. New concerns included SK odor problems, light pollution, leaking petroleum tanks, impact of train passage on emergency routes, cumulative impacts, stack height, land use policies, and human health impacts. Refer to Chapter 7, Public Participation, for a complete list.

The state Siting Board met on August 14, 1990 for consideration of the CBCP (Case No. 88-5740). After review of the RO and argument of interested parties in the matter, the Board concluded that several issues had not been adequately addressed in the RO. The project was remanded back to the DOAH with a request to prepare a supplemental RO dealing with the following issues: (1) whether a balance between the need for the facility and the environmental impacts had been achieved; (2) whether the design of the project and choice of fuels would produce minimal adverse effects; (3) whether there were other methods to treat or mitigate for copper in the proposed dewatering discharge; and (4) whether the applicant could use some source other than groundwater as the permanent primary source of cooling water.

Issue number (4), above, stemmed from public concerns about the proposed use of potable water from the Floridan Aquifer for cooling. Water restrictions in Jacksonville had raised the sensitivity of citizens to the permitting of new withdrawals of groundwater (the city's drinking water source) for industrial use. Also, Florida, through the state Water Policy (FAC 17-40), encourages the use of water of the lowest acceptable quality for the purpose intended.

Consequently, AES-CB proposed several modifications to the CBCP. These included (1) reducing the dewatering flows to achieve the copper discharge limit, (2) a commitment to use either surface water or reclaimed water (treated wastewater effluent) for cooling unless neither was permittable by FDER and EPA, and (3) implementation of a "Groundwater Mitigation Plan" if groundwater was ultimately used for cooling.

DOAH conducted a supplemental state Certification Hearing on October 29 and 30, 1990, to address the Siting Board's concerns and the proposed project revisions. On December 5, 1990, the Hearing Officer issued the supplemental RO. The RO recommended that the Siting Board certify the CBCP with modified Conditions of Certification which reflected AES-CB's proposed changes.

On February 11, 1991, the state Siting Board issued conditional Certification to the CBCP, providing the necessary state approval for construction of the facility. Certification was conditional in that it prohibited the use of groundwater for cooling. As AES-CB's NPDES permit application was based on use of groundwater for cooling, EPA's review of the CBCP application and EIS preparation was temporarily suspended. AES-CB began a major redesign effort in response to the Board's order.

On March 28, 1991, FDER issued the PSD permit (Permit No. PSD-FL-137) for the CBCP (see Section 1.2). EPA submitted concerns to FDER regarding the PSD permit but deferred the permit decision to FDER. FDER addressed EPA's concerns in their Final Determination (Appendix D).

AES-CB began construction of the CBCP in June 1991 before receiving all permits necessary for operation. The CBCP had received all state approvals necessary to initiate construction. AES-CB had eliminated the dewatering discharge which made a new source NPDES permit and Final EIS unnecessary for construction activities.

On July 15, 1991, AES-CB submitted revisions to the NPDES permit application. These revisions reflected the selection of SK wastewater as the cooling source for the CBCP and the deletion of the dewatering discharge. FDER and EPA began reviewing AES-CB's project modifications. At this point, EPA began preparation of a Revised Draft EIS. The EIS was to include a risk assessment to determine human health impacts from CBCP air emissions.

The CBCP did require an NPDES permit to allow discharge of construction-related stormwater. AES-CB requested that EPA separate the construction stormwater discharge permit from the other discharges under review (i.e., operational discharges).
This "bifurcation" of the NPDES permit was requested because AES-CB had begun construction activities at the site. A construction discharge permit of this type is not subject to NEPA requirements; thus completion of the EIS was not required for its issuance.

During 1990, SK had decided to convert their kraft paper mill to a recycled paperboard operation by mid-1992. This conversion would eliminate the need for any recovery boilers and would allow SK to comply with TRS limitations.

In November 1991, SK announced plans to refurbish three of the five old boilers that were to be shut down when CBCP began operation. The refurbished boilers were needed to provide the SK process steam that was to have been provided by the new recovery boiler. This was apparently contrary to the Conditions of Certification which required that the five specific boilers (three oil-, two bark-fired) were to be shut down permanently.

On March 6, 1992, in response to that contradiction, the Siting Board requested that the Attorney General appoint a Special Counsel to investigate the CBCP Certification to determine (1) whether any material false statements were made by any party in connection with the Certification application, (2) if so, whether a true statement in place of the false statements would have warranted the Siting Board's refusal to recommend Certification for the facility as proposed, and (3) whether any fact or circumstance warrants suspension, revocation, or other disciplinary action directed at the CBCP Certification. The reader is referred to FDER's revised SAR in Appendix G for a more complete discussion of the issues.

In February 1992, EPA issued a draft NPDES permit for construction-related stormwater discharges. EPA held two public meetings in Jacksonville on March 11, 1992. The first meeting, enthusiastically attended by a divided group of approximately 500 opponents and supporters, was an informational meeting to discuss the progress of the Revised Draft EIS and risk assessment. The second meeting was a Public Hearing on the construction-related stormwater NPDES permit.

In early April 1992, SK announced their intention not to refurbish the boilers, but rather to replace them with new gas-fired boilers.

On April 14, 1992, the Special Counsel found that although AES-CB and SK withheld information concerning the SK boilers, there was no legal cause to warrant suspension or revocation of the Site Certification. FDER reviewed the Special Counsel's report and issued a response to the Siting Board which disagreed with the conclusion of the Special Counsel. FDER recommended that the Siting Board direct AES-CB and SK to show cause why the CBCP Site Certification should not be suspended or revoked.

On May 5, 1992, the Siting Board voted to begin proceedings to revoke the Site Certification. AES-CB began negotiations with FDER in an effort to seek modification rather than total revocation of the Certification. AES-CB proposed several modifications, including provision of funds to purchase environmentally sensitive lands, reductions in air emissions, and a new wastewater treatment scheme.

AES-CB's proposed wastewater treatment scheme was as follows: In Phase I, the CBCP would use a percentage of treated SK wastewater for cooling tower makeup. AES-CB would install a zero-discharge system to eliminate all CBCP process wastewater discharges. Treated water would be recycled back to the cooling system and the SK cooling system, reducing SK groundwater withdrawals. In Phase II if an NPDES permit could be obtained, and if environmental benefits could be demonstrated, AES-CB would convert the zero discharge system to a system that would provide further treatment for all of the treated SK wastewater and discharge the portion not evaporated in both cooling processes to the St. Johns River.

The Siting Board met on June 16, 1992, to decide whether to accept these modifications or revoke the Certification. The Board agreed not to proceed with revocation; but ordered that the proposed modifications must be such that, on balance, the environmental impacts of the "modified" CBCP plus the addition of any boilers on the SK site, will be less than the impacts of the SK operation without the power plant.

After this decision, the lending consortium financing construction of the CBCP withdrew their support of AES-CB and sought a new project management team. In October 1992, USGen took over management of the CBCP (see Section 1.1.3 Identification of Applicants). Still bound to implement the modifications proposed by AES-CB and bound to the requirements of the Siting Board, USGen continued design of the CBCP. Meanwhile, the EPA NPDES permit for construction-related stormwater discharges became effective on October 1, 1992 (Appendix H).

The new applicant proposed several design changes to the zero-discharge scheme (Phase I) including a Reverse Osmosis technology and the recycling of other CBCP wastewater streams. the applicant's analysis of Phase II of the wastewater treatment system showed, to the satisfaction of FDER, that no environmental benefits would be realized with its implementation.

The applicant proposed additional design changes to the project, including Selective Non-Catalytic Reduction controls for nitrogen oxide emissions, testing of a carbon injection system for removal of mercury, and use of coal with lower sulfur content than previously permitted. The applicant also prepared a human health and ecological risk assessment on CBCP air emissions to supplement and complete the analyses done by FDER and EPA.

FDER approved the modifications on March 24, 1993 and issued revisions to their SAR (Appendix G). The state Modification hearing was scheduled for mid-April. During the preliminary hearing, all intervenors dropped their opposition to the project and agreed to a settlement (Appendix B). The hearing was canceled and the Hearing Officer submitted an RO recommending approval of the modifications to the Siting Board. The Jacksonville City Council passed a resolution in support of the revised project on April 14, 1993.

On May 11, 1993, the Siting Board approved the proposed modifications, thereby granting final state Site Certification to the CBCP (Appendix B). The CBCP is scheduled to begin operation in December 1993.

On May 14, 1993, the applicant asked EPA to withdraw the obsolete NPDES permit application for process wastewaters; they then submitted a new NPDES permit application for stormwater discharges during CBCP operations. The new permit application re-started EPA's NEPA process and preparation of this Final EIS.

CHAPTER 2

ALTERNATIVES EVALUATED

2.0 ALTERNATIVES EVALUATED

NEPA requires that an EIS describe project alternatives including those available to EPA or other permitting agencies as well as alternatives considered by the applicant. EPA's regulatory alternatives are discussed in Section 2.1, below. Project design alternatives considered by AES-CB, for the project as it was originally proposed, are included in the 1990 Draft EIS/SAR.

The fact that the CBCP has already received state Site Certification and has almost completed construction somewhat restricts the alternatives analysis in this Final EIS. Section 2.2 presents the originally-proposed CBCP as an alternative for comparison with the CBCP as certified. The CBCP as certified is described in Section 2.3. The No Build Alternative is also presented in Section 2.4.

2.1 REGULATORY ALTERNATIVES

The applicant has received all permits necessary to begin operation of the CBCP except an NPDES permit which is required for stormwater discharges from the site during plant operation. The CBCP is a zero discharge facility with the potential to discharge stormwater runoff in a high rainfall event. Thus, the applicant may operate the facility without the NPDES permit if confident no discharges will occur. However, any discharge of wastewater or runoff from the site would be a violation of the CWA.

The alternatives available to EPA under Section 402 of the CWA are to issue, issue with conditions, or to deny the new source NPDES permit requested for the CBCP stormwater discharges.

Issuance of the NPDES permit will allow discharge of stormwater overflow due to high rainfall runoff to the Broward River up to the limits set forth in the permit. The permit may be modified by certain conditions, such as additional monitoring and reporting, to evaluate the effectiveness of the pollution control systems. Such conditions are added to a permit if the impacts of the plant operation require special mitigation practices. Denial of the NPDES permit would be the No Federal Action Alternative.

EPA proposes to issue the NPDES permit for the CBCP. All proposed limitations of the draft NPDES permit are tentative and subject to comment from all reviewers during the public comment period. A copy of the NPDES permit (No. FL0061204) can be found in Appendix A.

If it is determined that the proposed CBCP operational discharges into the Broward River will not be in compliance with NSPS or water quality standards, EPA would deny the NPDES permit. Furthermore, EPA could deny the permit if environmental resources such as air quality, endangered species, historic or archeological sites, wetlands, or floodplains are significantly impacted and measures proposed for mitigating the impacts are unacceptable.

If the permit is denied by EPA, the applicant would have the options of adjudicating the determination; redesigning the project to respond to stated deficiencies and resubmitting the application; redesigning the project to eliminate water discharges and the consequent need for the NPDES permit; or discontinuing their permit request.

2.2 THE CBCP AS PROPOSED BY AES/CB

In 1988, AES-CB proposed to construct and operate the CBCP at the SK site. The project as originally proposed and project alternatives were described in the Draft EIS/SAR issued by EPA in May 1990. Copies of this document are available on request (see inside cover) and the Executive Summary of the Draft EIS/SAR is included in Appendix C.

Since the Draft EIS/SAR was issued, the CBCP has undergone several changes in project design (see Section 1.3, History, for explanation). The CBCP as finally certified by the state is described in Section 2.3. This Section presents the originally proposed CBCP as an alternative for comparison with the CBCP as certified.

The major elements of the originally proposed project which have since changed are summarized in Table 2-1. Many of the project design changes were required by FDER and the state Siting Board. The reader is referred to Section 1.3 History of the Project for a discussion.

2.3 THE CBCP AS CONSTRUCTED BY THE APPLICANT (CBC ALTERNATIVE)

CBC proposes to construct and operate a new coal-fired steam electric cogeneration facility currently under construction on the site of the existing SK paper mill. The CBCP will produce up to 250 MW for sale to FPL as well as up to 380,000 lb/hr of steam for use by SK.

2.3.1 The Project Site

The CBCP is located in an industrial area outside of Jacksonville, approximately seven miles north-northeast of downtown (see Figures 1-1 and 1-2). CBCP will occupy 35 acres of

TABLE 2-1

COMPARISON OF AES ALTERNATIVE AND CBC ALTERNATIVE

CBCP As Originally Proposed	CBCP As Certified
225 MW for sale to FPL	250 MW for sale to FPL
640,000 lb/hr steam to SK	380,000 lb/hr steam to SK
Use groundwater for cooling	Use SK wastewater and recycle internal waste streams for cooling
Maximum of 7 MGD groundwater withdrawal	Maximum of 1.2 MGD groundwater withdrawal
Several NPDES-regulated wastewater discharges to St. Johns and Broward Rivers: construction dewatering cooling tower blowdown boiler blowdown metal cleaning wastes low volume wastes stormwater overflows	Zero-discharge facility; only one NPDES-regulated discharge to Broward River: stormwater overflow
Control for NOx by proper boiler design and operation	Selective Non-catalytic Reduction control for NOx
No special control for mercury emissions	Test a carbon injection system for mercury control
Coal sulfur content (annual average): 3.3%	Coal sulfur content (annual average): 1.2%
Construction of coal conveyor across Broward River	Conveyor across Broward River eliminated from project design
Total air emissions permitted: 15,000 TPY	Total air emissions permitted: 8,000 TPY
SK to shut down 5 old boilers; SK plans to replace 3 recovery boilers with 1 large recovery boiler	SK to shut down 5 old boilers; SK plans for 3 new gas-fired boilers
Possible impact to small wetland on site from rail line construction detailed project description as originally proposed can be found in the 1990 Draft EIS/SAR	On site wetland impact avoided refer to detailed project description as certified in Section 2.3 of this Final EIS

425 acres owned by SK. The plant is being built on an area that was formerly used for storage of lime mud and is located to the west adjacent to the existing SK mill.

CBCP is located near two Jacksonville Electric Authority (JEA) power plants - the St. Johns River Power Park (SJRPP) and the Northside Power Plant. The SJRPP is located east of CBCP approximately 3 miles away, and Northside Power Plant is also located to the east, about 4 miles away.

2.3.2 Plant Orientation and Appearance

The CBCP will consist of three CFB boilers, a single steam turbine driven electrical generator, steam pipelines to supply the SK paper mill, mechanical draft cooling towers, 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 Jacksonville Electric Authority (JEA) and FPL power network systems. The CBCP has been designed to blend in with the profile of the existing SK paper mill, with the exception of the exhaust stack which is much taller (425 feet). The mechanical draft cooling tower array is located near the center of the CBCP plant area. Existing vegetation along the Broward River will provide a partial screen for the plant facilities.

2.3.3 Facility Description

2.3.3.1 Power Generation System

The CBCP will employ a single steam driven turbine electrical generator using steam produced by the three coal-fired CFB boilers. The boilers will produce steam at 1890 pounds per square inch, gauge (psig), for the single automatic extraction condensing turbine generator. This system will produce up to 250 MW for sale to FPL as well as electricity for operation of the CBCP and 380,000 lb/hr of 600 psig steam for sale to the SK paper mill.

Fossil-fueled steam electric power plants such as the CBCP produce electricity in a four stage process:

- Fossil fuel is burned in a boiler furnace, heating the boiler water which produces pressurized and superheated steam.

- Steam is used to turn the blades of a turbine which drive an electric generator to produce electricity. In the CBCP, some steam will be provided to SK for use in their operations.

- Low pressure steam leaving the turbine enters a condenser where it is condensed to water. The steam's heat is transferred to a cooling medium which is normally water. In the CBCP, approximately 73% of the cooling water will evaporate in the mechanical draft cooling towers; the remainder will be treated for reuse.

- Finally, some of the condensed steam is pumped back into the boiler to complete the cycle. A small percentage of this water, called blowdown, must be drawn off and replaced with fresh boiler makeup water. This prevents buildup of contaminants in the boiler water.

2.3.3.2 Materials Handling

<u>2.3.3.2.1 Fuel Transportation and Handling</u>

The CBCP facility is permitted to burn 1.17 million tons of eastern Kentucky coal per year. Short fiber recycle rejects from SK operations are permitted up to 139,179 cubic yards per year (wet). Within a year after initial emissions compliance, there will be a 30-day trial burn of short fiber rejects. The test burn will be designed to ascertain (1) whether the CFBs can burn the rejects as supplemental fuel without exceeding any of the limitations on emissions and fuel usage contained in the Conditions of Certification, (2) without causing any operational problems, and (3) without violating any other environmental regulations. All estimates of fuel transportation and handling were based on 100 percent coal-fired operation.

The coal will be delivered to the site by train using the existing CSX Railroad lines via an existing spur to the SK site. The line from which the SK spur branches is currently used for unit train coal delivery to the SJRPP a few miles east of the SK site. This line is not expected to need upgrading for the CBCP. Modifications will, however, be necessary to the SK spur. The applicant has upgraded the track south of the switchyard. This required a double track extension after the causeway until a point near the emergency water storage tank, where the double track merges into a single track for engine switching. The rail corridor and extension layout are shown in Figure 2-1.

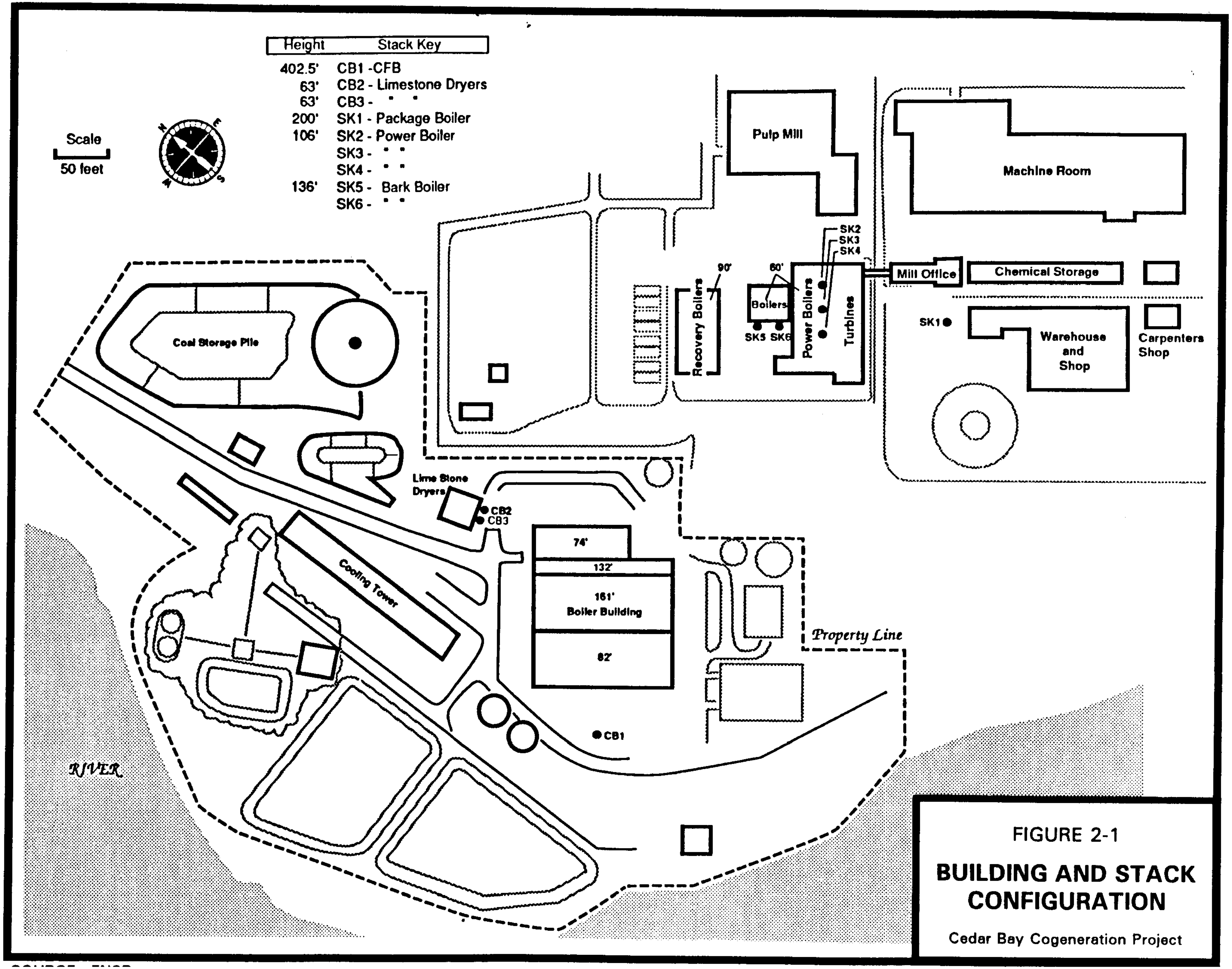


FIGURE 2-1

BUILDING AND STACK CONFIGURATION

Cedar Bay Cogeneration Project

There will be a maximum of one train every three days with approximately 90 cars per train, and a maximum of 106 tons of coal per car. The railcars will be unloaded within an enclosed building. 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 after 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 steam generation building. It is designed to hold 105,000 tons of coal, which is approximately a 30 day supply. Stormwater runoff from the storage area will be collected and routed to a lined retention basin.

2.3.3.2.2 Limestone Handling

Handling of limestone, which will be used during CFB boiler operation to control sulfur emissions, consists of delivery, unloading, stockout, reclaiming, preparation, drying, and storage. Stormwater runoff from the storage area (shown in Figure 2-1) is to be collected and routed to a lined retention basin.

Limestone will be transported from the barge terminal at Blount Island to the site via truck. No more than 320,000 tons per year will be used or handled.

2.3.3.3 Emission Controls

Air pollution control equipment will be used on the CFB boilers to control emissions of the major criteria pollutants. These include sulfur oxides (SO_x, primarily SO_2), NO_x, CO, VOCs, particulates [including total particulate matter (PM) and particulate matter less than 10 micrometers in diameter (PM 10)], and fugitive dust. Other trace pollutants will be controlled by the air pollution equipment used for the major criteria pollutants. The applicant will test an additional control to reduce mercury emissions (see Section 2.3.3.3.4 Controls for Mercury).

All air pollution control systems are designed to meet federal NSPS and the more stringent BACT requirements of the PSD permit. Section 3.1 Air Resources, includes a summary of the state and federal regulatory requirements for CBCP air emissions. The air quality control systems are designed to the maximum, "worst case", basis assuming the maximum permitted sulfur contents of 1.7% (train-load basis) and 1.2% (annual basis) by weight and ash content of 16% in the coal, and a minimum heating value of 12,000 British thermal units (Btu) per pound.

The burning of short fiber recycle rejects is limited to no more than 210 cubic yards (wet) per day for Boiler B and Boiler C. Maximum combined total capacity charging rate of short fiber recycle rejects is 420 yd^3/day (wet basis) or 139,176 yd^3/yr (wet basis). Because short fiber rejects comprise such a small percentage of the total, all air quality evaluations for the CBCP were based on 100 percent coal-fired operation.

The CFB is considered a "concurrent combustion/emission control process" technology; that is, air emissions are controlled within the combustion chamber, in this case by limestone injection and efficient combustion. Much of the sulfur is removed during combustion by the absorbent limestone. Also, in this process, nitrogen oxides (NO_x) production is low because of the relatively low temperature at which the combustion reaction takes place. NO_x will be further controlled in the CFB boilers with the selective non-catalytic reduction (SNCR) process.

2.3.3.3.1 PM and Fugitive Dust Controls

PM from the CFB boilers will be controlled by a fabric filter system. At the permitted annual heat input, 234 TPY of PM will be emitted.

Fugitive particulates may be generated by the dissolved and suspended solids in the cooling tower. PM in the cooling tower drift will be controlled by the use of drift eliminators. Drift, as used in this document, is defined in the Glossary (Appendix Q).

PM emissions may also be generated by coal handling, limestone handling, fly ash handling, and the flue gas desulfurization (FGD) waste handling and disposal systems. Control measures are planned as follows:

- Fabric Filters - fabric filters, or baghouse controls, will be installed on the following sources: coal crusher building, coal silo conveyor, limestone pulverizer and conveyor, limestone storage bin, bed ash hopper, bed ash silo, fly ash silo, bed ash bin, fly ash bin, pellet vibratory screen, pelletizing ash recycle tank, pelletizing recycle hopper, cured pellet recycle conveyor, pellet recycle conveyor. Each of these sources will have an emission limitation of 0.003 grains per dry standard cubic foot of air (gr/dscf).

- Wet Suppression - wet suppression/removal techniques will be used to control emissions from the following sources: coal car unloading, ash pellet hydrator, ash pellet curing silo, ash pelletizing. Each of these sources will have an emission limitation of 0.01 gr/dscf.

2.3.3.3.2 SO_x Controls

SO_x will be controlled by chemical reaction with limestone injected into the CFB. Combustion within the fluidized bed places the SO_x in direct contact with calcium in the limestone. The chemical reaction between SO_x and calcium effectively removes much of the SO_x from the exhaust gases.

With the PSD permit requirement to concurrently shut down the SK oil fired Power Boilers (three units), as well as the Bark Boilers (two units), the net emissions of SO_2 for the project will be lowered; e.g., a decrease of 384 TPY. The state Conditions of Certification place a requirement that the emissions from the three CBCP CFB boilers not exceed 2,598 TPY (see Appendix B).

2.3.3.3.3 NO_x Controls

Emissions of NO_x from the CFB boilers are proposed to be controlled using selective non-catalytic reduction (SNCR). The SNCR process is based on the chemical reaction between NO_x and injected ammonia to produce gaseous nitrogen and water vapor. Controlled NO_x emissions from each of the three CFB boilers will be 0.17 lb/MMBtu (30 day rolling average basis). Maximum permitted emissions of NO_x are 2,208 TPY for all three units.

2.3.3.3.4 Controls for Mercury

Trace quantities of mercury are present in coal. Most of this mercury is expected to volatilize during combustion, then either condense on submicron particles and be collected by the fabric filter or be emitted as vapor. The applicant has evaluated the anticipated control efficiency for mercury from the fabric filter and the levels of mercury in the contracted coal. Based on these evaluations, the CBCP will meet an emission limitation of 2.89×10^{-5} lb/MMBtu.

Fabric filtration is the most commonly used control alternative for mercury controls from CFB boilers. While other alternative mercury controls are being evaluated for other source types such as waste-to-energy facilities, none of these alternatives have been demonstrated as technically feasible on CFB boilers. However, the CBCP will conduct a test on one CFB boiler to determine whether substantial additional removal of mercury can be obtained through the use of injecting carbon between the boiler and the fabric filter.

2.3.3.3.5 Controls for Other Emissions

Other emissions of regulatory concern include CO, VOC, H_2SO_4, and toxic organic compounds (Pb, Be, and Fl). CO and VOC emissions from the CFB boilers will be controlled using combustor design and combustion optimization, which is the only technically feasible control alternative. This alternative seeks to maintain the proper conditions to ensure complete combustion through design features which enhance uniform fuel/air distribution and mixing, along with oxygen monitoring and adjustment of the staged air combustion to suppress CO and VOC formation. This process must be optimized with efforts to reduce NO_x emissions which often increase when steps to lower CO and VOC emissions are taken.

Other emissions from the CFB boilers will also be controlled by combustion design and operation. According to the state Conditions of Certification, collective emissions from the three CFB boilers are not to exceed the following levels:

Pollutant	**Maximum Permitted Emissions (TPY)**
CO	2,273
VOC	195
H_2SO_4 mist	6.1
Fl	9.7
Pb	0.78
Be	0.11

2.3.3.3.6 Stack Height

The CBCP stack height of 425 feet was based on Good Engineering Practice (GEP) and on the dimensions of nearby buildings. The stacks for the limestone dryers are below the minimum GEP of 213 feet.

2.3.3.4 Water Systems

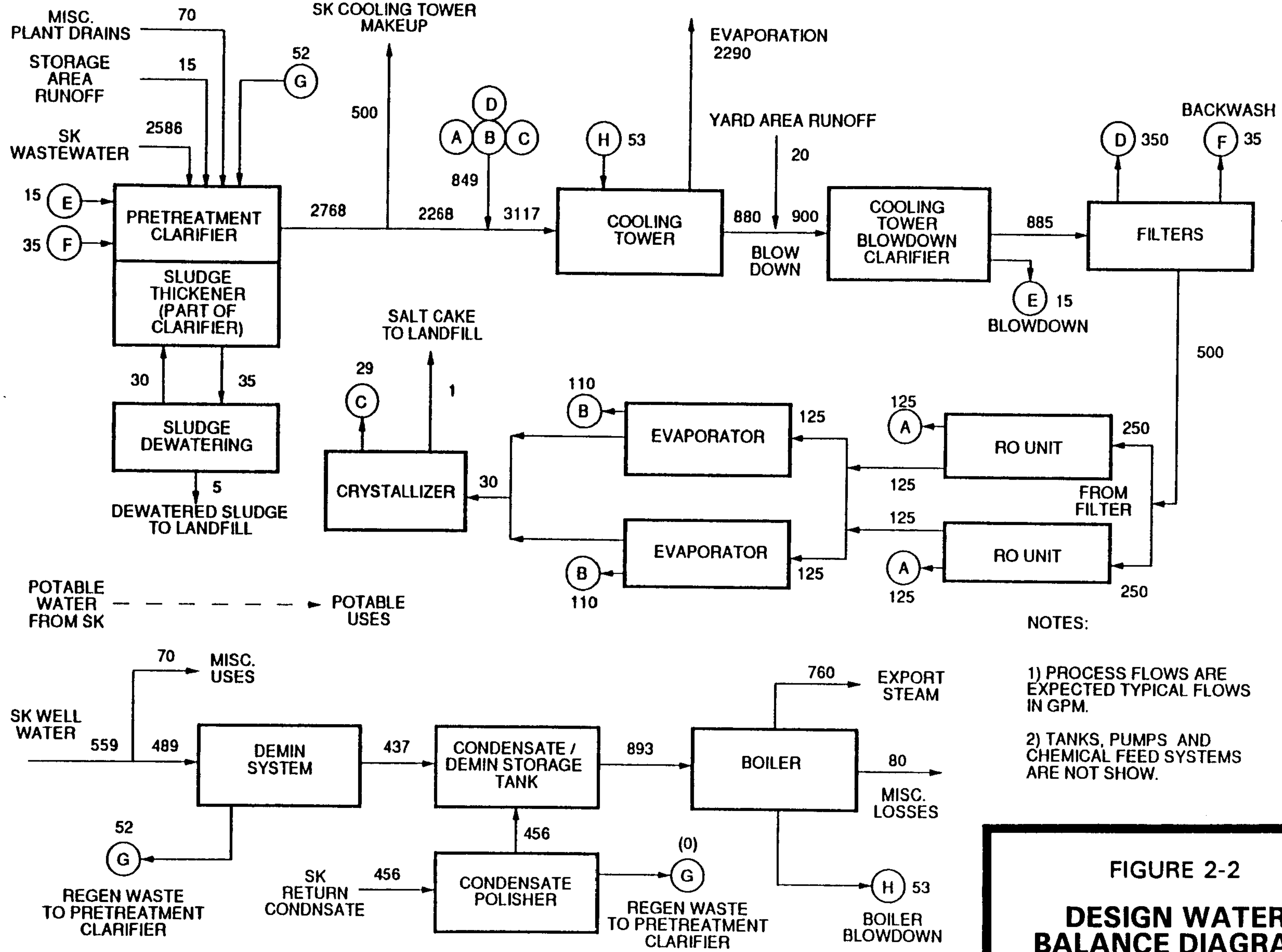
The CBCP requires water for several plant processes. The primary water demand is for cooling purposes. Cooling water represents 80% of the total external water demand. A smaller amount of high quality water is required for boiler makeup, plant service, and potable water. The CBCP will employ a zero-discharge system that will eliminate all process wastewater discharges. All wastewater streams will be reused or recycled within the system. A water balance diagram for the CBCP is shown in Figure 2-2.

The primary external source of water for the CBCP will be reuse of treated process wastewater from the SK mill. As shown on the water balance diagram, approximately 2,586 gallons per minute (gpm) [3.7 million gallons per day (MGD)] will be provided by SK. The other external sources will be the existing SK wells, which will supply a maximum of 1.45 MGD of groundwater from the Floridan aquifer, and potable water from SK. Other water demands will be met by recycling internal wastewater steams.

Facility water demands will be satisfied through a combination of sources:

- reuse of treated process wastewater from SK;
- recycle and/or treatment of internally generated plant waste streams for reuse on-site;
- recycle of condensate return water from SK;
- treatment and reuse of site stormwater runoff;
- use of potable water from SK; and
- use of groundwater from SK production wells.

CBC will minimize the use of fresh water, primarily relying on SK wastewater to meet cooling needs. Water discharges will be eliminated with a zero-discharge water treatment system, except for stormwater runoff in an extreme storm event. All process wastewater generated will be internally recycled, treated for reuse or processed in the zero-discharge post treatment system. Also, note that the CBCP will recycle some pretreated water back to SK for use in their cooling tower.



NOTES:

1) PROCESS FLOWS ARE EXPECTED TYPICAL FLOWS IN GPM.

2) TANKS, PUMPS AND CHEMICAL FEED SYSTEMS ARE NOT SHOW.

FIGURE 2-2

DESIGN WATER BALANCE DIAGRAM

Cedar Bay Cogeneration Project

SOURCE: ENSR

CBCP groundwater usage for non-cooling processes is expected to average 1,039 MGD (maximum permitted is 1.45 MGD). This will require an increased withdrawal of 722 gpm from the SK wells. The SK production well network consists of seven wells which are used on a rotating basis to produce an average of 12 MGD (maximum of 18 MGD) for SK operations. The wells are approximately 1,400 feet deep, each with a free flowing production capacity of approximately 7,500 gpm. The groundwater used by the CBCP will be softened and filtered in the existing SK pretreatment system.

Groundwater will be used for boiler makeup, service water, fire protection, and metal cleaning. Boiler makeup is discussed in Section 2.3.3.4.3 Boiler Makeup Water. Service water uses include water for water seals, cleaning and flushing. The fire protection system would only be activated under emergency conditions, therefore water requirements are relatively small. High quality water is required to prevent corrosion and scaling in the storage and distribution system. Small quantities (less than 200,000 gallons) of metal cleaning water will be required periodically for cleaning the steam generator and preboiler cycle piping.

Potable water uses include water for drinking, washing, and for sanitary purposes. The projected average 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 potable water flow includes use at both the CBCP and the SK paper mill.

Major system components required for the above are further described in the subsections which follow. Additional engineering details for each system are contained in Appendix I.

2.3.3.4.1 Cooling Water Pretreatment System

The bulk of the plant's cooling water makeup requirements will be satisfied through recycle/reuse of internally generated plant waste streams and supplemented through reuse of treated effluent from the SK mill. As shown in Figure 2-3, the CBCP will recycle and reuse the following internally generated waste streams:

- neutralized demineralizer regenerant wastes;
- blowdown clarifier wastes;
- sand filter backwash;
- sand filter effluent;
- plant service water;
- site stormwater runoff;

- reverse osmosis product water;
- boiler blowdown;
- filtrate from sludge dewatering;
- evaporator distillate; and
- crystallizer distillate.

Neutralized demineralizer regenerant wastes, blowdown clarifier wastes, filtrate from sludge dewatering and sand filter backwash will be routed directly to the cooling water pretreatment clarifier. Plant service water (i.e., water collected in plant floor drains) will be directed to oil/water separators, where required, and subsequently processed in the pretreatment clarifier. The clarifier will also process stormwater runoff from the facilities Storage Area Runoff Pond (SARP). The SARP collects runoff from the facility's Materials Storage Area. This includes the ash pelletizing and storage area, the limestone storage area, and the coal storage area. As described further in Section 2.3.3.4.10 Site Stormwater Management, runoff from the plant yard area, stormwater collected in the Yard Area Runoff Pond (YARP), will be treated for reuse in the cooling tower blowdown clarifier.

Other recyclable process streams will be routed directly to the cooling tower basin. These include boiler blowdown, a portion of the sand filter effluent, reverse osmosis product water and distillate from the evaporators and crystallizer.

Any additional cooling water makeup requirements will be satisfied through use of treated wastewater from the SK mill. Currently, SK's process wastewater is treated on-site and they discharge roughly 10.0 MGD to the St. Johns River. Prior to discharge, CBCP will withdraw, on average, 3.7 MGD for reuse as cooling water makeup. Following pretreatment, approximately 3.25 MGD will be used in the CBCP mechanical draft cooling towers. The remainder will be pumped back to SK for cooling use at the mill.

The cooling water pretreatment system consists of a premix tank, a combination clarifier/sludge thickener, chemical storage and feed equipment, and a sludge dewatering system. It will be operated to provide a softened effluent suitable for use in the cooling towers. Only water which causes little to no fouling of the heat exchanger surfaces is suitable for use. The water will be reused up to the point where fouling is a possible, at which time, it will be sent to the zero discharge system for further treatment. In short, the cooling towers will be operated at a reasonable number of "cycles of concentration" without causing fouling of heat exchanger surfaces.

Wastewater entering the system will be received in the premix tank and conditioned using lime and soda ash for softening, aluminum or iron salts for coagulation, and polymers as coagulant aids. Water from the premix tank will then enter the clarifier for solids removal. Settled solids will thicken at the bottom of the clarifier. The clarifier will also be equipped with chemical feed equipment for process adjustment and control. Clarified effluent will discharge to a clearwell for final pH adjustment using sulfuric acid. Following thickening, sludge from the clarifier will be dewatered for off-site disposal.

System design is based on receiving effluent from the SK wastewater treatment system with typical quality characteristics listed in Table 2-2. The expected mixed influent and effluent characteristics for the pretreatment clarifier are listed in Table 2-3.

A detailed description of the CBCP Cooling Tower Makeup Pretreatment System is contained in Appendix I.

<u>2.3.3.4.2 Sludge Dewatering System</u>

Sludge collected in the thickener portion of the pretreatment clarifier will be pumped on a batch basis to a plate and frame type filter press for dewatering. Solids will be captured and retained on cloth filters within the press. Filtrate will be returned to the pretreatment clarifier.

After dewatering, the filter cake is expected to contain 40 to 60% solids and consist primarily of calcium carbonate and magnesium hydroxide from the lime soda softening process. Sludge production is anticipated to be 80 tons per day assuming a solids content of 40%. Dewatered filter cake will be transported off-site for final disposal at an approved site (see Section 2.3.3.5).

<u>2.3.3.4.3 Boiler Makeup Water</u>

Boiler makeup requirements, including export steam to SK, will typically average 1.3 MGD. Makeup requirements will be partially satisfied through recycle of condensate return from the SK mill, averaging approximately 0.66 MGD, and supplemented through use of SK lime softened groundwater, typically 0.64 MGD [Note that an additional 0.1 MGD of lime softened groundwater will be used for site service water needs.]. Prior to reuse at CBCP, condensate return from SK will be treated using a weak acid cation/anion exchange mixed bed polisher. Prior to demineralization, lime softened groundwater will be filtered to remove suspended solids.

TABLE 2-2

Typical Makeup Water Characteristics from SK

Constituent	Units	Value
pH	standard	6.0 to 9.0
Alkalinity	mg/l	565
Sulfate	mg/l	805
Chloride	mg/l	312
Solids, Dissolved	mg/l	2300
Silica	mg/l	55
Calcium	mg/l	560
Magnesium	mg/l	260
Sodium	mg/l	850
Potassium	mg/l	15
Iron	mg/l	1.1
Manganese	mg/l	0.7

Source: Zero Discharge System: Engineering Description, Bechtel Corporation, 1993.

TABLE 2-3

Projected Pretreatment Clarifier Influent and Effluent Characteristics

Constituent	Units	Combined Influent	Effluent
pH	standard	6.0 to 9.0	8.0 to 10.0
M-Alkalinity	mg/l $CaCO_3$	540	60
Sulfate	mg/l $CaCO_3$	890	890
Chloride	mg/l $CaCO_3$	300	322
Solids, Dissolved	mg/l	2400	1900
Silica	mg/l	59	25
Calcium	mg/l $CaCO_3$	545	50
Magnesium	mg/l $CaCO_3$	270	50
Sodium	mg/l $CaCO_3$	903	1,160
Potassium	mg/l $CaCO_3$	15	15
Iron	mg/l	1.1	0.1
Manganese	mg/l	0.7	0.05
Phosphate	mg/l PO_4	2.0	0.2
Fluoride	mg/l $CaCO_3$	3	3
Boron	mg/l	2.4	2.4
Aluminum	mg/l	2.1	0.2
Barium	mg/l	0.2	0.05
Strontium	mg/l	1.6	1.0
Total Organic Carbon	mg/l	115	105
Solids, Suspended	mg/l	50	10

Source: Zero Discharge System: Engineering Description, Bechtel Corporation, 1993.

Demineralization is required to produce a high purity boiler makeup water (i.e., low dissolved solids feed water) to prevent scale formation in the high pressure boiler. Demineralization will be accomplished using a cation/anion exchange process. Regenerant wastes from the demineralization system will be neutralized and sent to the pretreatment clarifier for reuse as cooling tower makeup.

Effluent from the condensate polisher and demineralization system will be combined and temporarily stored in a Demineralized Water Storage Tank. The boiler feed water system will also be equipped with chemical feed systems for the addition of boiler water conditioning chemicals. These will include feeds for oxygen scavengers and antiscalants.

2.3.3.4.4 Cooling Tower Blowdown Zero Discharge Handling System

Blowdown from the Cedar Bay cooling tower and general site stormwater runoff will be treated in the zero discharge system. The system is designed to maximize reuse of process water as cooling tower makeup by using a post treatment train consisting of clarification and softening, filtration, reverse osmosis (RO), evaporation and crystallization. Major components in the system are described below. More detailed descriptions of individual components are contained in Appendix I.

2.3.3.4.5 Cooling Tower Blowdown Clarifier

Blowdown from the Cedar Bay cooling tower will be combined with plant yard area runoff (i.e., stormwater collected in the YARP) and directed to the cooling tower blowdown clarifier. In addition to removing suspended solids, the clarifier will be "soften" the water. Softening will be accomplished through the addition of lime, soda ash, sodium hydroxide, and magnesium chloride. The chemical feed systems will reduce the concentrations of calcium, magnesium, bicarbonate, suspended solids, barium, organics and silica in the cooling tower blowdown to acceptable levels for reuse.

The system will be designed to treat up to 1,000 gpm in a non-scraping type accelerated rate settling tank. The settling tank will be preceded by a premix/reaction tank (for chemical feed systems) to produce a softened effluent of the desired chemistry. Chemical feed systems will be designed to provide flexibility to treat an influent water having typical characteristics listed in Table 2-4. Effluent from the system is expected to have the following characteristics:

TABLE 2-4

Projected Blowdown Clarifier Influent Characteristics

Constituent	Units	Low Value[1]	Typical Value	High Value[1]
pH	standard	7.0	8.0	8.3
M-Alkalinity	mg/l $CaCO_3$	50	150	200
P-Alkalinity	mg/l $CaCO_3$	0	0	0
Sulfate	mg/l $CaCO_3$	3,300	6,800	8,000
Chloride	mg/l $CaCO_3$	1,000	2,300	3,000
Solids, Dissolved	mg/l	6,000	12,500	15,000
Silica	mg/l	60	120	150
Calcium	mg/l $CaCO_3$	150	350	1,000
Magnesium	mg/l $CaCO_3$	150	300	400
Sodium	mg/l $CaCO_3$	4,000	8,475	10,000
Potassium	mg/l $CaCO_3$	50	150	200
Iron	mg/l	0.5	2	5
Manganese	mg/l	0.05	0.1	1
Phosphate[2]	mg/l PO_4	0.1	2	10
Fluoride	mg/l $CaCO_3$	10	25	30
Boron	mg/l	5	20	30
Aluminum	mg/l	0.1	0.5	5
Barium	mg/l	0.5	1	2.5
Strontium	mg/l	5	10	15
Total Organic Carbon	mg/l	200	500	800
Solids, Suspended	mg/l	50	100	150

1) The low and high values are the expected ranges of each constituent. The actual analysis may contain some constituents at the high end of the concentration range and some constituents at the low end of the concentration range.

2) Phosphates could be as high as 10 to 15 mg/l (as PO_4) based on the scale/corrosion inhibitor selected.

Constituent	Concentration
Calcium	150 mg/l as $CaCO_3$
Magnesium	50 mg/l as $CaCO_3$
Silica	40 mg/l as SiO_2

The pH of the softened blowdown will be adjusted in the clarifier clearwell using sulfuric acid. Sludge from the clarifier will be recycled back the pretreatment clarifier for thickening, dewatering and ultimate disposal.

2.3.3.4.6 Sand Filters

Effluent from the clarifier clearwell will be filtered to prevent fouling of the RO unit membrane surfaces. The system will consist of four 33% capacity dual media filters capable of operating at full RO feed flow (i.e., 650 gpm) with one filter in the backwash mode. Filter backwash will be directed to the pretreatment clarifier for reuse as cooling tower makeup.

2.3.3.4.7 Reverse Osmosis System

The reverse osmosis (RO) system will serve to reduce the total dissolved solids (TDS) concentration of the softened blowdown. The system is designed to recover from 35 to 60 percent of the feed water for reuse as cooling tower makeup.

The system will be designed for an average 90% TDS removal efficiency. RO brine will be discharged to the emergency water storage tank for subsequent processing in the evaporators/crystallizer. System pH will be controlled at the inlet header through sulfuric acid addition. Biofouling will be controlled using sodium hypochlorite, if necessary. Provisions for antiscalant addition will also be incorporated.

2.3.3.4.8 Evaporator

The primary function of the evaporator is to increase the brine concentration of the RO waste stream and reduce its volume for subsequent processing in the crystallizer. The system will consist of two evaporator trains each capable of handling an RO brine feed flow of 150 gpm. The evaporators are designed to produce a distillate or product water stream and a concentrated brine stream. The distillate stream will have a dissolved solids concentration of approximately 10 mg/l and be discharged directly to the cooling tower basin. The concentrated brine stream will be further processed in the crystallizer/centrifuge system.

2.3.3.4.9 Crystallizer and Centrifuge

The crystallizer and centrifuge will receive concentrated brine from the evaporator. The crystallizer portion of the system is designed to further concentrate the evaporator slurry. The centrifuge will serve to dewater remaining solids to produce a near dry salt cake for off-site disposal. The crystallizer product water will be directed to the cooling tower basin. Additional chemical feeds, such as antifoaming agents and sodium hydroxide will be used, if required.

Salt cake from the crystallizer, approximately 25 tons per day, will be disposed of off-site at an approved landfill (See Section 2.3.3.5.2 Sludge). Projected characteristics of the salt cake are summarized in Table 2-5.

2.3.3.4.10 Site Stormwater Management

The CBCP stormwater management system was developed using guidelines, recommendations, and requirements of the SJRWMD, the City of Jacksonville, FDER, and EPA. EPA regulations for the Steam Electric Generating Point Source Category can be found at 40 CFR Part 423.

A schematic diagram of the stormwater system is presented in Figure 2-3. Site stormwater runoff will be collected and conveyed to one of two on-site retention ponds. Runoff from the storage area -- including the ash pelletizing area, the coal pile and the limestone pile -- will be collected in a common sump and discharged to the lined SARP. Runoff from the yard and power block areas will be collected and conveyed via gravity flow to the unlined YARP. Runoff from undeveloped areas will discharge off-site via overland flow through the existing, natural drainage system.

The SARP is designed to hold runoff for storms up to the 50-year, 24-hour event. A 50-year, 24-hour storm event is the largest storm of 24-hour duration expected to occur on average once in 50 years. Runoff from the coal storage area will contain contaminants that are subject to NSPS (thus, a new source NPDES permit is required; see Appendix A). The applicant has built mitigation into the CBCP design in an effort to prevent this discharge.

TABLE 2-5

Expected Constituents in Crystallizer Solids[1,4,5]

Constituent	Units	Value
Cyanide	lbs/day	0.89[2]
Antimony	lbs/day	1.49[2]
Arsenic	lbs/day	0.89
Beryllium	lbs/day	0.15[2]
Cadmium	lbs/day	0.06[2]
Chromium	lbs/day	0.45
Copper	lbs/day	0.29[3]
Lead	lbs/day	0.29
Mercury	lbs/day	0.006[2]
Nickel	lbs/day	0.29
Selenium	lbs/day	0.15[2]
Silver	lbs/day	0.0014[3]
Zinc	lbs/day	3.48
Titanium	lbs/day	0.15[2]
Phenols	lbs/day	3.28
Chloroform	lbs/day	0.05[2]

1) Data based on SK clarifier effluent samples collected on February 10,1993 and analyzed by Betz.
2) Constituent NOT reported above analytical detection limits in SK clarifier effluent.
3) Based on SK permitted discharge concentration.
4) Concentrations assume the cooling towers are operated at 10 cycles of concentration.
5) Variation in actual concentrations can be expected for the following reasons:

   a) Only limited data are avialable to characterize SK effluent for cardboard recycling operations.
   b) SK lagoon effluent quality may be different from SK clarifier effluent quality.
   c) Coprecipitation reactions in the cooling tower pretreatment clarifier and blowdown clarifier were assumed negligible. Partial removal of some constituents can, however, be expected to occur.
   d) Internal wastewater streams from Cedar Bay have not been included in the analysis.

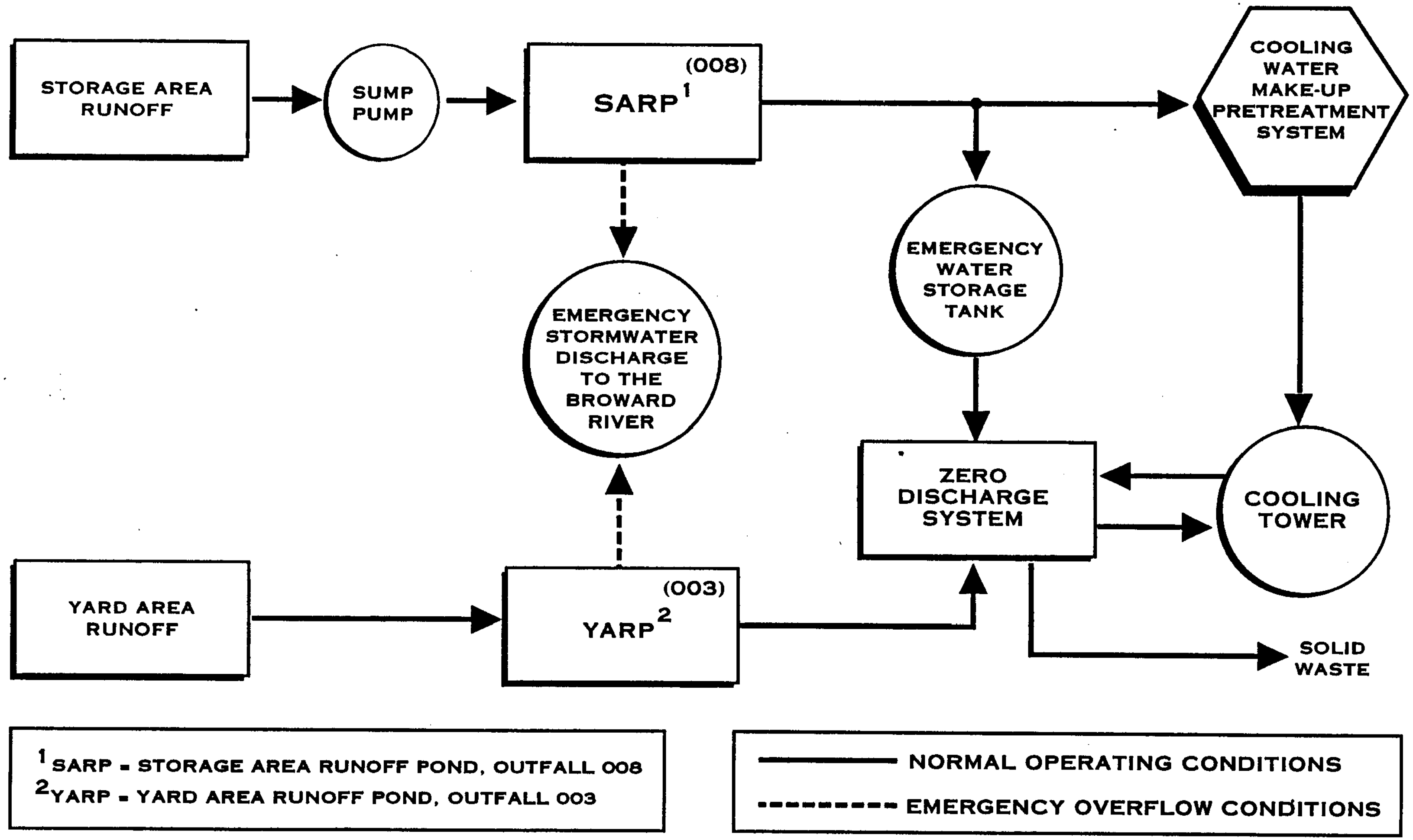


FIGURE 2- 3
Operational Stormwater Runoff

Except under severe rainfall conditions, collected stormwater will be treated and reused for cooling tower makeup. Water retained in the SARP can be diverted to the 1 million gallon emergency storage tank or directed straight to the zero discharge system (see beginning of this Section). During extreme storm events, both retention ponds may overflow into the Broward River.

The CBCP will employ "Best Management Practices" (BMP). The BMP program includes use of good housekeeping practices, routine inspection and maintenance programs, a spill prevention and counter-measure control plan, an employee training program, and record-keeping and reporting procedures. (See Appendix H)

2.3.3.5 Solid Waste Handling and Disposal

Construction activities resulted in the relocation of lime mud which had been stored on site. This is described in Section 2.3.4.1 Lime Mud Relocation. Solid waste generated by operation of the CBCP will consist primarily of fly ash and bed ash (including spent limestone). The zero-water discharged facility will create up to 80 tons per day of sludge waste. The CBCP will not generate hazardous waste in significant amounts.

2.3.3.5.1 Coal Ash Disposal

The combustion products to be generated by the CBCP include fly ash and bed ash. The ash will be formed into pellets ("pelletized") to reduce volume and for easier handling. The exact quantities of waste to be produced will depend on the properties of the coal and limestone used in the combustion process.

The applicant estimates that bed ash production will be approximately 88,000 TPY. The bed ash 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.

The applicant estimates that fly ash will be produced at a rate of 336,000 TPY. Most of this fly ash will be collected by a fabric filter system (baghouse), then 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 TPY) will also be conveyed to the silo via the vacuum transport system.

On April 21, 1989, AES-CB signed a Fuel Supply and Ash Disposal Agreement with Costain Coal, Inc. In this agreement, AES-CB was to pelletize the fly and bottom ash from the CBCP and load the pelletized ash onto those rail cars used to deliver the coal to the site. Costain has a purchase option agreement on property for the disposal of the pelletized ash. The disposal site(s) will be permitted in accordance with the state laws of Kentucky governing Residual Landfills designed specifically for the handling of this material. The site(s) will be in close proximity to the coal mining and loadout operations. CBC plans to either continue this agreement with Costain or to transport, via rail, the pelletized ash to another out-of-state licensed, permitted disposal facility.

CBC agreed to maintain a previously adopted paragraph to Conditions of Certification IV (see Appendix B) with FDER and the City of Jacksonville Regulatory/Environmental Services Department (formerly BESD) stating:

> Bottom ash and fly ash will be pelletized, and either shipped back to the mine utilizing the trains to deliver the coal, or sold as an additive to concrete. The bottom ash and fly ash shall not be disposed of in a landfill within Duval County. If the permittees decide to dispose of the bottom ash or fly ash by other than returning it to the mine, they shall notify BESD and [FDER].

2.3.3.5.2 Sludge

Two types of sludge waste, inorganic or salts, will be produced by the zero-water discharge system. Approximately 80 tons per day will be created: 55 tons of inorganic from the clarifier and 25 tons of salt form the crystallizer. These waste streams will be sent to a recycling facility or a licensed non-hazardous landfill. Projected characteristics of the salt cake are given in Table 2-5 (in section 2.3.3.4.9 Crystallizer and Centrifuge).

2.3.3.5.3 Hazardous Waste

The applicant expects that no hazardous waste will be produced on a continuous, long-term basis. Any hazardous waste produced by an intermittent, short duration process, such as cleaning solvent containing rags, will be transported to a licensed, permitted treatment, storage and disposal facility.

2.3.3.6 Transmission Facilities

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

2.3.3.7 Resource Requirements

The major resource requirements of the CBCP, on a yearly and lifetime basis, are summarized in Table 2-6. Coal will be burned in the boilers and Number 2 fuel oil or natural gas will be used for boiler startup. Limestone will be used for adsorption of SOx as the coal is burned. According to the state Conditions of Certification, consumptive uses of groundwater include boiler makeup, service water, and potable water.

2.3.4 Construction Procedures

2.3.4.1 Lime Mud Relocation

Initial site preparation required the relocation of an estimated 500,000 cubic yards of the lime mud which had been stored on the plant site. The lime mud was placed in a lime mud storage area in the northwestern portion of the SK property. Construction of the storage area included a geomembrane cap and seeded earth cover, which inhibit rainfall infiltration from leaching contaminants into the groundwater. These design elements are provided to ensure compliance with groundwater quality criteria specified in FDER rules (17-28 and 17-550). AES-CB and FDER confirmed that the lime mud deposits are not hazardous wastes under the provisions of Title 40 CFR 261 and 17-7630, F.A.C., the federal and state regulations which define hazardous waste (See Appendix L). All water from the lime mud ponds and former storage area was directed to the existing SK IWTS for treatment and discharge.

TABLE 2-6

MAJOR RESOURCE REQUIREMENTS OF THE CBCP
(M = MILLION; B = BILLION)

Resource	Yearly	30 Year Service Life
Coal (1)	1.170 Mtons	35.1 Mtons
Fuel Oil (2)	1.9 MGals	57 Mgals
Limestone	0.320 Mtons	9.6 Mtons
Groundwater (3)	0.529 BGals	15.88 Bgals

(1) Based on a maximum annual average coal consumption rate of 135.56 tons per hour, a design capacity factor of 93 percent and maximum coal properties of 12% ash and 1.7% sulfur by weight on a shipment basis.

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

(3) Based on maximum allowable daily use of 1.45 MGD for 365 days a year.

2.3.4.2 Clearing and Grubbing

The existing SK site, because it was already used for industrial purposes, was essentially clear of vegetation.

2.3.4.3 Dewatering Minimization

To minimize dewatering requirements, the applicant raised the site elevation by 5 feet. The result of this action was that most dewatering, with its consequent impacts on the Broward River and on groundwater movement, was no longer necessary.

Fabrication of the coal receiving structure required excavating a pit forty (40) feet below ground level. Groundwater infusion was reduced by lining the pit with corrugated piling; the ground piling reduced the flow rate to about five gallons per minute, which was removed from the pit using portable pumps.

2.3.4.4 Stormwater Management

The only wastewater discharges expected to occur during construction are stormwater runoff and sanitary wastes. The stormwater discharge is regulated by NPDES permit (Appendix H-3) issued in October 1992. An Erosion and Sedimentation Control Plan was developed to minimize construction-related runoff impacts. Various techniques, including sedimentation, are currently being used to control construction-related runoff. Runoff from areas of the site not disturbed by construction activities is being directed to the natural drainage systems within the area. Runoff from areas of the site disturbed by construction activities or plant operations is being collected in a ditch system and/or catchbasin and underground piping system and directed to ponds as described in the following paragraphs. Drainage systems have been designed for gravity flow wherever site conditions allow.

Temporary ditches and the primary permanent drainage ditches and catch basins were constructed early in the construction period. All construction runoff is being directed to this collection system and routed to the YARP and/or SARP. The construction runoff resulting from a 10-year, 24-hour storm is being contained in the ditches and ponds. A 10-year, 24-hour storm is the largest storm of 24-hour duration expected to occur on average once in 10 years.

Offsite runoff will not be collected in the onsite drainage system. Swales are provided to direct runoff which originates in offsite, upgradient areas around the site perimeter into existing drainage patterns. These swales are 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 800 people. Of this, approximately 200 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.

2.3.4.5 Solid Wastes

Pre-operational boiler and condensate system metal cleaning wastes will be transported to a licensed Treatment, Storage and Disposal Facility for off-site treatment and disposal.

2.4 SK-ONLY ALTERNATIVE

For this evaluation the No Action Alternative is the operation of SK without the CBCP steam and power supply for manufacturing processes. The SK operation would be required to supply steam and power for their operation from existing boilers, which are the existing oil and bark fired boilers. The recovery boilers would be shutdown under this alterantaive due to the facility changing to a recycling operation, which does not require the use of a liquor recovery system.

In addition, the No Action Alternative is evaluated based on the CBCP not being built on the adjacent land area and this this area would conutinue to be used as a disposal site for SK operations.

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing environment at those locations which could potentially be affected by the project. More detailed descriptions of the environmental resources are provided in the Draft EIS/SAR.

3.1 AIR RESOURCES

3.1.1 Climate/Meteorology

The terrain surrounding the CBCP site is level. Easterly maritime winds blow about 40% of the time producing a moderate climate. The annual mean temperature at Jacksonville is 68.4°F. Summers are long, warm and relatively humid (average temperature 80°F). Winters are mild, with occasional cold snaps (average temperature, 55°F).

Annual rainfall averages about 54 to 55 inches. 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 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 miles per hour overall. Wind speed is slightly higher during spring than in other seasons.

The height of the surface "mixing layer" is defined by the heat distribution in the vertical. The mixing layer or mixing height is measured from the vertical temperature distribution and represents the layer where vigorous vertical mixing of the atmosphere occurs. A temperature increase with height, or also called a temperature inversion, caps the layer. Jacksonville has an annual average morning mixing height of 1,457 feet (444 meters) and an annual average afternoon mixing height of 4,672 feet (1,424 meters). The annual average morning mixing height is one of the smallest in Florida, but larger then those further inland in Georgia and other states. The afternoon annual average mixing height is one of the largest in Florida, but smaller than those formed away from large water bodies.

3.1.2 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. FDER is working with a number of the existing sources to resolve certain modeled SO_2 violations, described below.

3.1.3 Air Quality

Table 3-1 summarizes the existing air quality in the study area. The central 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 designated unclassified for PM10. Duval County has not experienced an exceedance of the PM10 standard in almost three years.

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. Because of their relative location to the sources of emissions, it appears that most of the monitors are significantly influenced by the existing major sources of SO_2. While Jacksonville is considered attainment for SO_2, recent modeling submitted with consideration of downwash have indicated potential modeling 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. Although some monitors are affected by major point sources and others are presumably influenced by transportation sources, monitored 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).

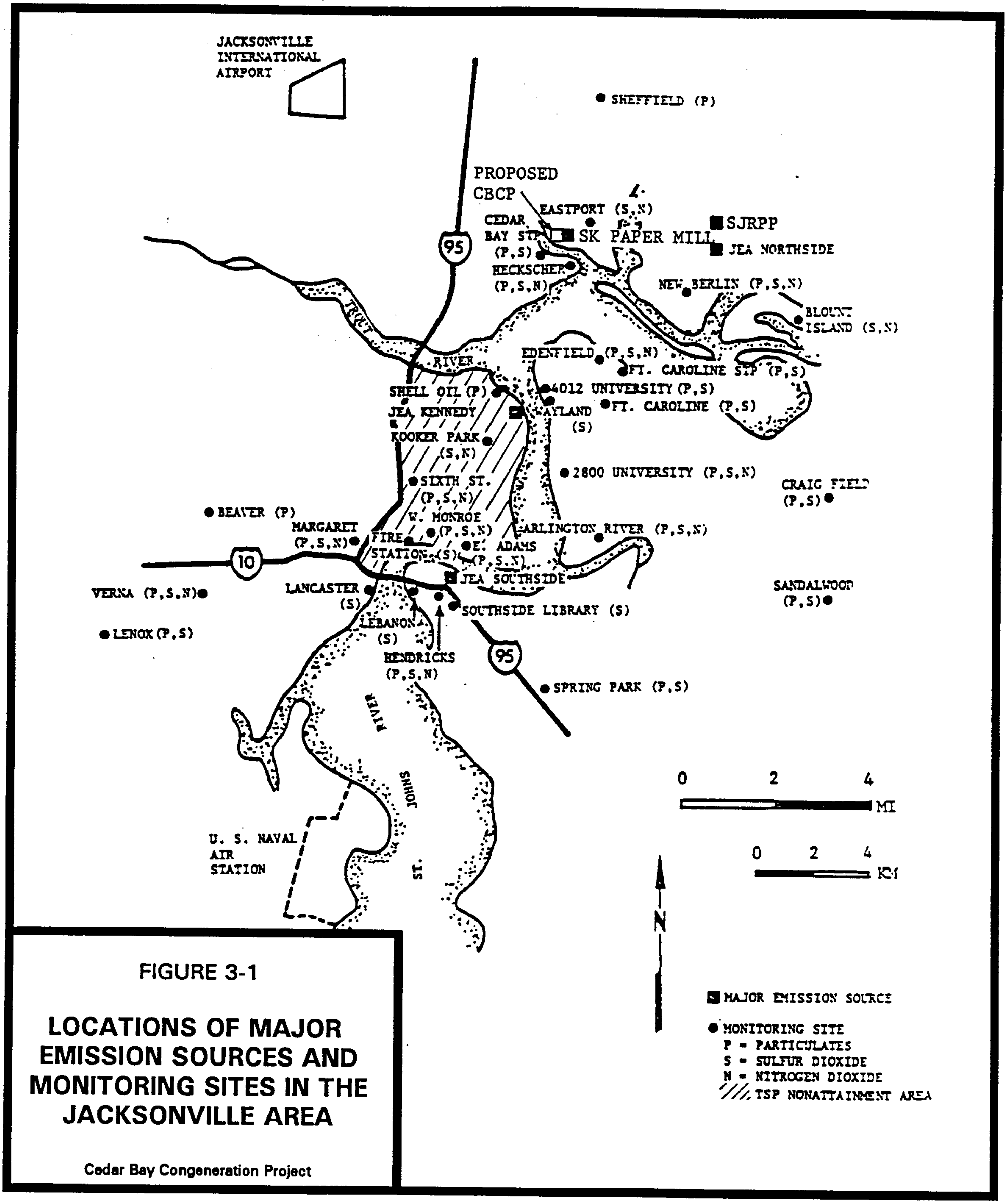


FIGURE 3-1

LOCATIONS OF MAJOR EMISSION SOURCES AND MONITORING SITES IN THE JACKSONVILLE AREA

Cedar Bay Cogeneration Project

SOURCE: JEA/FP&L 1981

TABLE 3-1

EXISTING AIR QUALITY

Pollutant	Sampling Period	Jacksonville Central Area ug/m^3	Outlying Areas of Jacksonville Area ug/m^3
SO_2	Annual	20	5 to 15
	24-hour	100 to 200	30 to 60
	3-hour	400 to 900	---
Nox	Annual	40	<20
PM_{10}*	Annual	<60 (unclassified)	<40
	24-hour	<150 (unclassified)	<90
CO	8-hour	8,000	---
	1-hour	14,000	---
0_3*	1-hour	<235 (transitional)	<235 (transitional)
Pb	Calendar	---	---
	Quarter		

* At the end of 1991 Duval County had three years of monitoring data sufficient to be classified as attainment for PM10 and ozone. Currently the county is unclassified for PM10 and transitional 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 micrograms per cubic meter (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.

3.1.4 Regulatory Framework

3.1.4.1 Federal Regulatory Requirements

Because the CBCP is a major stationary source of air pollution, it is required by the Clean Air Act (CAA) to obtain an air permit before operation. The process is called new source review (NSR).

The CBCP must meet two major federal requirements in its NSR: National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD). The NAAQS establishes a limit for air quality degradation in all areas of the United States. The PSD program establishes an amount of increase (increment) over a baseline level above which a new industry may not deteriorate air quality.

Areas where NAAQS are exceeded are called "non-attainment" areas. Projects located in non-attainment areas are subject to Non-Attainment Area (NAA) permits. Areas where air quality conditions are acceptable are called "attainment" or unclassified areas. PSD permitting applies in these areas. A source is subject to PSD permitting requirements if it will emit any PSD pollutant in amounts equal to or exceeding a 100 TPY threshold.

The CAA requires EPA to set NAAQS for certain pollutants (criteria pollutants) and the levels of each that should not be exceeded for the protection of public health (primary standards) and welfare (secondary standards) (Table 3-2). In areas of non-attainment, new pollution sources are restricted through the requirements of pollution offsets. This means that before construction of a new significant contributor of the non-attainment pollutant in or near a non-attainment area, an equal of greater reduction of that pollutant from another source in the area must be secured.

In attainment areas, where PSD applies, the amount of incremental increase allowed depends on the classification of the area affected (Table 3-3). In Class I areas, which are predominately large national parks, the increment is very small. A moderate increment is

TABLE 3-2

FEDERAL AND FLORIDA AMBIENT AIR QUALITY STANDARDS

Pollutants	Averaging Period ug/m³	Federal Standards Primary ub/m³	Federal Standards Secondary ug/m³	Florida Pollutant Standards
Sulfur Dioxide (SO_2)	Annual 24-hour 3-hour	80 365	--- --- ---	60 260 1,300
Nitrogen Dioxide (NO_2)	Annual	100	100	100
Particulate Matter (PM_{10}	Annual 24-hour	50 150	50 150	50 150
Carbon Monoxide* (CO)	8-hour 1-hour	10 40	--- ---	10 40
Ozone (O_3)	1-hour	235	235	235
Lead (Pb)	Calendar Quarter	1.5	1.5	1.5

* Units are mg/m³

TABLE 3-3

PSD CLASS I AND CLASS II AIR QUALITY INCREMENTS

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

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

allowed in Class II areas, while the greatest increments are allowed in Class III areas. Presently there are no Class III areas in Florida.

To ensure that PSD increments are not exceeded, other sources which have either expanded or consumed increment since the baseline date must be accounted for if they affect the increment within the impact area of the proposed source. Typically, these are sources located within about 50 km of a proposed source which have either received PSD permits or have retired older emissions units.

The CBCP is located in a transitional ozone non-attainment area. Because of this, CBCP emissions of VOCs (a precursor to ozone) must be offset with emission reductions. The concurrent shut-down of the SK boilers will result in a net decrease of VOCs in the project area. The CBCP is not subject to NAA permit requirements.

Two additional federal requirements associated with the NSR include the New Source Performance Standards (NSPS) and Best Available Control Technology (BACT). The NSPS establish industry- specific emission limitations. Fossil fuel-fired steam generating units of more than 250 MMBtu/hr of heat input produce three types of emissions for which EPA has established NSPS (see 40 CFR 60, Subpart D): PM, SO_2 and NO_x.

BACT is defined as an emission limitation based on the maximum degree of reduction which EPA, taking into account energy, environmental and economic impacts, determines is achievable for a source. A BACT evaluation is required for pollutants which will be emitted in amounts equal to or exceeding the PSD significant emission rate.

3.1.4.2 Projected Regulatory Requirements

The Clean Air Act Amendments of 1990 (CAAA) are the only future regulations under development over the coming years that could potentially impact the CBCP. Title I -Non-attainment Areas provisions mandate more stringent requirements for more and smaller sources of VOC and NO_x in ozone non-attainment areas. However, Duval County is classified as a transitional ozone non-attainment area. This essentially means that it is already becoming an attainment area and therefore not subject to the new requirements.

Title III - Air Toxics provisions require EPA to study public health risks from exposure to hazardous air pollutants from existing utilities and make recommendations, if needed, for specific regulations. It is not known at this time if EPA will recommend additional requirements. However, new plants such as the CBCP, with advanced emissions control technology, should not be impacted, if at all, to the degree that older utility plants may. Title III of the 1990 CAAA also requires regulation of Extremely Hazardous Substances (EHS) to prevent accidental releases. However, the CBCP will likely not store any EHSs in quantities that would trigger such requirements.

The CBCP will not be subject to requirements under Title IV, Acid Deposition Control, based on its status as a qualifying cogeneration facility. Nevertheless, the CBCP SO_2 and NO_x emission limitations are already below those that will be required for existing utilities. As a newly permitted major source with extensive monitoring and reporting requirements, the CBCP should have no problem complying with the state's operating permit program under Title V of the 1990 CAAA, which is primarily aimed at sources in existence prior to the 1977 CAA.

3.1.4.3 State Regulatory Requirements

Under the CAA, each state must prepare a State Implementation Plan (SIP) describing how it will control emissions to meet the NAAQS. 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 (see Table 3-2). The primary difference between the federal requirements and Florida's requirements is in the NSPS.

3.2 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 section.

3.2.1 Mortality and Morbidity

The mortality data for Duval, Volusia, and Seminole Counties, State of Florida, and the United States are presented in Table 3-4. 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 cirrhosis 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.

TABLE 3-4

DEATH RATES PER 100,000 POPULATION FOR SELECTED CAUSES DURING 1978 [a]

Cause	Duval County	Volusia/Seminole Counties	Florida	USA
Heart Disease	376.0	550.8	530.4	334.3
Cancer	175.4	239.1	241.2	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	31.4	32.4	23.1
Cirrhosis 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	5.0	7.6	10.1
All Causes	840.0	1,075.0	1,103.7	883.4

[a] National Center for Health Statistics, 1978; and, State of Florida Department of Health, 1978.

This cause group is probably more directly related to cigarette smoking and/or air pollution than any other with the exception 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.

3.2.2 Lung Cancer in the Jacksonville Area

A county-by-county survey of mortality in the United States (1950 - 1969) revealed that Duval County had 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 3-5).

The finding that white males had an approximately 50% greater likelihood of lung cancer than the rest of the country was also reported in an update of the epidemiologic data from 1975 to 1984 (McDonagh, et al, 1991). In this study, a somewhat smaller excess of lung cancer was seen in white females and no significant differences were seen in non-whites when compared to U.S. statistics. This study revealed no clusters of cancer when investigating the data by census tract.

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 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. An ongoing study, led by the St. Vincent's Medical Center Heart and Lung Institute, is being conducted to discern other possible causes and has, to date, identified a possible contributor in an excess smoking rate among white males in Duval County. 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, as well as the nation as a whole.

3.3 NOISE

3.3.1 Noise Basics

All noise and sound data relate to an "A-weighted" sound level since this sound level is the closest to the range of human hearing. The A-weighted sound level is measured in decibel

TABLE 3-5

MORTALITY RATES FOR LUNG CANCER (LISTING OF THE 10 METROPOLITAN COUNTIES [a] IN THE U.S.A. WITH THE HIGHEST AGE-ADJUSTED RATES AMONG WHITE MALES, 1970-75 [b] [c])

Ranking	County	Mortality Rate (deaths/year/10)
1	Duval, FL	93.2
2	St. Louis City, MO	90.9
3	Baltimore City, MD	88.4
4	Chesapeake, VA [d]	87.2
5	Orleans, LA	86.1
6	Mobile, AL	83.8
7	Jefferson, KY	82.8
8	James City, VA [e]	80.4
9	Chesterfield, VA [f]	79.3
10	Marion, IN	77.6

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

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

(c) Source, Blot et. al. 1981

(d) Includes the independent cities of Norfolk and Portsmouth

(e) Includes the independent City of Newport News

(f) Includes the independent City of Richmond (dB) units and is expressed in various metric descriptors that average sound energy over given time periods. Noise conditions at the proposed CBCP are given in dBs and expressed in the following common descriptors:

- equivalent sound level for 24-hour periods [Leq(24)] which is a time-weighed average of the sound energy present over 24 hours; and

- day-night average sound level (DNL or Ldn) which considers the intrusiveness of nighttime noise by adding 10 dB noise events occurring between 10 p.m. and 7 a.m.

Existing noise conditions can also be compared to the levels identified by EPA as protective in the EPA report "Information on Levels of Environmental Noise," generally known as the "Levels Document" (EPA, 1974). EPA, like all federal agencies, must comply with the Noise Control Act (NCA) of 1972. In addition, EPA is responsible for the enforcement of the NCA and has review authority for noise impacts in NEPA documents prepared by other federal agencies. Although funding for the EPA noise program is currently limited to the EPA Headquarters office in Washington, D.C., EPA has recently enforced the NCA in a civil case regarding the inaccurate labeling of protective hearing devices (U.S. Department of Justice and EPA, 1993).

EPA is also part of the Federal Interagency Committee on Noise (FICON) which was organized to review federal policies regarding the noise impact assessments of airports. FICON has recommended criteria for airport analyses, which although developed to address airport noise, are also reasonably applicable to any project that causes an increase in environmental noise. If screening analysis shows that noise-sensitive areas will be at or above DNL 65 dB and will have an increase of DNL 1.5 dB or more, further analysis should be conducted (FICON, 1992).

EPA believes that actual noise levels, incremental increases and single-event (intermittent peak) levels are important in characterizing and documenting project noise impacts. In general, noise levels of 55 dB and less at project property line represent a useful target for the protection of the affected human environment. EPA also believes that any noise increase produced by a project may result in a noise impact. A 10 dB and greater increase is considered a significant impact. Intrusive single-event noise levels (e.g. train whistles, power plant flare stack noise, blow-out cleaning of power plant piping during construction, etc.) should be documented to supplement the cumulative noise level metrics (e.g., Ldn and Leq) which essentially average noise contributions over a given period of time.

EPA encourages noise avoidance and mitigation for unavoidable noise impacts. Source reduction, noise source or receptor insulation, public announcement prior to known significant noise events, dense evergreen vegetation, barrier construction, realignments, and residential displacement compensation (i.e., buy-outs), etc. are desirable mitigative approaches, as appropriate.

In addition to the EPA guidelines, the U.S. Department of Housing and Urban Development (HUD) has established noise guidelines that provide minimum standards to protect citizens against excessive noise in their communities and residential areas. Three categories of acceptability have been defined: acceptable if the Ldn is less than 65 dB; normally unacceptable if the Ldn is greater than 65 dB and less than 75 dB; and unacceptable if the Ldn is greater than 75 dB (HUD, 1979). These noise levels are to be based on noise from all sources, including highway, railroad, and construction-related activities.

Additional noise information entitled "Basics of Sound and Noise" is provided in Appendix O.

3.3.2 Existing Conditions

This section describes the ambient sound environment for the proposed site prior to construction. The study area included noise receptors that could possibly be affected by noise from the CBCP. Noise sources in the area included roadways, railroads, industrial plants, the SK mill, and airports. A noise survey was prepared 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 SK site. Another location was at the junction of Heckshер Drive and Eastport Road. The last location was in a residential area along Cedar Bay Road. Monitored noise levels are listed in Table 3-6.

The noise receptor most likely to be affected by the CBCP is located near residences across the Broward River along Cedar Bay Road some 2,000 feet west of the site. Measured noise levels ranged from a Leq of 46.3 decibels (dB) during nighttime hours to 83.1 dB during daytime hours. While making measurements, insect noise, a sewage treatment plant and the SK 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.

TABLE 3-6

EXISTING NOISE LEVELS

NML *	Period	Day	Time	dBA		Identifiable Sources
				'eg	'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 Hecksher Road, 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	Wild 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

3.3.3 Applicable Guidelines and Regulations

There are no existing federal or state noise control regulations that apply directly to offsite noise levels resulting from the CBCP. Two local ordinances regulating noise levels are applicable to the CBCP: the Land Use Regulations for the City of Jacksonville, Florida and the restrictions established by the Jacksonville Environmental Protection Board (JEPB).

Noise Pollution Control, Rule 4.0, produced by the JEPB, requires that the noise from an industrial emitter cannot exceed a set of octave band frequency limits or an overall A-weighted level at a residential area as follows:

Daytime (7 a.m. to 10 p.m.)

Octave Band Center Frequency, Hz.

31	63	125	250	500	1000	2000	4000	8000	dB
80	78	73	67	61	56	52	48	45	65

Nighttime (10 p.m. to 7 a.m.)

Octave Band Center Frequency, Hz.

31	63	125	250	500	1000	2000	4000	8000	dB
75	74	67	63	56	51	47	45	40	60

3.4 SURFACE WATER RESOURCES

The waters of concern which may be affected by the CBCP include the St. Johns River and the Broward 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). State Water Quality Standards for Class II and III waters are presented in Table 3-7.

TABLE 3-7

STATE WATER QUALITY STANDARDS

Parameter	Class II	Class II - Fresh	Class III - Marine
Alkalinity	--	≥20 mg/l as $CaCO_3$	--
Aluminum	≤1.5 mg/l	--	≤1.5 mg/l
Ammonia, unionized	--	≤0.02 mg/l	--
Antimony	≤0.02 mg/l	--	≤0.02 mg/l
Arsenic	≤0.05 mg/l	≤0.05 mg/l	≤0.05 mg/l
Beryllium	--	≤0.011 mg/l when hardness ≤150 mg/l ≤1.10 mg/l when hardness >150 mg/l	--
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	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	≤0.1 mg/1 as free Br	--	≤0.1 mg/l as free Br
Cadmium	≤5.0 ug/l	≤0.8 ug/l when hardness ≤150 mg/l ≤1.2 u/l when hardness >150 mg/l	≤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	<10% increase over normal background levels in predominantly marine waters
Chlorine (Total Residual)	≤0.01 mg/1	≤ 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 in <10% of samples	≤200 counts/100 ml monthly average; 400 counts/100 ml in <10% of samples per month; ≤800 counts/100 ml on any one day	≤200 counts/100 ml monthly average; 400 counts/100 ml in <10% of samples per month; ≤800 counts/100 ml on any one day

TABLE 3-7

STATE WATER QUALITY STANDARDS (continued)

Parameter	Class II	Class II - Fresh	Class III - Marine
Coliforms, Total	≤70 counts/100 ml median; 230 counts in <10% of samples	≤1,000 counts/100 ml monthly average; 1,000 counts/100 ml in <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 in <20% of samples per month; ≤2,400 counts/100 ml at any time
Copper	≤0.015 mg/l	≤0.03 mg/l	≤0.015 mg/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 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 as fluoride ion	≤5.0 mg/l
Iron	≤0.3 mg/l	≤1.0 mg/l	≤0.3 mg/l
Lead	≤0.05 mg/l	≤0.03 mg/l	≤0.05 mg/l
Manganese	≤0.1 mg/l	--	--
Mercury	≤0.1 ug/l	≤0.2 ug/l	≤0.1 ug/l
Nickel	≤0.1 mg/l	≤0.1 mg/1	≤0.1 mg/l
Nutrients	Shall not be altered so as to cause an imbalance in natural populations of aquatic flora and fauna	Shall not be altered so as to cause an imbalance in natural populations of aquatic flora and fauna	Shall not be altered so as to cause an imbalance in natural populations of aquatic flora and fauna

TABLE 3-7

STATE WATER QUALITY STANDARDS (continued)

Parameter	Class II	Class II - Fresh	Class III - Marine
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	± 1.0	±1.0	±1.0
Phenol	≤1.0 ug/l	≤1.0 ug/l	≤1.0 ug/l
Phenolic Compounds	≤1.0 ug/l	≤1.0 ug/l	≤1.0 ug/l
Phosphorous (Elemental)	≤0.1 ug/l	--	≤0.1 ug/l
Phthalate Esters	--	≤3.0 ug/l	--

TABLE 3-7

STATE WATER QUALITY STANDARDS
(continued)

Parameter	Class II	Class II - Fresh	Class III - Marine
Polychlorinated Biphenyl	≤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	≤0.025 mg/l	≤0.025 mg/1	≤0.025 mg/1
Silver	≤0.05 ug/1	≤0.07 ug/l	≤0.05 ug/1
Specific Conductance	Shall not be increased more than 50% above background or to 1,275 umhos/cm, whichever is greater	Shall not be increased more than 50% above background or to 1,275 umhos/cm, whichever is greater	--
Transparency from background	≤10% reduction from background	≤10% reduction from background	≤10% reduction from background
Turbidity from background	≤29 NTU increase from background	≤29 NTU increase from background	≤29 NTU increase from background
Zinc	≤1.0 mg/l	≤0.03 mg/l	≤1.0 mg/1

3.4.1 Surface Water Systems

3.4.1.1 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 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 cubic feet per second (cfs). During 1979-1980, flow measurements were made in the river approximately three miles east of the site. Velocities varied from 0.45 feet per second (fps) to 1.76 fps during flood tide and 0.43 to 1.79 fps at 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 against tidal influences for a short period of time.

Data collected in the late 1980s 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.

3.4.1.2 Broward River

Water quality data for the Broward River just upstream of its confluence with the St. Johns River was obtained from the City of Jacksonville RESD. Data indicates occasional exceedances of State water quality standards criteria for pH, iron, lead, and copper.

3.4.2 Surface Water Uses

The St. Johns River is under the jurisdiction of the SJRWMD. The SJRWMD develops 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 for power generation, 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 upstream as far as Sanford.

3.4.2.1 Water Withdrawals

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, surface water use was estimated to be 185.6 MGD. A significant portion of water use for industry and power generation was obtained from surface water sources, principally the St. Johns River.

The Northside Generating Station and SJRPP are major users of surface water from the St. Johns River in the area. JEA withdraws approximately 806 MGD total for the two power plants.

3.4.2.2 Surface Water Discharges

The SK mill currently discharges 11 MGD of wastewater from its industrial wastewater treatment system (IWTS).

3.5 GROUNDWATER RESOURCES

3.5.1 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 below ground surface and the shallow rock aquifer 40 to 100 feet below ground surface. 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 gallons per minute (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. Recharge to the shallow aquifer system occurs from rainfall and surface water. Movement of groundwater at the plant site is generally towards the adjacent 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. Use of water from 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.

3.5.2 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 1989 , the Floridan aquifer provided approximately 168 MGD for Duval County. A breakdown of groundwater use in the surrounding area includes the following estimates:

User	Amount (MGD)
Public Water Supply Systems	94.1
Domestic Uses	13.4
Industry	39.9
Agriculture/Irrigation	9.2
Thermal Electric	4.4
Miscellaneous	6.7
Total	167.7

Fresh water use in Duval County is 168.8 MGD, with 167.7 MGD from groundwater. Power generation in Duval County requires 4.44 MGD of groundwater. The CBCP would increase the daily requirement for power generation to 5.48 MGD.

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 in the potentiometric surface 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 National Geodetic Vertical Datum (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, which draw from the Floridan Aquifer, flow at approximately 7,500 gpm at 9.5 pounds per square inch (psi) pressure at the ground surface.

3.5.3 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 I-B." The water quality criteria (Table 3-8) for Class I-B are applicable except within zones of discharge.

TABLE 3-8

STATE AND FEDERAL GROUNDWATER QUALITY CRITERIA[a]

Constituent	State of Florida[b] Class I-B Waters	EPA Drinking Water Standards[c]	
		Primary	Secondary
Inorganic			
Arsenic	0.05	0.05	
Barium	1.0	1.0	
Cadmuim	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	

TABLE 3-8

STATE AND FEDERAL GROUNDWATER QUALITY CRITERIA[a] (Continued)

Constituent	State of Florida[b] Class I-B Waters	EPA Drinking Water Standards[c]	
		Primary	Secondary
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 unites, 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.

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 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 were 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 was conducted in 1972-1975 and in 1985 (Law Engineering Testing Company, 1983) indicated that the water is of the calcium-bicarbonate type. SK Well No. 2 showed increases in concentrations of sodium, conductivity, and 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 St. Johns River. Sampling in 1983 also indicated that the conductivity in Well No.'s 1 and 2 had significantly higher 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 I-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. Groundwater analyses of surficial wells were conducted in 1988 and 1989 by Black & Veatch, Dames & Moore, and Environmental Resources Management -South, Inc. The pH was noted to be elevated in some areas. Metallic ions such as zinc, cadmium, mercury, arsenic, aluminum , chromium, copper, iron and lead show values in excess of state water quality criteria. Nickel levels are elevated as is phenol and certain hydrocarbon compounds due to oil spills on site.

3.6 ECOLOGICAL RESOURCES

This section provides a summary of the existing ecological resources in the vicinity of the CBCP site prior to construction. Since the CBCP site area was previously used by the SK paper mill, and is historically an industrial site, on-site terrestrial resources are limited.

The Timucuan Ecological and Historic Preserve, named a National Park Unit in 1988, is located approximately 10 miles away (see Appendix M) and encompasses salt and fresh water marshes between the St. Johns and Nassau Rivers.

3.6.1 Aquatic Ecology

The CBCP site is adjacent to the extreme northern portion of the St. Johns River. Aquatic communities near the 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 mill is nevertheless a highly productive estuarine area.

3.6.1.1 Aquatic 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 St. Johns 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 per millimeter 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/FPL 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. 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 support 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.

3.6.1.2 Aquatic Fauna

3.6.1.2.1 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/FPL 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).

3.6.1.2.2 Macroinvertebrates

Benthic macroinvertebrate populations in the study area are dominated by polychaetes, obligochaetes, and small crustaceans (JEA/FPL 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.

3.6.1.2.3 Shellfish

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 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). However, the FDER has not approved the St. Johns River in Duval County for shellfish harvesting (JEA/FPL 1981a).

3.6.1.2.4 Fish and Ichthyoplankton

The St. Johns River estuary supports an abundant and varied fish community as 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 CBCP site (JEA/FPL 1981a). This study lists 113 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 viable commercial fisheries industry.

3.6.2 Terrestrial Ecology

3.6.2.1 Terrestrial Flora

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 project site is located on industrialized land which had been used for pulp mill operations for at least 30 years. During that period alteration of the natural vegetation of the area had occurred, with the exception of the northern portion where there was habitat suitable to the gopher tortoise (a Florida species of special concern). The majority of the onsite vegetation consisted 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 was covered by weedy species such as briar, ragweed, dog fennel, and Bermuda grass. Shrubby grounsel trees occurred along the river and on certain isolated portions of the site. Other species in shrubby wooded sections consisted of black cherry, wax myrtle, and cabbage palm. Along the shore of the Broward River is a Spartina-Juncus marsh .

3.6.2.2 Terrestrial Fauna

Prior to construction, onsite wildlife habitat was limited, scattered in small patches, and 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 included rabbits, snakes, tortoises, and armadillos. Raccoons, skunks, mice, and opossums were likely onsite. Due to lack of useful habitat, larger mammals such as deer may have only occasionally visited fringe areas of the site.

3.6.3 Ecologically Sensitive 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.

Habitat suitable for the gopher tortoise existed on the northern portion of the SK site. The gopher tortoise can potentially harbor in its burrows at least 30 types of commensal animals, including the endangered indigo snake. The gopher tortoise is a federal C2 candidate species and a species of special concern in Florida. Nine gopher tortoises were found on-site and were relocated under the guidance of the Florida Game and Freshwater Commission. See Section 4.6.1 Construction-related Ecological Impacts and Appendix P.

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, which inhabits ponds, lakes, and rivers, 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 classified as species of special concern in 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 have been found on site.

3.7 GEOLOGIC 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.

3.7.1 Physiography and Topography

Florida can be divided into three major transpeninsular 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.

3.7.2 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 aquifer's 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 were necessary to provide a firm foundation.

Foundations for heavy structures were placed on a combination of friction and bearing piles, driven into the dense sands or the Hawthorne formation. More lightly loaded structures were placed on shallow footings, mats, or piles as necessary. Removal of lime mud and wood chips was also necessary for construction of the CBCP.

3.7.3 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.

3.7.4 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.

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 Limestone, the Lake City Limestone, and usually the Oldsmar Limestone. These strata are limestones and dolomites, generally very permeable, and yield high quantities of groundwater.

3.8 SOCIAL AND ECONOMIC CONDITIONS

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 CBCP project.

3.8.1. 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 U.S. Navy bases located in the county.

Table 3-9 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 U.S. Department of Commerce and from JPD. Table 3-10 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.

3.8.2 Economic Conditions

It is expected that the area principally affected by the 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. While there may be some secondary impacts realized in other counties of the

TABLE 3-9

POPULATION ESTIMATE FOR DUVAL COUNTY, FLORIDA, BY PLANNING DISTRICT AND MUNICIPALITY (APRIL 1, 1987)

District/ Municipality	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 District	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 (JPD, August 1987).

TABLE 3-10

POPULATION PROJECTIONS FOR 1988 AND 1990

Area	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.

project region, it is not expected that their public or private services and community infrastructure will be directly affected by CBCP.

3.8.2.1 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 3-11 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.

TABLE 3-11

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	10.0	11.4
Transportation	23,700	8.2	27,200	7.1	14.8
Wholesale Trade	22,600	7.9	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	24.3	93,000	24.3	54.4
Government	53,400	18.5	57,500	15.0	7.6
Total County	**288,600**	**100.0**	**382,200**	**100.0**	**32.0**

3.8.2.2 Income

The growth in the level of household income in Duval County from 1970 to 1980 is detailed in Table 3-12. 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.

3.8.2.3 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 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	Percent Change
Single Family	142,310	161,482	13.47
Duplexes	6,811	7,753	13.83
Tri/Quad-plexes	9,841	16,286	65.49
Five or More	41,562	54,333	30.73
Mobile Homes	13,032	23,460	80.83
Demolitions	0	-1,802	--
Total	213,556	261,512	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 has 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. 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.

TABLE 3-12

HOUSEHOLD INCOME IN DUVAL COUNTY, FLORIDA

Type of Household	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.

JPD has forecast that housing stock in Duval County will continue to grow, expanding 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 3-13. This continued growth is demonstrated by 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

3.8.3 Community Services

3.8.3.1 Water Supply and Wastewater Treatment

The Jacksonville/Duval County public works function includes sewage, water, and sanitation services. At present, each component is operating with excess capacity. The total 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 the CBCP.

The service level capacity of the sanitation component was 1.1 million pounds per day in 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 in 1989 but was re-opened two months later. Another landfill was opened in August, 1992. The County had also filed a request for expansion of the present North District landfill but withdrew the permit request. The system capacity will be approximately 1,800 tons per day of usable space, or 26 years.

TABLE 3-13

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

		Group Quarter Population		Dwelling Units						
Year	**Total Population**	**Household Population**	**Total**	**Civilian**	**Military***	**Household Size**	**Total**	**Occupied**	**Vacant**	**Percent Vacant**
1980	571,003	559,694	11,309	6,235	5,074	2.69	226,611	208,151	18,260	8.06
1985	633,920	617,885	16,035	6,561	9,474	2.61	258,518	236,799	21,719	8.40
1990	690,354	672,570	17,784	6,887	10,897	2.56	285,756	262,610	23,146	8.10
1995	733,914	715,804	18,110	7,213	10,897	2.51	310,747	285,204	25,543	8.22
2000	769,565	751,129	18,436	7,539	10,897	2.47	332,285	304,606	27,679	8.33
2005	799,467	780,705	18,762	7,865	10,897	2.43	351,090	321,423	29,667	8.45
2010	827,151	808,063	19,088	8,191	10,897	2.43	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).

3.8.3.2 Public Safety

The public safety service function includes law enforcement and fire protection. Based on U.S. Department of Commerce standards, the law enforcement component for 1979-80 had 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/FPL 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 were eight fire stations in 1985, 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.

3.8.3.3 Education

The public school system of Jacksonville/Duval County area consists of 132 schools and 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/FPL 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).

	Projected Enrollment	Additional Schools
Elementary 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.

3.8.3.4 Health Care

Based on U.S. Department of Commerce standards, a city of Jacksonville's size should maintain a public health staff of approximately 750 personnel. The public health service function of Jacksonville/Duval County has a staff of only 165, resulting in a deficiency of approximately 590 personnel (JEA/FPL 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/FPL 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 North District with the majority of these located in the southern and central portions.

3.8.4 Land Use

3.8.4.1 Region and Area

Land use in the seven county project region is predominantly agricultural with approximately 2,336,500 acres (82%) devoted to this use (Table 3-14). Other land uses in the

TABLE 3-14

EXISTING LAND USE ACREAGE - NORTHEAST FLORIDA REGION (JACKSONVILLE AREA PLANNING BOARD 1977A IN JEA/FPL 1981A)

Classification	County							
	Baker	Clay	Duval	Flagler	Nassau	Putnam	St. Johns	Region
Residential(1)	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(2)	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(3)	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	21	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	2,336,520
Agriculture as % of Total Land	95.6	91.4	58.8	90.5	83.8	76.2	86.1	81.8

(1) Includes local street right-of-way.
(2) Includes an estimated 11,316 acres of rights-of-way.
(3) Excludes national forest and/or swamp lands and game management areas or refuge.
Note: Columns may not total exactly due to rounding.

region include residential; commercial; industrial; and extractive (mining/quarrying). The greatest urban-related use in the Northeast Region is residential land use (approximately 102,930 acres or 4%). Low density development is 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 developed land use in Duval County is residential comprising 58,247 acres (11.9%) while industrial, institutional, and commercial uses constitute 36,950 acres or approximately 7.5% of the total land area (Jacksonville Area Planning Board 1977a in JEA/FPL 1981a).

3.8.4.1.1 Existing Land Cover

Most of the land within the five mile radius of the CBCP site is within the North District of the City of Jacksonville. A total of 116,545 acres can be considered suitable for development. Approximately 27% of this total was covered with urban development in 1985. Of this urban development, 32% 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 cover 31% of the acreage within this district. Parks and recreational areas cover approximately 16% of the acreage.

3.8.4.1.2 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 largely related to uses of the St. Johns River and is expected to continue in such related uses (Table 3-15).

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 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 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. Industries are locating in this area not only because of the St. Johns River, but also because of the proximity to interstate

TABLE 3-15

SUMMARY OF LAND USE EXISTING IN 1985 IN THE AREA SURROUNDING THE PLANT (CENSUS TRACTS 102.01 AND 102.02)(AES-CB/SK 1988)

Land Use	Acreage			
	Census Tract 102.1	Census Tract 102.02	Total	Percent of Developable Land
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	
Urbanized Development				
Single Family	1,089.70	436.32	1,526.02	16.7
Multi-Family	0	0.00	0.00	0.00.0
Parks & Recreation				
Institutional	20.19	158.00	178.19	2.0
Commercial & Service	44.52	30.65	75.17	0.8
Communications & Utilities	33.00	13.63	46.63	0.5
Major Transportation	186.90	316.85	503.75	5.5
Industrial	179.55	789.01	968.56	10.6
Total Urbanized	1,553.86	1,744.46	3,298.32	36.1

Note: Census Tracts 102.01 and 102.2 are bordered by: Duval Station Road on the north, Dunn Creek on the east, Main Street on the west, and the St. Johns River on the south.

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 mobile homes 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 family 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 commercial development. This development occurred primarily along Main Street, New Berlin Road, and Busch Drive, with some development along Eastport Road and Hecksher Drive.

3.8.4.1.3 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. JPD's 2005 Comprehensive Plan calls for port- and water-related industry development and provides for the protection of wetland areas in the vicinity of the proposed project (JEA/FPL 1981a).

The area along Hecksher Drive from Interstate 95 east to just north of Blount Island (near the SJRPP) 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. Blount Island is expected to continue developing as a center for water-related industries.

3.8.4.1.4 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 Jacksonville City Council declined to rezone this parcel. Consequently AES-CB 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 is 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 CBCP (note that this is no longer part of project plans). The state has found the site to be in compliance with local land use and zoning plans.

3.8.5 Recreational Resources

Recreational areas in the region center around the coast and the river. Within a five mile radius of the proposed CBCP is the Jacksonville Municipal Zoo and Yellow Bluff Fort, an undeveloped park at the site of Confederate Army gun placements located in the Timucuan Preserve. The Timucuan Ecological and Historic Preserve, established as a National Park in 1988, is located between the St. Johns and Nassau Rivers and includes the Fort Caroline National Memorial. It contains 46,000 acres, most of which are wetlands. A number of areas also exist that are not officially designated as parks. These areas are normally used for fishing, sunbathing, and picnicking.

Between seven and ten miles from the proposed site are two regional parks located in the Timucuan Preserve. 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/FPL 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/FPL 1981a). The Fort Caroline National Memorial, a 120-acre reconstruction of a French fort built in 1564, is located approximately eight miles southeast of the site. 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.

3.8.6 Aesthetic Conditions

The site of the proposed CBCP is a relatively flat area on the eastern shore of the Broward River and in 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 SK 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 is Fort Caroline Road which runs contiguous up to the marshes and Mill Cove. The CBCP can also be seen from the Dames Point Bridge. On the north side of the St. Johns River south of the proposed site, a view of the proposed CBCP is possible from Hecksher Drive.

This view includes CBCP's 425 foot tall stack, which has medium intensity flashing white lights. The lights, which are required by the Federal Aviation Administration as navigational aids, could impact citizens in the line of sight of the stack. This view was previously dominated by the paper mill in the foreground and is typical of the industrialized section of Hecksher Drive. East of the site, the tree cover allows only a limited view of most of the structures.

3.9 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 used to describe the existing environment at the proposed CBCP site.

3.9.1 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 (AES/SK 1988). These sources indicate no presence of historic resources 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 June 21, 1990: "... it is the opinion of this agency that project activities will have no effect on any archaeological or historic sites or properties 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 with this agency..." (See Appendix N)

3.9.2 Surrounding Area

Legislation introduced by Congressman Charles Bennett established Florida's newest National Park Unit, the Timucuan Ecological and Historic Preserve on February 16, 1988. Located entirely within the Jacksonville city limits in Duval County, the approximately 46,000-acre Preserve encompasses salt and fresh water marshes between the St. Johns and Nassau rivers. The Preserve, which lies east of the CBCP site, includes cultural resources Fort Caroline National Memorial and Zephaniah Kingsley Plantation.

Historically the lower St. Johns River was a very important resource--the seat of political, military, and religious power of Spanish Florida. This continuum of defense-related activity is evident today with the presence of the U.S. Navy's facility at Mayport. (See Appendix M)

3.10 TRANSPORTATION RESOURCES

Northeast Florida was considered to be the regional transportation study area in order to determine the existing transportation facilities available to the proposed CBCP. This study area includes the transportation facilities of Jacksonville, Florida which will provide direct access to the proposed project.

Transportation systems of importance to the Jacksonville area are highways, railroads, airports, and ship facilities. Major highways (see Figure 3-2) include Interstate Highways 10, 95 and 295; US Highways 1, 17, 23, and 90 and State Roads 9A, 13, and 115. Two rail systems serve the area: the Southern Railway and the Chessie System Express (CSX). Only the CSX 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.

Roads expected to provide access to the proposed CBCP site are Hecksher Drive, Eastport Road, and Main Street. Traffic counts indicate that (under existing conditions) all signalized locations and roadways in the area operate at the standard minimum acceptable levels of service with additional capacity available (JPD Traffic Circulation Element/Comprehensive Plan 1990).

According to the NDP, the project site is wholly contained in a region intended for industrial development. Also the NDP proposes a number of improvements to the transportation facilities in the area of the City that includes the project site. These improvements are designed to facilitate traffic flow in the face of increasing numbers of long coal trains needed to serve the SJRPP located a few miles east of the CBCP site. These recommended improvements include five overpasses: on North Main Street near Eastport Road, on Eastport Road near North Main Street, on Westport Road near Faye Road, on Alta Drive near Faye Road, and on New Berlin Road near Faye Road. The trains for coal delivery to CBCP are expected to use the same route as the trains serving the SJRPP and, hence, the impact on road traffic flow (see Section 4.12) in that area of the city would be minimized.

The Jacksonville International 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/FPL 1981a).

Jacksonville functions as a major port facility serving the southeastern United States. Many Jacksonville industries are dependent on 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).

3.11 ENERGY RESOURCES

3.11.1 Florida

The following section addresses the energy sources, energy consumption and overall current condition of traditional and non-traditional energy means both in the state of Florida and in Peninsular Florida. Some of the terms used in this section may not be familiar to the layman. Most are defined in the Glossary in Appendix Q.

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 produce 20.8% and nuclear power 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 is 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 nation's energy, as compared to 20.8% in 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 than 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 (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 electricity, while natural gas accounted for 13.6% , both down from 1986. The use of wood and waste as an electricity generating fuel increased significantly in 1987 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.) By 1990, Florida had 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 provided only 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.

Electric sales rose 5% in from 1986 to 1987, to a total of 122.128 gigawatt hours (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. 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 Btus) of the total energy consumption in Florida in 1987. Total energy from direct solar (0.7 trillion Btus), alcohol (0.2 million Btus), crop residues, and hydropower (2.7 trillion Btus) is small. The remainder is attributable to wood and municipal waste burning (21.6 trillion Btus) (Florida Governor's Energy Office 1981).

3.11.2 Peninsular Florida

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 of those 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 FPL

FPL is an investor owned utility which services retail customers in 35 counties in southern and eastern portions of Florida. As of December 31, 1991, FPL served a total of 3,325,517 customers. During 1991, the net energy for load generated by FPL was used as follows (FPSC 198lb):

User Category	GWH	Percent
Rural and Residential	35,629	25.0
Commercial	27,508	19.3
Industrial	3,917	2.7
Railroads & Railways	82	--
Street & Highway Lighting	351	--
Other Sales to Public Authorities	680	--
Total Sales to Ultimate Customers	68,167	47.8
Sales for Resale	839	--
Utility Use & Losses	5,323	3.7
Total	142,496	98.5

Existing generating capacity and planned additions through 1991 consist of 15 active plants comprised of the following types and numbers of units:

Unit Type	
Internal Combustion	1
Nuclear Power	2
Steam Unit	14
Gas Turbine	4
Combined Cycle	8
Bituminous Coal	4
Integrated Coal Gasification Combined Cycle	--
Total	33

Fuels used to produce a total of 73,160 Gwh of electricity in 1991 included 29% from Annual Energy Interchange, 28% residual oil, 19% nuclear, 4% coal, and 18% natural gas (FPL 1992). Additional needs by FPL were addressed in the FPL Martin County Project EIS (EPA 1991).

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, JEA consumed 4.5 million barrels of oil. Total energy production from oil amounted to 2,732 GWh. JEA consumed 2.2 million tons of coal in 1988.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This chapter summarizes the potential impacts on the natural and man-made environment of the three alternatives described in Chapter 2. Briefly, the three alternatives are: the AES Alternative is the CBCP as it was originally proposed, which includes elimination of all boilers at SK; the CBC Alternative is the CBCP as constructed by USGen, which includes three package boilers at SK and; the SK-only Alternative is the "No Action Alternative", which would be the SK as a recycling facility with its existing oil and bark fired boilers. Additional alternatives were considered and evaluated in the 1990 Draft EIS/SAR.

The potential impacts of the alternatives are analyzed using information presented by the applicant and information gathered and developed during the preparation of this EIS. This information about the site and the proposed project was used to assess environmental consequences of the three alternatives. For a number of environmental concerns, modeling was used to estimate and compare potential impacts associated with each alternative (e.g., air quality and human health).

4.1 AIR QUALITY IMPACTS

The combustion of fuels to produce steam and electricity releases air pollutants that can impact surrounding and regional air quality. Air quality is normally the principal and pivotal issue that must be addressed for fossil-fuel power facilities. This section evaluates the potential air quality impacts of the three alternatives. Included in this section is: a descriptive evaluation of construction-related emissions; a qualitative evaluation of materials handling emissions (i.e., fugitive dust) and; a quantitative comparison of controlled operation-related combustion emissions and resulting air quality.

4.1.1 Construction-Related

Construction-related emissions result from clearing and grubbing, excavation, material hauling and handling, and open burning. These activities are common to most major construction projects and impacts are normally limited to the construction site and adjacent areas.

The primary air pollutant emitted during construction activities is fugitive dust, which is caused by exposure of cleared areas to vehicles, construction equipment and wind. Fugitive dust during construction was controlled by watering in active areas and soil stabilization. Stabilization included laying down a surface (e.g., rock), which inhibits particles from becoming airborne. Other measures for fugitive dust control included: planned and prudent operation of on-site equipment; reduced vehicle speeds over haul roads and; revegetation of cleared areas after construction. These control measures for fugitive dust are adequate to limit impacts to the construction site and adjacent areas.

Open burning of cleared vegetation is an additional source of air emissions during construction. Typical emissions from burning activities include particulate matter, carbon monoxide, hydrocarbons, sulfur oxides, and nitrogen oxides, the amount of which depends on the amount and moisture content of the material burned. No specific control measures for open burning were required and burning conducted during periods of good atmospheric dispersion (e.g., clear sunny days) would not be expected to cause any substantial air quality impacts to areas surrounding the construction site.

Exhausts of heavy machinery and truck traffic produce air pollutants, consisting mainly of carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, and particulate matter. Due to the limited construction area (20 to 30 acres), these emissions are likely to be minor and limited to the site.

With implementation of standard control measures, construction-related air quality impacts were expected to be minimal and not have a substantial impact to surrounding areas.

4.1.2 Operation-Related

Operation-related impacts on air quality would be due to materials handling and release of combustion products. The following sections provide a descriptive analysis of materials handling impacts and a quantitative analysis of emissions and air quality for the alternatives.

4.1.2.1 Materials Handling

Both the AES and CBC Alternatives included control measures for fugitive dust control associated with coal, limestone, fly and bed ash handling (includes pelletizer). The controls described previously for the AES Alternative (1990 Draft EIS/SAR) and the CBC Alternative (Section 2.3.3.3.1) include use of wetting agents, fabric dust collectors, water sprays and enclosure. The control measures for either Alternative will adequately minimize fugitive dust impacts and are considered adequate mitigation.

4.1.2.2 Combustion Products Emissions Comparison

Air quality impacts from operation are primarily the result of combustion of fuels (e.g., gas, oil, coal and bark) and the subsequent release of combustion products (e.g., SO_x, NO_x, and CO) through stacks. Air quality (discussed in the next section) is directly related to the amount of pollutant emissions and the dispersion of the pollutants. This section compares the quantities of pollutants expected to be released by each of the three alternatives.

In an Air Quality Analysis, performed by ENSR for the applicant, regulated and non-regulated emissions were estimated for each of the alternatives. The Executive summary of the applicant's "Air Quality Analysis" document is contained in Appendix J and the document is available for review upon request. Emission rates for each alternative were based on the number of emission sources, types and quantities of fuels burned at each source, expected efficiencies of pollution control systems, and power generation (electricity and steam). For this analysis, emissions for the three alternatives were based on the following:

- AES Alternative - three coal-fired CFBs and two oil-fired (No. 2 distillate) limestone dryers producing a total of 640,000 lbs/hr of steam to SK and 225 MW of electricity;

- CBC Alternative - three coal-fired CFBs, two oil-fired (No. 2 distillate) limestone dryers at CBCP producing a total of 380,000 lbs/hr of steam for SK and 250 MW of electricity and three gas-fired package boilers at SK producing 260,000 lbs/hr of steam.

- SK-only Alternative - three oil-fired (No. 6 distillate) power boilers, two bark boilers fired with any combination of bark, oil (No. 6 distillate) and recycle rejects at SK producing a total of 640,000 lbs/hr of steam.

The results of this analysis are summarized below.

Regulated emissions for the three alternatives are summarized in Table 4-1. The sum of all regulated emissions for the CBC Alternative (8067.4 TPY) was lower than for the other two alternatives. Of the eleven regulated pollutants, six (SO_2, TSP, PM-10, VOC, fluorides, and H_2SO_4 mist) were lower for the CBC Alternative. The sum of all regulated emissions for the SK-only Alternative (9259 TPY) were slightly higher than the CBC Alternative; however,

TABLE 4-1

MAXIMUM REGULATED POLLUTANT EMISSIONS FOR THE ALTERNATIVES

Pollutant	SK-Only (Total ton/yr)	CBC (tons/yr)	AES (tons/yr)
SO_2	3,560.0	2404.1	4,058.8
NO_x	1,736.0	2356.5	3,788.0
CO	2,191.0	2661.6	2,473.2
TSP	572.0	223.7	262.2
PM_{10}	460.0	223.7	259.2
VOC	451.0	181.5	195.4
Lead	0.19	0.72	91.0
Mercury	0.012	0.10	1.5
Beryllium	0.013	0.35	3.4
Fluorides	203.2	8.9	1,122.0
H_2SO_4 mist	85.2	6.2	309.8
TOTAL	9259.0	8067.4	12,564.5

Notes:

NA = Not Applicable

(a) Source: final Order and Certification PA-88-24 (2/11/91) and Amended Petition for Modification of Certification (July 22, 1992 Before the State of Florida, Division of Administrative Hearings, In Re: AES Cedar Bay Cogeneration Project, Power Plant Site Certification Application PA-88-24) plus additional improvements by CBCP.

(b) 12 month running average

(c) 30 day running average

(d) Lb/hr values represent emission limits for each of two limestone dryers
Annual emissions are for both dryers and are based on maximum operation of 8 hours/day each, 365 days/yr

(e) Firing natural gas - lb/hr values for each of three boilers - emissions data from ENSR 1993 five of the individual pollutant emissions (NO_x, CO, lead, mercury and beryllium) were less than determined for the CBC Alternative. The sum and individual regulated emissions for the AES Alternative were greater than the other two alternatives.

Non-regulated emissions for the three alternatives are summarized in Table 4-2. The sum of all non-regulated emissions for the SK-only Alternative (70.7 TPY) was lower than determined for the other two alternatives. Ten of the twenty non-regulated pollutants were lower for the SK-only Alternative than for the other alternatives. The sum of all non-regulated emissions for the CBC Alternative (95.5 TPY) were slightly higher than the SK-only Alternative; however, the remaining (ten) individual pollutant emissions were lower for the CBC Alternative than determined for the SK-only Alternative. This suggests that one or two pollutants, in this case zinc, cause the difference in total non-regulated emissions between the two alternatives and that the two non-regulated emission amounts are similar. As was found for regulated pollutants, the sum and individual non-regulated emissions for the AES Alternative were greater than the other two alternatives.

The lower regulated pollutant emissions for the CBC Alternative (CBCP as constructed) in comparison to the AES Alternative (CBCP as proposed) and the SK-only Alternative (SK as a recycling facility) are the result of more efficient boilers, improved reactor temperature control, and emission control measures for SO_2, PM, and NO_x that are summarized in Chapter 2.0. The lower non-regulated emissions for the CBC Alternative, in comparison to the AES Alternative, are primarily the result of improved PM removal in the baghouse by more efficient operation and bag material selection. The lower non-regulated emissions estimated for the SK-only Alternative than the other two alternatives are due to the fuel type and quantity of fuel used.

Emissions are only one consideration in evaluating impacts of pollutant emissions on air quality. The degree of dispersion (i.e., mixing of pollutants) will affect the concentration of the pollutants in the surrounding area. The following section evaluates the air quality resulting from each of the alternatives.

4.1.2.3 Air Quality Comparison

Air quality resulting from each alternative is not only influenced by the quantity of pollutant emissions, but also by the dispersion of the pollutants. Dispersion of the pollutants into the surrounding atmosphere is affected by a number of factors including: meteorologic conditions (e.g., temperature, wind speed and wind direction); the height of the stack; the location (with respect to other structures) of the stack; and the temperature of the flue gas. To evaluate the effects of each alternative on air quality, the applicant performed dispersion modeling in accordance with EPA and DER requirements for new source review, which requires the

TABLE 4-2

MAXIMUM NON-REGULATED POLLUTANT EMISSIONS COMPARISON FOR THE ALTERNATIVES

Pollutant	SK-Only (Total tons/yr)	CBC (tons/yr)	AES (tons/yr)
Antimony	0.050	0.13	0.14
Arsenic	0.057	1.7	1.9
Barium	0.76	7.3	7.9
Bromine	15.82	3.47e-04	1.04e-03
Cadmium	0.057	0.38	4.12e-01
Cobalt	5.30	0.45	0.50
HCl	21.8	21.6	23.6
Indium	1.39	1.67e-03	1.82e-03
Chromium VI	0.0009	1.27e-02	1.38e-02
Copper	0.72	0.97	1.0
Formaldehyde	2.38	1.6	1.8
Manganese	0.18	6.0	6.5
Molybdenum	2.82	1.2	1.3
Nickel	3.09	0.97	1.0
Phosphorous	0.74	4.0	4.4
POM	0.44	0.22	0.24
Selenium	0.008	0.19	0.21
Tin	2.49	0.49	0.56
Vanadium	10.95	3.8	4.3
Zinc	1.65	44.5	48.5
Radionuclides (d)		0.020	0.022
Totals	70.70	95.53	104.30

Notes:

NA - Not applicable
(a) Source: emission factors developed by Bechtel Power
(b) Annual Average
(c) Lb/hr values represent emission limits for each of two limestone dryers
Annual emissions are for both dryers and are based on maximum operation of 8 hours/day each, 365 days/yr
(d) Firing natural gas - lb/hr values for each of three boilers - emissions data from ENSR 1993
(e) Emission units expressed as curies

evaluation be based on maximum allowable emission rates for all sources. The analysis included an evaluation based on relevant loads (i.e., power production at CBCP and/or 640,000 lbs/hr of steam for SK) and the associated emission rates. The Executive Summary of the applicant's "Air Quality Analysis" document is contained in Appendix J and the document is available for review upon request.

For this analysis the applicant selected the EPA's Industrial Source Complex Short Term (ISCST2) model (ver. 92062), which is a model recommended in EPA's "Guidelines on Air Quality Models" (EPA 1986, 1987). The model requires input of hourly meteorologic data for wind speed, wind direction, temperature, atmospheric stability, and boundary layer mixing depth. To obtain a representative profile of expected future conditions, EPA recommends the model be run for a five year historical meteorologic period using the nearest national weather service stations, which were Jacksonville International Airport, in Jacksonville, Florida (surface meteorology) and Ware County Airport in Waycross, Georgia (upper air observations).

The ISCST2 model was used to predict the net air quality impacts for each alternative at 1008 receptors for five pollutants (SO_2, NO_x, PM-10, CO, and Lead) that have ambient standards and an aggregate of trace pollutants (total air toxics). Receptors were located based on a circular (polar) grid, centered on the CBCP CFB stack location, using 36 radials and 28 concentric circles at variable intervals out to a distance of 25 kilometers (15.5 miles). This grid system places 720 receptors of the 1008 within 5 kilometers (3 miles), which is the distance within which the greatest air quality impacts are expected from the CBCP.

Maximum predicted impacts for each parameter, averaging period and alternative are presented in Table 4-3. The maximum SO_2 impacts were lowest for the CBC Alternative, except for short-term (1 hr) averaging periods, which were lowest for the AES Alternative. The maximum predicted carbon monoxide (CO) impacts were lowest for the AES Alternative. The remaining pollutants' predicted maximums were lower for the CBC Alternative than the other two alternatives. The higher short-term SO_2 maximums for the CBC Alternative were the result of meteorologic conditions (i.e., wind velocity and direction) that caused severe downwashing of pollutants from the three SK package boilers in areas adjacent to the CBCP. Higher CO maximums for the CBC Alternative were caused by the higher CO emissions (includes the SK package boilers) of this alternative and the short-term averaging, which reflects local downwashing from the SK boilers, as was observed for short-term SO_2 predictions. The predicted pollutant maximums for the SK-only Alternative were all highest of the three alternatives and were due to the higher emission rates and lower stack height (125 ft), which resulted in local downwashing.

TABLE 4-3

COMPARISON OF MAXIMUM PREDICTED IMPACTS AND NET AIR QUALITY EFFECTS OF THE ALTERNATIVES

Pollutant	Averaging Period	Meteorological Year	Maximum Predicted Impacts ($\mu g/m^3$)			Comparison of CBC Alternative and AES Alternative		Comparison of CBC Alternative and SK-only Alternative	
			AES	CBC	SK-only	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved[a]
SO_2	3 hr	1983	165.60	443.11	677.67	5.71	831	85.35	989
		1984	173.48	232.14	637.65	6.95	829	72.60	1001
		1985	236.12	299.64	500.03	9.75	841	71.04	997
		1986	210.39	260.70	460.42	7.04	808	64.68	985
		1987	173.15	267.90	528.98	6.11	845	70.51	990
	24 hr	1983	60.99	112.51	281.03	3.12	742	27.51	997
		1984	89.88	68.84	189.90	4.23	766	22.18	1004
		1985	70.75	83.23	259.03	3.71	809	20.40	997
		1986	81.04	65.46	184.22	3.59	768	21.89	993
		1987	72.54	86.35	171.44	3.37	750	22.24	989
	Annual	1983	9.33	3.74	5.98	0.47	468	1.49	1004
		1984	9.84	2.81	4.88	0.50	477	1.37	1003
		1985	9.82	3.71	6.08	0.49	483	1.41	1004
		1986	12.39	2.64	5.01	0.51	497	1.30	1003
		1987	10.10	3.42	9.26	0.47	460	1.51	1004

TABLE 4-3
(Continued)

COMPARISON OF MAXIMUM PREDICTED IMPACTS AND NET AIR QUALITY EFFECTS OF THE ALTNERNATIVES

Pollutant	Averaging Period	Meteorological Year	Maximum Predicted Impacts ($\mu g/m^3$)			Comparison of CBC Alternative and AES Alternative		Comparison of CBC Alternative and SK-only Alternative	
			AES	CBC	SK-only	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved[a]
PM_{10}	24 hr	1983	35.91	20.43	39.80	0.55	755	4.94	994
		1984	33.00	19.52	32.56	0.53	653	4.49	988
		1985	33.73	20.07	46.21	0.50	738	4.34	986
		1986	32.91	24.89	39.24	0.45	736	4.37	991
		1987	33.77	19.31	36.26	0.45	676	4.56	992
	Annual	1983	3.97	3.04	2.14	-0.009	369	0.28	942
		1984	4.75	3.49	2.18	-0.014	308	0.25	931
		1985	3.71	3.39	2.16	-0.013	337	0.28	943
		1986	4.31	3.70	1.99	-0.017	310	0.24	914
		1987	3.85	2.89	2.93	-0.005	383	0.28	935
CO	1 hr	1983	47.38	367.00	980.12	-15.84	87	203.00	1004
		1984	57.94	356.02	943.78	-15.38	91	204.44	1004
		1985	60.60	366.01	922.11	-15.41	90	204.14	1004
		1986	69.07	365.43	910.40	-15.37	95	206.40	1004
		1987	52.69	369.33	1036.23	-15.20	96	209.60	1004

TABLE 4-3
(Continued)

COMPARISON OF MAXIMUM PREDICTED IMPACTS AND NET AIR QUALITY EFFECTS OF THE ALTNERNATIVES

Pollutant	Averaging Period	Meteorological Year	Maximum Predicted Impacts ($\mu g/m^3$)			Comparison of CBC Alternative and AES Alternative		Comparison of CBC Alternative and SK-only Alternative	
			AES	CBC	SK-only	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved[a]
CO (continued)	8 hr	1983	14.17	147.08	410.77	-5.36	117	80.64	1003
		1984	16.84	96.23	367.68	-5.26	115	78.98	1003
		1985	16.86	131.09	431.98	-5.41	113	78.03	1004
		1986	16.39	132.16	365.36	-5.28	114	75.33	1004
		1987	15.58	111.10	380.01	-5.23	115	78.12	1004
NO_2	Annual	1983	4.47	2.48	5.75	0.20	446	1.40	1004
		1984	4.72	1.86	5.55	0.22	555	1.33	1004
		1985	4.70	2.46	5.85	0.22	506	1.37	1004
		1986	5.94	1.73	5.00	0.23	544	1.28	1004
		1987	4.83	2.24	8.21	0.21	535	1.42	1004
Pb	Monthly	1983	1.9e-02	3.2e-04	2.27e-03	0.006	977	5.01e-04	945
		1984	1.8e-02	2.4e-04	2.83e-03	0.006	976	4.75e-04	936
		1985	1.9e-02	3.5e-04	2.52e-03	0.006	978	4.59e-04	950
		1986	2.9e-02	3.6e-04	2.00e-03	0.007	978	4.91e-04	034
		1987	2.1e-02	3.8e-04	2.88e-03	0.006	976	5.31e-04	939

TABLE 4-3
(Continued)

COMPARISON OF MAXIMUM PREDICTED IMPACTS AND NET AIR QUALITY EFFECTS OF THE ALTNERNATIVES

Pollutant	Averaging Period	Meteorological Year	Maximum Predicted Impacts ($\mu g/m^3$)			Comparison of CBC Alternative and AES Alternative		Comparison of CBC Alternative and SK-only Alternative	
			AES	CBC	SK-only	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved	Net Air Quality Effect ($\mu g/m^3$)	Number of Receptors Improved[a]
Pb (continued)	Annual	1983	6.2e-03	1.1e-04	9.3e-04	0.002	976	2.18e-04	922
		1984	7.0e-03	1.0e-04	9.5e-04	0.002	976	2.09e-04	921
		1985	6.3e-03	1.1e-04	9.4e-04	0.002	976	2.16e-04	933
		1986	7.6e-03	1.1e-04	8.7e-04	0.002	978	2.02e-04	927
		1987	7.9e-03	1.1e-04	1.27e-03	0.002	977	2.21e-04	923
Total Air Toxics	8 hr	1983	9.71	9.36	55.14	1.94	966	11.48	1004
		1984	11.54	11.02	49.30	2.10	964	11.16	1004
		1985	11.55	9.51	57.45	2.25	965	11.08	1004
		1986	11.23	9.27	51.50	1.96	966	10.68	1004
		1987	10.67	8.66	55.28	1.96	966	11.03	1004
	24 hr	1983	5.02	3.95	33.06	0.99	964	6.46	1004
		1984	7.39	2.44	28.93	1.12	968	6.30	1004
		1985	5.82	2.95	37.31	1.12	965	5.99	1004
		1986	6.66	2.31	34.68	1.01	972	5.96	1004
		1987	5.96	3.04	30.52	1.02	967	6.18	1004

TABLE 4-3
(Continued)

COMPARISON OF MAXIMUM PREDICTED IMPACTS AND NET AIR QUALITY EFFECTS OF THE ALTNERNATIVES

Pollutant	Averaging Period	Meteorological Year	Maximum Predicted Impacts (µg/m³)			Comparison of CBC Alternative and AES Alternative		Comparison of CBC Alternative and SK-only Alternative	
			AES	CBC	SK-only	Net Air Quality Effect (µg/m³)	Number of Receptors Improved	Net Air Quality Effect (µg/m³)	Number of Receptors Improved[a]
Total Air Toxics (continued)	Annual	1983	0.77	0.22	1.95	0.07	963	0.49	1004
		1984	0.81	0.19	2.04	0.08	964	0.48	1004
		1985	0.81	0.22	1.97	0.08	962	0.50	1004
		1986	1.02	0.18	1.87	0.08	971	0.47	1004
		1987	0.83	0.21	2.63	0.07	966	0.50	1004

[a] Out of a total of 1008

Also in Table 4-3, are comparison between alternatives presented as net air quality differences and the number of receptors with improved air quality. Net air quality is the average of modeled differences between two alternatives at all stations; a positive value indicates an air quality improvement and a negative value indicates an air quality degradation. The results indicate that for the CBC Alternative, in comparison to the AES Alternative and the SK-only Alternative, air quality would be better for all parameters except CO and PM-10 (annual average only), which would be better for the AES Alternative. The PM-10 net air quality for the AES Alternative to the CBC Alternative comparison were nearly zero indicating the difference is trivial. As mentioned in the previous paragraph, the differences in CO air quality is a result of downwashing from the SK package boilers included in the CBC Alternative.

Based on the air quality comparison of the three alternatives, both maximum predicted impacts and net air quality impacts, the CBC Alternative appears to have less negative impacts on air quality. The CBC Alternative received further analysis to determine whether this alternative would cause or contribute to a violation of federal or state AAQSs, NTLs, or allowable PSD increments. The results are discussed in the following sections.

4.1.2.3.1 AAQS Compliance Evaluation

State and federal AAQS for pollutants considered for the CBC Alternative (CBCP as constructed) are contained in Table 4-4, along with EPA SILs for the pollutants. SILs (Significant Impact Levels) are the levels of increase in pollutants that can occur without significantly contributing to an increase in ambient air concentrations. Comparison of the SILs with the maximum predicted increases in pollutant concentrations for the CBC Alternative (see Table 4-3), indicates only SO_2, NO_x, and PM-10 concentrations exceed the SILs. CO and lead concentrations are well below the SILs, indicating the levels do not significantly contribute to an exceedance of AAQS; therefore, these pollutants were not considered in the AAQS compliance evaluation.

The applicant conducted the compliance evaluation, in the "Air Quality Analysis" document, for the CBC Alternative using similar procedures and modelling methods as used for the Net Air Quality Comparison. In addition, this analysis considered other pollution sources in the area as well as measured background concentrations of each pollutant. Receptors beyond 5 kilometers (3 miles) were not considered because concentrations modelled for pollutants at these receptors were well below the SILs. However, two receptors were added beyond the 5 kilometer distance at two PSD Class I areas: the Okefenokee and Wolf Island Wilderness Areas in Georgia.

TABLE 4-4

NATIONAL AND FLORIDA AMBIENT AIR QUALITY STANDARDS ($\mu g/m^3$) FOR POLLUTANTS BEING MODELED

Pollutant	Averaging Period	NAAQS Standards		Florida State Standards	EPA Significant Impact Level[a]
		Primary	Secondary		
SO_2	Annual	80	--	60	1
	24-hour	365	--	260	5
	3-hour	--	1,300	1,300	25
NO_2	Annual	100	100	100	1
PM_{10}	Annual	50	50	50	1
	24-hour	150	150	150	5
CO	8-hour	10,000	--	10,000	500
	1-hour	40,000	--	40,000	2,000
Lead (Pb)	Calendar Quarter	1.5	1.5	1.5	0.03[b]

(a) 40 CFR 51.165(b)(2)
(b) Florida Administration Code, 17-212.100(63)(e)

The applicant identified the maximum predicted value for averaging periods for each parameter. In the case of short-term averaging periods (i.e., 3-hour and 24-hour), the highest predicted concentrations were elminated and the highest-second-high was used, based on procedures consistent with EPA and FDER. The applicant compared the contribution from the CBC Alternative to the SILs, eliminating predicted maximums to which the CBC Alternative did not contribute at concentrations above the SILs. Using this methodology, maximum predicted air concentrations to which the CBC Alternative contributed at concentrations above the SILs were identified.

The results of the modeling and identification procedure for SO_2, NO_x, and PM-10 are summarized in Tables 4-5 through 4-7. The tables indicate the maximum predicted ambient concentrations to which the CBC Alternative contributes at levels above the SILs. The tables also indicate the concentration contributed by the CBC Alternative to the maximum predicted concentration. The annual average maximums predicted for SO_2 and PM-10 are in close proximity, but less than the AAQS. The remaining predicted AAQS for the three pollutants are well below the respective AAQS. The results of the modeling also indicate the CBC Alternative, typically contributes less than one-third of the predicted maximum concentrations. Further, the locations of the predicted maximum concentrations usually occur within the building cavity of the CBCP boiler structures or on the CBCP and SK property.

Emissions of VOC (volatile organic compounds), which can be precursors to ozone, should be evaluated to determine compliance of the CBC Alternative with AAQS for ozone; however, due to the complexity of sources and photochemical process involved, quantitative air quality modeling can not sufficiently characterize and predict impacts of VOC from a single source on ozone concentrations. To evaluate compliance of the CBC Alternative with AAQS for ozone, a qualitative evaluation of ozone air quality was conducted through comparison of VOC emissions between the current SK emissions to expected emissions from the CBC Alternative. Examination of Table 4-1 indicates expected VOC emissions for the CBC Alternative are lower than the SK-only Alternative emissions. The SK operations, prior to converting to recycling, would emit greater VOC than the SK-only Alternative, due to more sources (e.g., recovery boilers). This suggests VOC emissions would be reduced by more than 270 TPY by the CBC Alternative in comparison to existing SK operations and should result in a corresponding decrease in ozone by the CBC Alternative. Since existing ambient air quality is in compliance with AAQS for ozone, the CBC Alternative should also be in compliance with the AAQS for ozone.

Based on the AAQS compliance evaluation, the CBC Alternative is expected to be in compliance with state and federal AAQS.

TABLE 4-5

COMPLIANCE OF THE CBC ALTERNATIVE (AS CONSTRUCTED BY U.S. GENERATING) WITH TOTAL AMBIENT SO_2 AAQS

Averaging Period	Year	Maximum Concentration to Which CBCP Contributes Significantly ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	Cedar Bay Contribution ($\mu g/m^3$)
3-Hour	1983	653.2*	1300	179.2
	1984	653.4*		179.2
	1985	775.6*		179.2
	1986	577.7*		179.2
	1987	596.2*		179.2
24-Hour	1983	177.2*	260	26.5
	1984	186.8*		26.5
	1985	186.5*		26.5
	1986	165.0*		26.5
	1987	194.6*		26.5
Annual	1983	43.6*	60	6.64
	1984	43.1*		6.64
	1985	46.3*		6.64
	1986	42.7*		6.64
	1987	41.0*		6.64

*Impact falls within the CFB building cavity region.
[a]Excluding the highest total concentration for 3, 24-hour averages.

TABLE 4-6

COMPLIANCE OF THE CBC ALTERNATIVE (AS CONSTRUCTED BY U.S. GENERATING) WITH TOTAL AMBIENT PM-10 AAQS

Averaging Period	Year	Maximum Concentration to Which CBCP Contributes Significantly[a] ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	Cedar Bay Contribution ($\mu g/m^3$)
24-Hour	1983	60.7	150	12.2
	1984	62.8		14.8
	1985	61.9		14.3
	1986	58.9*		11.2
	1987	58.6		15.1
Annual	1983	35.3*	50	5.08
	1984	35.5*		4.81
	1985	36.0*		5.23
	1986	35.8*		5.13
	1987	35.4*		5.14

[a]Excluding the highest total concentration for 24-hour average.
*Impact occurs within the CFB building cavity region.

TABLE 4-7

COMPLIANCE OF THE CBC ALTERNATIVE (AS CONSTRUCTED BY U.S. GENERATING) WITH TOTAL AMBIENT NO_2 AAQS

Averaging Period	Year	Maximum Concentration to Which CBCP Contributes Significantly ($\mu g/m^3$)	AAQS ($\mu g/m^3$)	Cedar Bay Contribution ($\mu g/m^3$)
Annual	1983	34.69*	100	3.16
	1984	34.57*		3.16
	1985	35.17*		3.16
	1986	34.09*		3.16
	1987	33.90*		3.16

*Impact falls within the CFB building cavity region.

4.1.2.3.2 PSD Compliance Evaluation

Compliance of the CBC Alternative with PSD (Prevention of Significant Deterioration) Class I and II attainment areas was also assessed. Permissible increase increments for Class I and Class II areas are summarized in Table 4-8, which indicates the Class I increments are similar to SILs for AAQS compliance. Similar to AAQS compliance, PSD compliance was only evaluated for three pollutants (SO_2, NO_x, and PM-10) that exceeded SILs. In the case of this analysis the applicant assumed PM-10 would represent a conservative estimate of TSP (total suspended particulates). For PSD increment calculations, the analysis considered both new sources that have increased air pollution and closure or refurbishment of sources that have decreased air pollution since the baseline year.

The maximum predicted SO_2 concentrations for all sources and the CBC Alternative are summarized in Table 4-9. The PSD Class II evaluation indicates that neither predicted maximums from the CBC Alternative or maximums from all sources to which the CBC Alternative significantly contributes are above the allowable Class II increments. As was observed for the AAQS evaluation the maximum predicted values are located within the CBCP building cavity. Table 4-10 also indicates the maximum increase from all sources and the maximum contribution by the CBC Alternative were below the allowable Class I increments. The negative values for annual SO_2 averages in the two Class I areas suggest air quality improved and the available PSD increment increased from the shutdown or refurbishment of existing air pollution discharges (e.g., the shutdown of SK bark and recovery boilers).

The results of the PSD compliance evaluation for TSP and NO_x are summarized in Tables 4-11 and 4-12. Similar to the SO_2 evaluation, the allowable PSD TSP and NO_x increments for Class II attainment areas were not exceeded by either the maximum value contributed by the CBC Alternative or the predicted maximum concentration of all sources when the CBC Alternative contribution exceeded the SIL. The maximum modeled TSP and NO_x values at the two Class I areas (see Tables 4-13 and 4-14) were also in compliance with the allowable Class I increments. As was observed for the SO_2 evaluation, the predicted annual averages for these two pollutants were negative suggesting air quality has improved and the available increment has increased.

Based on this analysis, the CBC Alternative is expected to not cause or contribute to a violation of a Class I or Class II PSD increment for SO_2, NO_x, and TSP. The CBC Alternative, based on annual averages for the three parameters, may improve air quality and increase the increment at the Class I areas.

TABLE 4-8

FEDERAL AND FLORIDA PSD INCREMENTS

Pollutant	Averaging Period	PSD Area Classification		PSD Class II Significant Impact Levels
		Class I	Class II	
SO_2	3-hour	25	512	25
	24-hour	5	91	5
	Annual	2	20	1
TSP	24-hour	10	37	5
	Annual	5	19	1
NO_2	Annual	2.5	25	1

TABLE 4-9

MAXIMUM PREDICTED INCREASES IN SO_2 AT PSD CLASS II AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTERNATIVE SIGNIFICANTLY CONTRIBUTES

Averaging Period	Year	Maximum Increment Consumption to Which CBCP Contributes Significantly[a] ($\mu g/m^3$)	Class II Increment	Cedar Bay Contribution ($\mu g/m^3$)
3-Hour	1983	284.7*	512	179.2
	1984	291.7*		179.2
	1985	278.4*		179.2
	1986	283.8*		179.2
	1987	295.9*		179.2
24-Hour	1983	55.9*	91	26.5
	1984	54.3*		26.5
	1985	55.7*		26.5
	1986	52.6*		26.5
	1987	52.4*		26.5
Annual	1983	8.87*	20	6.64
	1984	8.28*		6.64
	1985	8.83*		6.64
	1986	8.06*		6.64
	1987	8.46*		6.64

* Impact occurs within the CFB Building cavity region.
(a) Excluding the highest total concentration for 3, 24-hour average.

TABLE 4-10

MAXIMUM PREDICTED INCREASES IN SO_2 AT PSD CLASS I AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTERNATIVE SIGNIFICANTLY CONTRIBUTES

Averaging Period	Year	Allowable Increment ($\mu g/m^3$)	Okefenokee Concentrations ($\mu g/m^3$) for Compliance Evaluation		Wolf Island Concentrations ($\mu g/m^3$) for Compliance Evaluation	
			Concentration for Compliance Evaluation	Cedar Bay Contribution	Concentration for Compliance Evaluation	Cedar Bay Contribution
3-Hour	1983	25	13.2	1.2	10.6	0.29
	1984		15.9	0.9	9.1	0.45
	1985		16.8	0.7	12.3	0.94
	1986		16.7	1.6	7.8	0.63
	1987		14.5	0.2	9.7	0.42
24-Hour	1983	5	3.4	0.3	1.8	0.04
	1984		3.3	0.6	1.8	0.06
	1985		3.4	0.3	2.1	0.17
	1986		3.5	0.3	1.5	0.04
	1987		2.8	0.4	2.2	0.06
Annual	1983	2	-0.02	0.02	-0.07	0.02
	1984		-0.01	0.04	-0.12	0.02
	1985		-0.02	0.04	-0.12	0.02
	1986		-0.03	0.04	-0.06	0.02
	1987		0.003	0.04	-0.09	0.02

TABLE 4-11

MAXIMUM PREDICTED INCREASES IN TSP AT PSD CLASS II AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTERNATIVE SIGNIFICANTLY CONTRIBUTES

Averaging Period	Year	Maximum Increment Consumption to Which CBCP Contributes Significantly[a] (μg/m³)	Class II Increment	Cedar Bay Contribution (μg/m³)
24-Hour	1983	25.2*	37	8.0
	1984	27.0*		8.0
	1985	29.1*		8.0
	1986	33.1		33.1
	1987	25.4*		8.0
Annual	1983	5.80*	19	1.94
	1984	5.53*		1.94
	1985	5.86*		1.94
	1986	5.92*		1.94
	1987	5.86*		1.94

* Impact occurs within CFB Building cavity region.
(a) Excluding the highest total conentration for 24-hour averages.

TABLE 4-12

MAXIMUM PREDICTED INCREASES IN NO_2 AT PSD CLASS II AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTENATIVE SIGNIFICANTLY CONTRIBUTES

Averaging Period	Year	Maximum Increment Consumption to Which CBCP Contributes Significantly ($\mu g/m^3$)	Class II Increment	Cedar Bay Contribution ($\mu g/m^3$)
Annual	1983	3.16*	25	3.16
	1984	3.16*		3.16
	1985	3.16*		3.16
	1986	3.16*		3.16
	1987	3.16*		3.16

* Impact falls with CFB building cavity region.

TABLE 4-13

MAXIMUM PREDICTED INCREASES IN TSP AT PSD CLASS I AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTERNATIVE SIGNIFICANTLY CONTRIBUTES

Averaging Period	Year	Allowable Increment ($\mu g/m^3$)	Okefenokee Concentrations ($\mu g/m^3$) for Compliance Evaluation		Wolf Island Concentrations ($\mu g/m^3$) for Compliance Evaluation	
			Concentration for Compliance Evaluation	Cedar Bay Contribution	Concentration for Compliance Evaluation	Cedar Bay Contribution
24-Hour	1983	10	0.06	0.006	0.05	0.003
	1984		0.07	0.012	0.05	0.008
	1985		0.07	0.003	0.05	0.002
	1986		0.05	0.006	0.04	0.006
	1987		0.07	0.011	0.08	0.004
Annual	1983	5	-0.012	0.003	-0.01	0.002
	1984		-0.009	0.002	-0.02	0.003
	1985		-0.015	0.003	-0.02	0.003
	1986		-0.008	0.002	-0.02	0.002
	1987		-0.01	0.003	-0.02	0.003

TABLE 4-14

MAXIMUM PREDICTED INCREASES IN NO_2 AT PSD CLASS I AREAS FROM ALL NEW SOURCES TO WHICH THE CBC ALTERNATIVE SIGNIFICANTLY CONTRIBUTES

Year	Allowable Increment ($\mu g/m^3$)	Okefenokee Concentrations ($\mu g/m^3$)		Wolf Island Concentrations ($\mu g/m^3$)	
		Highest	Cedar Bay Contribution To Highest	Highest	Cedar Bay Contribution To Highest
1983	2.5	-0.009	0.024	-0.015	0.013
1984		-0.007	0.017	-0.027	0.016
1985		-0.012	0.018	-0.020	0.020
1986		-0.006	0.013	-0.017	0.014
1987		-0.007	0.022	-0.020	0.013

4.1.2.3.3 NTL Compliance Evaluation

FDER has developed a draft list of potentially toxic substances and identified concentrations that do not pose a threat to human health, called No Threat Levels (NTLs). To evaluate compliance of air toxic emissions from the CBC Alternative with draft NTLs, the applicant conducted modeling to predict maximum pollutant concentration for each averaging period (i.e., 8-hour, 24-hour and annual). The maximum concentrations for each averaging period over the five-year modeling period are presented in Table 4-15, along with, for comparison sake, the draft NTL. The maximum predicted concentrations for the air toxins were, for the most part, at least an order of magnitude less than the draft NTLs. Only two parameters, arsenic and sulfuric acid mist, approached the draft NTL. The maximum predicted concentrations for arsenic were well below the draft NTL for each averaging period except for the annual average, which approached the NTL. The maximum predicted sulfuric acid mist concentration approached the draft NTL for both the 8 and 24 hour averaging period. As was indicated in previous analyses, the predicted maximums occur at receptors within the building cavity or on the CBCP and SK properties. Based on these results, emissions contributed by the CBC Alternative will not cause an exceedance of draft NTLs.

4.1.2.4 Visibility Impacts

Visibility impairment is defined as any humanly perceptible change in visibility (visual range, contrast, coloration) from that which would have existed under natural conditions. The emission of pollutants (e.g., NO_x, and PM-10) from the CBC Alternative may cause impacts in the surrounding area through visibility of the stack plume and, regionally, by decreased viewing distance. The visual impacts occur when the plume appears darker, lighter, or discolored with respect to the background sky or terrain. The applicant performed a screening analysis to assess the potential adverse visibility impairment of the CBC Alternative on Class I and II areas using procedures consistent with the requirements and procedures contained in the EPA's "Workbook for Plume Visual Impact Screening and Analysis". The results are contained in the "Air Quality Analysis" document and summarized below.

4.1.2.4.1 Class I Areas

The analysis was performed for the two nearest Class I areas, Okefenokee National Wildlife Refuge and Wolf Island Wilderness Area, at points 55 km (35 miles) northwest and about 100 km (65 miles) north of the CBCP, respectively. The reference points were the nearest points to the CBCP at each Class I area. Potential plume visibility impacts at the two areas is most prevalent during stable dispersion conditions when stack emissions travel long distances with little dilution.

TABLE 4-15

MAXIMUM PREDICTED CONTRIBUTIONS
(BASED ON 1983-1987 METEOROLOGICAL DATA)
OF THE CBC ALTERNATIVE TO AIR TOXICS CONCENTRATIONS

Pollutant	Averaging Period	Year	Maximum Concentration ($\mu g/m^3$)	Draft No Threat Levels ($\mu g/m^3$)
Acetaldehyde	8-hour	1985	0.76	1800
Acetaldehyde	24-hour	1985	0.27	432
Acetaldehyde	Annual	1987	0.013	0.45
Acetic Acid	8-hour	1983	6.25	250
Acetic Acid	24-hour	1987	1.14	60
Antimony Compounds	8-hour	1983	2.5e-03	5
Antimony Compounds	24-hour	1987	4.5e-04	1.2
Antimony Compounds	Annual	1987	4.0e-05	3.0e-01
Arsenic	8-hour	1987	0.025	2
Arsenic	24-hour	1987	9.0e-03	0.48
Arsenic	Annual	1987	1.9e-04	2.3e-04
Barium	8-hour	1985	0.071	5
Barium	24-hour	1985	0.025	1.2
Barium	Annual	1987	8.1e-04	5.0e+01
Beryllium	8-hour	1983	1.6e-03	0.02
Beryllium	24-hour	1985	3.5e-04	0.0048
Beryllium	Annual	1983-1987	2.0e-05	4.2e-04
Bromine	8-hour	1983	4.4e-03	6.6
Bromine	24-hour	1987	8.0e-04	1.584
Cadmium	8-hour	1983	6.6e-03	0.5
Cadmium	24-hour	1985	1.5e-03	0.12
Cadmium	Annual	1987	1.0e-04	5.6e-04
Chromium VI Compounds	8-hour	1983, 1985	1.3e-04	0.5
Chromium VI Compounds	24-hour	1985	5.0e-05	0.12
Chromium VI Compounds	Annual	1983-1987	<1.0e-05	8.3e-05
Cobalt	8-hour	1983	0.039	0.5
Cobalt	24-hour	1987	7.1e-03	0.12

TABLE 4-15
(Continued)

MAXIMUM PREDICTED CONTRIBUTIONS (BASED ON 1983-1987 METEOROLOGICAL DATA) OF THE CBC ALTERNATIVE TO AIR TOXICS CONCENTRATIONS

Pollutant	Averaging Period	Year	Maximum Concentration ($\mu g/m^3$)	Draft No Threat Levels ($\mu g/m^3$)
Copper	8-hour	1983	0.18	10
	24-hour	1987	0.032	2.4
Fluorides (as F)	8-hour	1985	0.065	25
	24-hour	1985	0.023	6
Formaldehyde	8-hour	1983	0.25	12
	24-hour	1987	0.046	2.88
	Annual	1987	4.0e-03	7.7e-02
Hydrogen Chloride	8-hour	1983	0.415	75
	24-hour	1987	0.075	18
	Annual	1987	6.5e-03	7.0e+00
Indium Compounds	8-hour	1985, 1987	2.0e-05	1
	24-hour	1984, 1985, 1987	1.0e-05	0.24
Lead Compounds	8-hour	1983	5.6e-03	0.5
	24-hour	1985	1.8e-03	0.12
	Annual	1987	9.0e-05	9.0e-02
Manganese	8-hour	1985	0.058	50
	24-hour	1985	0.021	12
	Annual	1987	6.7e-04	4.0e-01
Mercury Alkyl Compounds	8-hour	1985	3.6e-03	0.1
	24-hour	1985	1.3e-03	0.024
Molybdenum	8-hour	1983	0.031	50
	24-hour	1987	5.6e-03	12
Nickel	8-hour	1983	0.11	1
	24-hour	1987	0.019	0.24

TABLE 4-15
(Continued)

MAXIMUM PREDICTED CONTRIBUTIONS (BASED ON 1983-1987 METEOROLOGICAL DATA) OF THE CBC ALTERNATIVE TO AIR TOXICS CONCENTRATIONS

Pollutant	Averaging Period	Year	Maximum Concentration ($\mu g/m^3$)	Draft No Threat Levels ($\mu g/m^3$)
Phenol	8-hour	1983	6.25	190
	24-hour	1987	1.14	45.6
	Annual	1987	0.099	30
Phosphorous	8-hour	1983	0.067	1
	24-hour	1985	0.014	0.24
Pyridine	8-hour	1983	6.25	160
	24-hour	1987	1.14	38.4
	Annual	1987	0.099	1
Selenium	8-hour	1983	7.1e-03	2
	24-hour	1987	1.3e-03	0.48
Sulfuric Acid Mist (H_2SO_4)	8-hour	1983	7.36	10
	24-hour	1987	1.34	2.4
Tin	8-hour	1983	0.21	1
	24-hour	1987	0.038	0.24
Vanadium	8-hour	1983	0.47	0.5
	24-hour	1987	0.085	0.12
	Annual	1987	7.4e-03	2.0e+01

The EPA Workbook identifies two levels of screening to evaluate plume visibility impairment. Level 1 is designed to represent generic "worst-case" atmospheric dispersion conditions. In Level 2, an analysis using actual meteorological data is conducted to determine the site-specific worst-case conditions that could transport the plume from the source to the Class I area. Both the Level 1 and Level 2 analyses make use of the EPA VISCREEN model, which calculates two visibility impairment parameters, plume contrast and plume perceptibility. Critical values for these two parameters used to determine significant visual impacts are $\pm$ 0.05 for contrast (E) and 2.0 for perceptibility (C).

The background visual range for Okefenokee and Wolf Island Wilderness areas is 25 km (16 miles), as determined from the map in the EPA Workbook. However, because the line on the map marking the boundary between the 25 km and 40 km visual range appears to pass close to the eastern portion of the Okefenokee Wilderness Area (about 20 km), the Level 1 visibility screening analysis was conducted for this area using the 40 km (26 miles) background distance as well. Because modeled visibility impairment is inversely related to background visual range, using the higher value will result in an even more conservative assessment.

The VISCREEN Level 1 analysis for the CBC Alternative, using the 25 km background visibility, resulted in maximum screening values much less than the significant impact criteria for contrast and perceptibility at the Okefenokee (max. E = 1.34; max. C = -0.009) and Wolf Island Wilderness Areas (max. E = 0.45; max. C = -0.004). However, the Level 1 values for the 40 km background perceptibility at Okefenokee Wilderness Area were above the screening criteria while the values of plume contrast (against both the sky and terrain) were determined to be below the screening criteria. As a result, a Level 2 analysis was conducted for the Okefenokee Wilderness Area.

Differences between Level 1 and Level 2 analysis result from considering meteorologic information that affect plume transport. Meteorologic conditions for plume transport were determined based on procedures in the EPA Workbook using five years (1983-87) of meteorologic data (e.g., wind direction, wind speed and atmospheric stability) from the Jacksonville airport. In general, the method determines wind directions that are most likely to transport the plume to the Class I area, which were SE and ESE, and the worst case (one-percentile) meteorologic conditions (i.e., wind speed and atmospheric stability). The plume contrast and perceptibility are calculated for these conditions.

The results of the Level 2 screening analysis are summarized in Table 4-16. The predicted values of plume perceptibility and plume contrast to the sky and terrain for the worst case meteorologic conditions are below the screening criteria values. The emissions from the CBC Alternative should not impact visibility at the Okefenokee Class I areas.

TABLE 4-16

RESULTS OF LEVEL 2 ANALYSIS OF IMPACTS FROM THE CBCP ON THE 40 KM VISUAL RANGE AT THE OKEFENOKEE WILDERNESS AREA

Visibility Impairment Parameter	Wind Director Section	Closest Distance to Class I Area (km)	Maximum Calculated Value	Screening Criteria Value
Plume Perceptibility (ΔE)	ESE	55.0	1.261 0.989 0.667 0.503	2.0
	SE	59.5	1.613 1.098	
Plume Contrast (C_p)	ESE	55.0	-0.008 -0.006 -0.004 -0.003	±0.05
	SE	59.5	-0.010 -0.007	

4.1.2.4.1 Class II Areas

A VISCREEN analysis was also performed to evaluate plume visibility in the area surrounding the facility. Although specifically designed to evaluate plume visibility at somewhat distant Class I areas, VISCREEN, with appropriate limitations, can be applied in a more generalized context. Some of the limitations employed include: only the VISCREEN visibility parameters applicable to the effect of the plume against the background sky were used, since the vicinity of the CBCP contains no elevated terrain; the observer distance was limited to a minimum of 5 km (3.2 miles) out to a maximum of 25 km (16 miles) since VISCREEN simulates the emissions as a point source, which makes simulations of closer observer distances inappropriate; and only two sight-lines were considered with the observer either looking straight down the centerline of the plume in the direction of the stack or with the observer at a right angle to the plume direction, which would be more applicable to the general observer. The modelling effort also considered relatively conservative meteorologic conditions of neutral atmospheric stability typical of early morning hours before surface heating and a wind speed of 3 m/s (6.6 miles per hour).

The results of the Class II plume visibility analysis are summarized in Table 4-17. Based on the Class II analysis, the plume for the CBC Alternative would only be detectable when directly viewing the facility at distances within 20 km. Given the assumed line-of-sight, the facility would be in full view, which suggests the visibility of the plume against the sky would be secondary to the contrast of the facility against the sky. For the general observer, the potential for a visible plume is limited to the closest distance modeled (5 km). At greater distances, the modeled visibility parameters fall off rapidly and are much less than the critical values. The visual impacts of a plume from the CBCP are expected to be localized and occur only under light wind and neutral dispersion conditions, which occur primarily during early daylight hours.

4.1.2.5 Regional/Global

4.1.2.5.1 Acidic Deposition

In recent years public awareness regarding the potential impacts of acidic deposition (or rain) on the natural and man-made environments has increased. Acidic deposition, both wet (as rain, snow and fog) and dry (particulate fallout), refers to the increase in acidity of deposition (wet and dry) from anthropogenic (man-made) sources. Background rainfall normally has a slightly acidic pH in the range of 4.5 to 5.5, which is due to the introduction of acid causing agents from natural sources (e.g., volcanoes, wetlands, oceans, vegetation and animals);

TABLE 4-17

VISIBILITY OF CBCP STACK PLUME IN CLASS II AREAS (I.E., IN THE VICINITY OF THE FACILITY)

Distance (km)	View Towards Source		Cross Plume View	
	ΔE	Cp	ΔE	Cp
5	8.0	-0.044	3.0	-0.016
10	6.6	-0.039	1.5	-0.009
15	4.0	-0.026	0.7	-0.005
20	2.1	-0.016	0.4	0.004
25	1.3	-0.008	0.3	-0.002

Notes:

Detectability thresholds: ΔE = 2.0, Cp = ±0.05
Meteorological Conditions: Stability D, 3 m/sec wind speed

however, anthropogenic sources of SO_2 and NO_x are believed to have increased rainfall acidity in many regions, particularly industrial areas.

SO_2 and NO_x, which result from the combustion of fossil fuels (oil, gasoline, and coal), undergo chemical transformations in the atmosphere to produce sulfuric and nitric acid. Depending on the natural buffering capacity, acidic deposition has been found to contribute to: acidification (chronic and episodic) of stream and lakes resulting in damage to fisheries; acidification of forest soils, releasing toxic chemicals (e.g., aluminum), and causing decreased productivity or mortality of vegetation; formation of "acid fog" which destroys plant tissues (e.g., leaves and needles); leaching of nutrients from agricultural soils deceasing productivity and/or increasing the need for fertilizers; and damage to building materials (e.g., steel, concrete, limestone and marble).

Impacts of the alternatives can be evaluated by comparison of the total SO_2 and NO_x emissions from each alternative to pre-conversion of SK to recycling operations. The total SO_2 and NO_x emissions from each source were summarized in Table 4-1. The estimated total acid gas emission rate of 4760 TPY (sum of SO_2 and NO_x) for the CBC Alternative is lower than the AES and SK-only Alternatives, which have total emission rates of 7850 TPY and 5300 TPY, respectively. In addition, the CBC Alternative is also expected to lower acid gas emissions over pre-conversion emissions at SK, which should be somewhat higher than the SK-only Alternative (SK as a recycle facility) emissions. The lower emission rates of the CBC Alternative are due to the use of lower sulfur coal than the AES Alternative, and greater SO_2 and NO_x control at the CBC Alternative than either the AES and SK-only Alternatives.

The decrease in acid gases emissions that would result from the CBC Alternative should have a net improvement on acidic deposition impacts; however, the release of acid gases by this alternative will continue to cause, albeit somewhat less, acidic deposition impacts. The areas of impact are controlled by prevailing wind directions and travel distances. The prevailing winds vary considerably with season from NE to SE, but predominately vary from the NW to SW. Chemical transformation of SO_2 and NO_x emissions to sulfuric and nitric acid occur at slow rates and impacts to areas within 50 km (32 miles) of the CBCP are likely to be low. Based on these assumptions the area of greatest deposition will occur NE to SE of the facility, which, at distances greater than 50 km, is the Atlantic Ocean. This area would not likely be impacted by acidic deposition due to the high buffering capacity of marine waters (250 mg/kg as $CaCO_3$). Areas of lesser deposition are the Okefenokee Swamp to the NW and the Central Florida lake belt to the SW. These areas contain soils and surface waters with limited buffering capacity, that may be more susceptible to acidic deposition impacts.

4.1.2.5.2 Global Climate

The release of anthropogenic gases, primarily carbon dioxide, but including methane, nitrous oxides, chlorfluorocarbons, have been identified as contributing to a global problem, called the "Greenhouse Effect". This is due to the ability of these gases to trap infrared radiation (heat) from both the sun and the earth causing a warming effect somewhat analogous with a greenhouse. Recent mathematical modeling of the greenhouse gases effects predict a global warming of between 0 and 4°C over the next 50 years; however, the uncertainties in the predictions are high due to our limited understanding of interactive processes (e.g., increased cloud formation). The temperature increases are predicted, by some climatologist, to cause a global rise in sea level, changing precipitation patterns resulting in changing climates, and increase in severity in violent meteorologic events (e.g., hurricanes).

Global anthropogenic emissions of carbon dioxide, released by combustion of fossil fuels, exceed six billion metric tons annually. Expected emissions from the AES and CBC Alternatives are expected to be less than 2.5 million metric tons annually. Due to much lower fuel consumption, the SK-only Alternative carbon dioxide emissions will be considerably lower. The three alternatives represent a very small percent of the total global carbon dioxide emissions. Further, the energy produced by the CBCP will replace older SK boilers and may replace older less efficient fossil-fuel fired generating capacity in Florida; however, expected future population growth and energy consumption in Florida suggest the facility will be used to meet future power requirements. This information suggests each alternative does not, individually, cause an effect, but, when viewed cumulatively with all anthropogenic sources, may represent a substantial global "Greenhouse Effect" concern.

4.2 HUMAN HEALTH IMPACTS

Potential human health impacts from the CBCP are likely to be associated with operation and not construction; specifically combustion product emissions. To evaluate direct health impacts associated with air pollutants discharged during the operation of the CBCP, Section 4.1.2.3 Air Quality compared air quality from the CBCP to state and federal AAQS. In addition to this analysis and in response to public concerns regarding potential longterm human health (e.g., cancer) impacts, a human health risk assessment was conducted by ENSR for the applicant. The Executive Summary of the ENSR document is contained in Appendix K and the complete document is available for review upon request.

The results of this analysis are summarized in the following sections. The AES Alternative was similar in stack design to the CBC Alternative, but was expected to discharge greater amounts of air pollutants (See Table 4-1 and 4-2). This indicates the AES Alternative of human health impacts between the CBC Alternative and the SK-only Alternative was conducted.

4.2.1 Risk Assessment Methods

In assessing human health risks, the applicant followed procedures recommended by the National Research Council (NAS, 1983) and EPA (EPA 1986a, EPA 1989b, EPA 1989d, and EPA 1990b). The risk assessment is a stepwise procedure that includes: hazard or chemical identification; evaluation of available dose-response information for each chemical identified; assessment of human exposure to identified chemicals; and determination of potential risks to each chemical.

4.2.1.1 Chemical Identification

Chemicals initially identified as potential human hazards were the five criteria pollutants and the 26 other organic and inorganic substances that were included on the Draft Florida Air Toxics List and modelled as part of the Air Quality Analysis. Based on their relative toxicity, the list was further reduced to include 10 metals, polynuclear aromatic hydrocarbons (PAH), formaldehyde and total radionuclides.

The ten metals identified for the human health risk assessment were antimony, arsenic, barium, beryllium, cadmium, hexavalent chromium, lead, mercury and nickel. These metals were not only selected based upon their toxicity, but also because of their persistence in the environment, which can lead to accumulation in the environment and in tissues. PAH were included because they are considered probable carcinogens by EPA. Formaldehyde and radionuclides were included in the risk assessment by the applicant, because of public concern regarding the release of these chemicals from the CBCP.

All the identified chemicals were evaluated for both the CBC Alternative and the SK-only Alternative, except for radionuclides, which are not expected to occur at significant concentrations from the SK oil-fired boilers (SK-only Alternative). In addition to the above, chlorinated dioxins and furans were included in the assessment for the SK-only Alternative, since these two chemicals were reported in emissions from bark burners (Sassenrah 1991).

4.2.1.2 Dose-Response Data

Dose-response is the relationship between dose or exposure of a chemical and the likelihood that a health effect will occur. Exposure to a chemical can occur by a number of pathways that include: ingestion of food (e.g., fish and vegetables); accidental ingestion of soils; inhalation of airborne pollutants and soil particles (i.e., dust); and absorption through the skin.

Health effects from exposure are typically categorized into carcinogenic effects and non-carcinogenic effects, which can include chronic effects such as decreased longevity, respiratory ailments, and liver and kidney disfunction. The dose-response information, identified by the applicant in the human health risk assessment are contained in Table 4-18 (carcinogenic) and Table 4-19 and 4-20 (non-carcinogenic).

Carcinogenic data (Table 4-18), obtained from EPA sources, incorporates a number of conservative dose-response assumptions. EPA assumes that there is no threshold effect of carcinogenic chemicals and that there is a potential risk at any dose above a zero concentration. In addition, EPA uses models to extrapolate dose-response data on experimental animals (e.g., rats) to expected human dose-response, which assumes humans are more sensitive to the effects of the chemicals than the test animals. The EPA models also statistically estimate, from the range of dose-response slopes of all chemicals, an upper bound of dose-response slopes. The final value from the model is known as a cancer slope factor (CSF), which will likely overestimate true carcinogenic dose-responses of human exposure to a chemical and thus be more protective of human health. This approach is considered to be conservative.

Non-carcinogenic data (Table 4-19 and 4-20) was also obtained from EPA sources and are based on observed effects in animal experiments and accidental exposures of humans. The non-carcinogenic values represent a dose "threshold" (i.e., the dose below which no adverse human health effects would occur) and are called No Observed Adverse Effect Levels (NOAEL). To be protective of sensitive individuals within a population (e.g., elderly and children), EPA requires adjustment of the NOAEL by "uncertainty factors" to obtain a Reference Dose (RfD). The "uncertainty factors" result in RfDs that are conservative and protective of the most sensitive individuals within the population.

TABLE 4-18

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL CARCINOGENIC EFFECTS

Compound	CAS Number	EPA Carc. Class	Oral			Inhalation		
			CSF [1/(mg/kg-day)]	Ref. (Last Verified)	Study Animal	CSF [1/(mg/kg-day)]	Ref. (Last Verified)	Study Animal
Antimony	7440-36-0	ND	NA	NA	NA	ND	NA	NA
Arsenic	7440-38-2	A	1.75E-01	IRIS (9/92)	human	1.50E+01	IRIS (9/92)	human
Barium	7440-39-3	ND	ND	NA	NA	ND	NA	NA
Beryllium	7440-41-7	B2	4.30E+00	IRIS (10/92)	rat	8.40E+00	IRIS (10/92)	human
Cadmium	7440-43-9	B1	ND	NA	NA	6.30E+00	IRIS (10/92)	human
Chromium VI	7440-47-3	A	ND	NA	NA	4.20E+01	IRIS (9/92)	human
Formaldehyde	50-0-0	B1	ND	NA	NA	4.55E-02	IRIS (11/92)	rat
Lead	7439-92-1	B2	ND	NA	NA	ND	NA	NA
Mercury	7439-97-6	D	ND	NA	NA	ND	NA	NA
Nickel	7440-02-0	A	ND	NA	NA	8.40E-01*	IRIS (7/92)	human
PAH [B(a)P]	50-32-8	B2	7.30E+00	IRIS (2/93)	mouse	6.10E+00	HEAST (1992)	hamster
TCDD-TE	1746-01-6	B2	1.50E+05	HEAST (1992)	rat	1.50E+05	HEAST (1992)	rat

TABLE 4-18
(Continued)

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL CARCINOGENIC EFFECTS

Compound	CAS Number	EPA Carc. Class	Oral			Inhalation		
			CSF [1/(mg/kg-day)]	Ref. (Last Verified)	Study Animal	CSF [1/(mg/kg-day)]	Ref. (Last Verified)	Study Animal
Antimony	7440-36-0	ND	NA	NA	NA	ND	NA	NA
Radionuclides	NA	**	NA**	HEAST (1992)	NA	NA**	HEAST (1992)	NA
Vanadium	7440-62-2	ND	ND	NA	NA	ND	NA	NA

Notes:
* - Nickel Refinery Dust value.
** - Cancer slope factors for uranium-238 and thorium-232 are used to assess carcinogenic exposure to total radionuclides (see text).
CAS - Chemical Abstracts Service.
CSF - Cancer Slope Factor.
IRIS = Integrated Risk Information System, an online computer database of toxicological information (U.S. EPA, 1993).
HEAST = Health Effects Assessment Summary Tables, published annually by the U.S. EPA (1992).
ND - Not Determined by the U.S. EPA.
NA - Not Applicable.
Source: ENSR 1992.

TABLE 4-19

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL NONCARCINOGENIC CHRONIC EFFECTS FROM ORAL EXPOSURE

Compound	CAS Number	Oral Dose-Response Value (mg/kg-day)	Reference (Last Verified), Type	Target Organ/Critical Effect at LOAEL	Study Animal	Uncertainty and Modifying Factors (UFxMF)
Antimony	7440-36-0	4.00E-04	IRIS (2/93), RfD	longevity, blood glucose & cholesterol	rat	1000
Arsenic	7440-38-2	3.00E-04	IRIS (9/92), RfD	keratosis	human	3
Barium	7440-39-3	7.00E-02	IRIS (1/93), RfD	increased blood pressure	human	3
Beryllium	7440-41-7	5.00E-03	IRIS (10/92), RfD	no adverse effects observed	rat	100
Cadmium	7440-43-9	1.00E-03	IRIS (10/92), RfD	protein in urine	human	10
Chromium VI	7440-47-3	5.00E-03	IRIS (9/92), RfD	no adverse effects observed	rat	500
Formaldehyde	50-0-0	2.00E-01	IRIS (11/92), RfD	reduced weight gain; histopathology	rat	100
Lead	7439-92-1	4.30E-04	TTAL	ND	ND	ND
Mercury	7439-97-6	3.00E-04	HEAST (1992), RfD	kidney effects	rat	1000
Nickel	7440-02-0	2.00E-02*	IRIS (10/92), RfD	decreased body & organ weights	rat	300
PAH [B(a)P]	50-32-8	ND	NA	NA	NA	NA
TCDD-TE	1746-01-6	ND	NA	NA	NA	NA

TABLE 4-19

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL NONCARCINOGENIC CHRONIC EFFECTS FROM ORAL EXPOSURE

Compound	CAS Number	Oral Dose-Response Value (mg/kg-day)	Reference (Last Verified), Type	Target Organ/Critical Effect at LOAEL	Study Animal	Uncertainty and Modifying Factors (UFxMF)
Antimony	7440-36-0	4.00E-04	IRIS (2/93), RfD	longevity, blood glucose & cholesterol	rat	1000
Arsenic	7440-38-2	3.00E-04	IRIS (9/92), RfD	keratosis	human	3
Radionuclides	NA	NA	NA	NA	NA	NA
Vanadium	7440-62-2	7.00E-03	HEAST (1992), RfD	no adverse effects observed	rat	100

Notes:
CAS - Chemical Abstracts Service.
LOAEL - Lowest Observed Adverse Effects Level.
RfD - Reference Dose.
IRIS - Integrated Risk Information System, an on-line computer database of toxicological information (U.S. EPA, 1993_).
HEAST - Health Effects Assessment Summary Tables, published annually by the U.S. EPA (1992_).
ND - Not Determined by the U.S. EPA.
NA - Not Applicable.
* - Value for nickel refinery dust.
Source: ENSR 1993

TABLE 4-20

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL NONCARCINOGENIC CHRONIC EFFECTS FROM INHALATION EXPOSURE

Compound	CAS Number	Inh. Dose-Response Value (mg/kg-day)	Reference (Last Verified), Type	Target Organ/Critical Effect at LOAEL	Study Animal	RFC (mg/cu.m)	Uncertainty and Modifying Factors (UFxMF)
Antimony	7440-36-0	ND	NA	NA	NA	ND	NA
Arsenic	7440-38-2	ND	NA	NA	NA	ND	NA
Barium	7440-39-3	1.43E-04	HEAST (1992), Alt. RfC	fetus	rat	5.00E-04	1000
Beryllium	7440-41-7	ND	NA	NA	NA	ND	NA
Cadmium	7440-43-9	ND	NA	NA	NA	ND	NA
Chromium VI	7440-47-3	ND	NA	NA	NA	ND	NA
Formaldehyde	50-0-0	ND	NA	NA	NA	ND	NA
Lead	7439-92-1	4.30E-04	HEAST (1992), NAAQS	NA	NA	NA	NA
Mercury	7439-97-6	8.57E-05	HEAST (1992), RfC	nervous system	human	3.00E-04	30
Nickel	7440-02-0	ND	NA	NA	NA	ND	NA
PAH [B(a)P]	50-32-8	ND	NA	NA	NA	ND	NA
TCDD-TE	1746-01-6	ND	NA	NA	NA	ND	NA
Total Radionuclides	NA	NA	NA	NA	NA	ND	NA

TABLE 4-20
(Continued)

DOSE-RESPONSE INFORMATION FOR INORGANIC AND ORGANIC CHEMICALS WITH POTENTIAL NONCARCINOGENIC CHRONIC EFFECTS FROM INHALATION EXPOSURE

Compound	CAS Number	Inh. Dose-Response Value (mg/kg-day)	Reference (Last Verified), Type	Target Organ/Critical Effect at LOAEL	Study Animal	RFC (mg/cu.m)	Uncertainty and Modifying Factors (UFxMF)
Antimony	7440-36-0	ND	NA	NA	NA	ND	NA
Arsenic	7440-38-2	ND	NA	NA	NA	ND	NA
Vanadium	7440-62-2	ND	NA	NA	NA	ND	NA

Notes:
CAS - Chemical Abstracts Service.
LOAEL - Lowest Observed Adverse Effects Level.
RfC - Reference Concentration.
IRIS - Integrated Risk Information System, an on-line computer database of toxicological information (U.S. EPA, 1992_).
HEAST - Health Effects Assessment Summary Tables, published annually by th U.S. EPA (1992_).
ND - Not Determined by the U.S. EPA.
NA - Not Applicable.
*** - An acceptable air concentration of 0.07 mg/cu.m was estimated by Carson et al. (1981) for sulfuric acid from available data.**
Source: ENSR 1993.

4.2.1.3 Exposure Assessment

The applicant used a multi-step procedure to quantify human exposure to pollutants discharged by the CBCP and SK. Their process included: identification of ways in which humans may be exposed to emissions released into the environment (i.e, exposure scenarios); identification of receptors or locations at which human exposure should be evaluated; and estimation of amounts to which humans may be exposed.

The exposure scenarios considered for the human health assessment, presented in Figure 4-1, were based on two types of chemical release in the environment (i.e., air dispersion and deposition). The two types of release resulted in human exposure through: inhalation of air suspended chemicals; consumption of local fish and home-grown vegetables contaminated by pollutants; and ingestion and dermal absorption of soils contaminated by the chemicals.

A number of receptors were identified (Figure 4-2 and Table 4-21) in the vicinity of the CBCP site. The locations identified included: residential areas that are in close proximity to the facility and are expected to have the highest ambient air and deposition exposure; and schools and playgrounds in the vicinity of the CBCP, which were included as sensitive areas.

The applicant used the EPA ISC2 model to estimate chemical concentrations for each exposure pathway and receptor. Air dispersion models (ISCST2) were used to estimate ambient air concentration and the concentrations of chemicals that may be inhaled. A deposition model was used to estimate soil and water contamination in the area, which was used to determine concentrations in locally grown and consumed fish and vegetables and in contaminated soils that may be ingested.

Exposure estimates were made for a "Reasonably Maximally Exposed" individual (RME), which is a hypothetically exposed individual. This hypothetical individual is a person that is used to quantify exposure to pollutants via the various pathways. To be protective of the population, conservative assumptions are made regarding "reasonable maximum" exposure scenarios. Examples of protective assumptions in the assessment made for the RME include: consumption of one-half pound of fish from the Broward River per week for nine months of the year; consumption of two pounds of home-grown vegetables per week every week of the year; and inhalation of air at receptors 24 hours per day 365 days per year. The applicant also considered exposures for young and older children, which have different body weights and exposure scenarios than adults. These conservative assumptions likely resulted in estimations that are much higher than the average individual and a risk assessment that overestimates risk of the population.

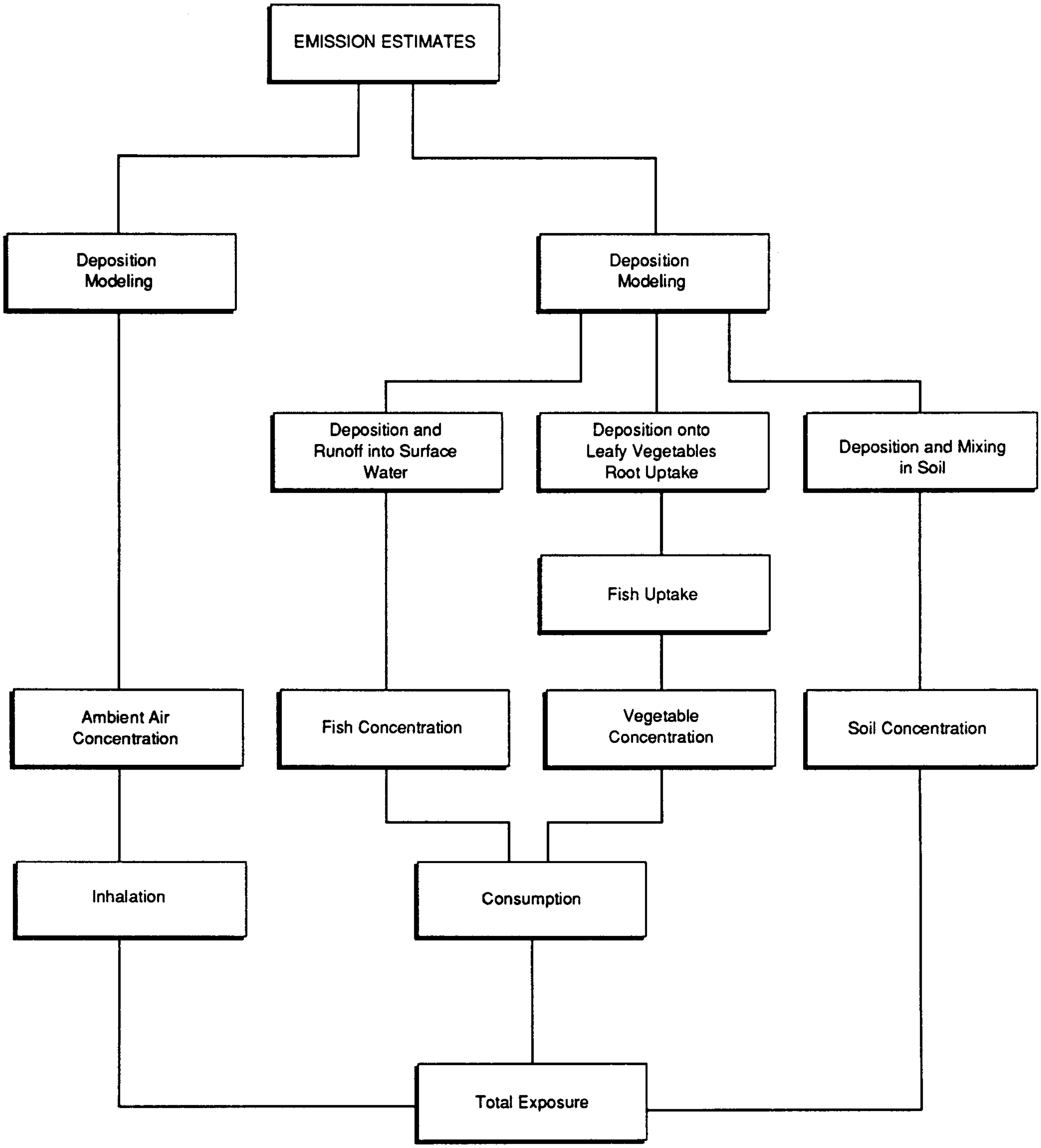
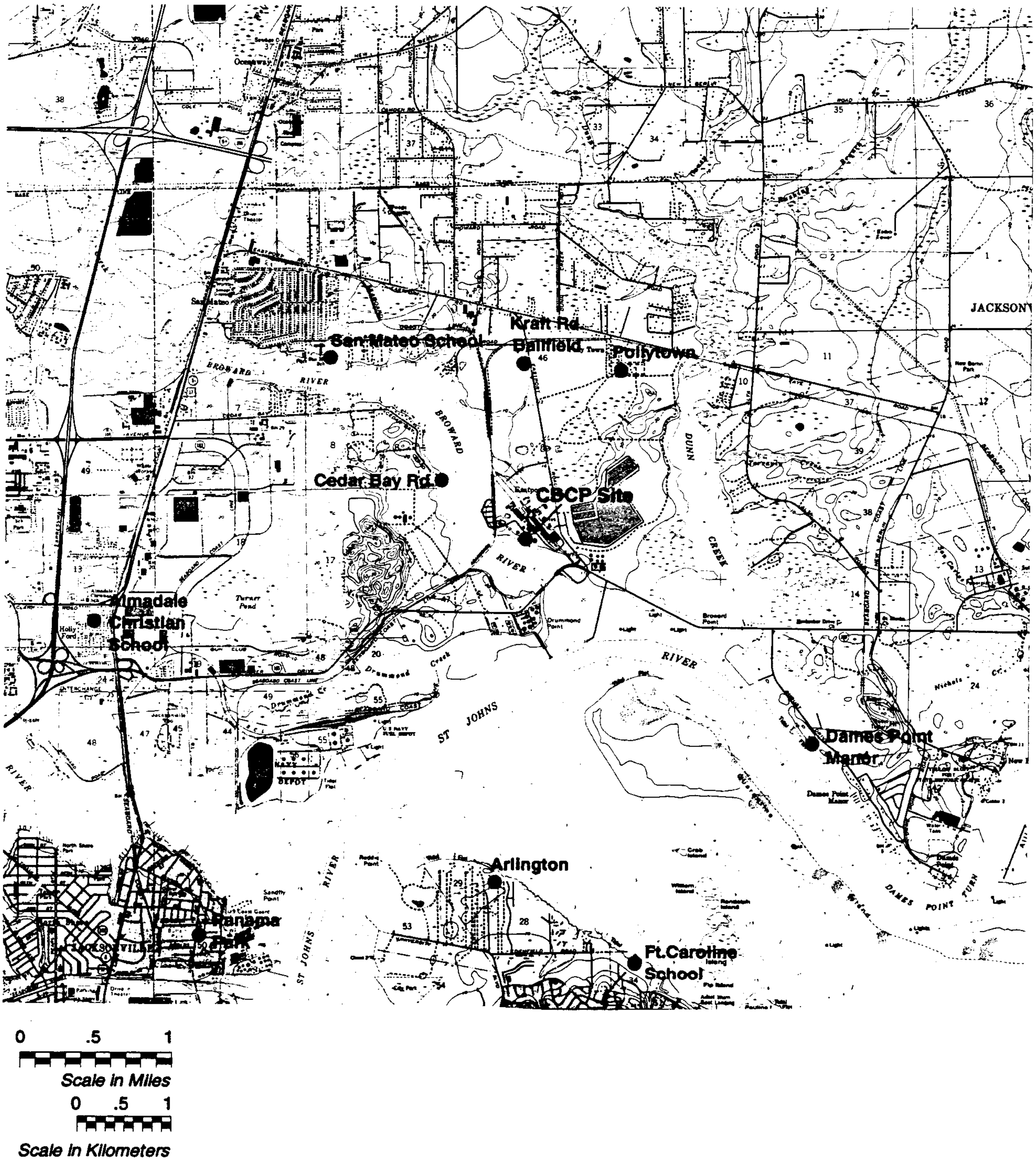


FIGURE 4-1

EXPOSURE ASSESSMENT MODEL USED TO EVALUATE POTENTIAL HUMAN HEALTH RISK FROM THE CBCP AND SK

Cedar Bay Cogeneration Project

SOURCE: ENSR



N

U.S.G.S. 7.5 minute series quadrangle of Jacksonville, Florida

Legend:

● Residential Location

● Parks and Schools

FIGURE 4-2

RECEPTOR LOCATIONS FOR THE HUMAN HEALTH RISK ASSESSMENT

Cedar Bay Cogeneration Project

SOURCE: ENSR

TABLE 4-21

RECEPTOR LOCATION INFORMATION USED FOR THE HUMAN HEALTH RISK ASSESSMENT

Location	Receptor Number	Distance (Meters)	Location (Degrees from north)	Comment
Dames Point Manor	182	4000	120	Residential Receptor RME for air impact
Cedar Bay Road	803	500	300	Residential Receptor Nearest neighbor, RME (a,b)
Polly Town	50	2000	40	Residential Receptor Nearest neighbor (a)
Arlington	278	4000	180	Residential Receptor
Kraft Road Ballfield	861	1500	0	San Mateo Little League ballfields
San Mateo Elementary School	484	3000	310	School with ballfields (c)
Almadale Christian School	467	2500	300	School (a)
Panama Park	344	5000	220	Downtown park with softball fields (c)
Ft. Caroline Elementary School	265	6000	170	School with ballfields and pedestrian trails. Also near Ft. Caroline playground. (c)

(a) Source: U.S.G.S. 7.5. minute maps.
(b) Personal Communication, Moore/Bowers landuse consultants.
(c) Jacksonville Planning and Development Department, 1989a.

4.2.1.4 Regulatory Benchmarks

Interpretation of results from a human health risk assessment (cancer and non-cancer) are subject to debate. In the case of cancer risk, the assessment quantifies risks as probabilities (e.g., number of chances in 100,000) of increased cancer risk of an individual, which as previously indicated are for a "Reasonably Maximally Exposed" individual. The applicant used a cancer risk benchmark of 1 chance in 100,000 for any individual chemical exposure. For carcinogenic risk, EPA generally chooses a range of interest between one chance in 100,000 to one chance in a million excess cancer risk. This risk level is used as a point of departure for determining the need for corrective action. Below this risk level, corrective action is generally considered unnecessary. Individual contaminants or pathway totals with carcinogenic risk exceeding this range are cause for concern.

Non-carcinogenic health risks were based on calculation of parameters called hazard quotients, which are the relationship between the dose that is considered safe (RfD) and the estimated dose of the RME. Regulatory programs typically require the hazard quotient for individual chemical exposure to be less than one; however, this may not reflect exposure of individuals to other sources. The applicant also calculated a hazard index, which is the sum of the hazard quotients for all individual chemicals. A value of less than 0.2 for the hazard index was considered adequate protection, based on the use of this value by EPA for setting primary drinking water standards.

4.2.2 Risk Assessment Results

4.2.2.1 Carcinogenic Risks

The potential cancer risks associated with the CBC Alternative are presented in Table 4-22. The highest estimated cancer risk associated with the CBC Alternative (0.24 in 100,000) was observed in the Cedar Bay residential area. This is well below the applicant's established cancer risk benchmark and was within EPA's range of interest. All the remaining locations evaluated for the CBC Alternative were well below 0.1 in 100,000, indicating this alternative should not pose any cancer risk to the population in the vicinity of the facility.

The SK-only Alternative also had cancer risks less than the benchmark and would not likely pose a cancer risk to the local community. However, as can be seen in Table 4-22, the SK-only Alternative has higher cancer risks at the majority of evaluated locations (except Cedar Bay Road) than the CBC Alternative. Further, as previously mentioned, the AES Alternative has greater emissions for all of the chemicals evaluated and would likely have greater estimated

TABLE 4-22

POTENTIAL HUMAN HEALTH CANCER RISK COMPARISON FROM THE CBC ALTERNATIVE AND THE SK-ONLY ALTERNATIVE

Location	Exposures	Cancer Risk (Chances in 100,000)		Difference in Risk CBCP-SKC
		CBCP and Package Boilers	SKC Existing	
Dames Point Manor	Inhalation Soil Foodchain	0.05	0.14	-0.09
Cedar Bay Road	Inhalation Soil Foodchain	0.24	0.16	+0.08
Polly Town	Inhalation Soil Foodchain	0.03	0.1	-0.02
Arlington	Inhalation Soil Foodchain	0.02	0.08	-0.06
Kraft Rd. Ballfield	Inhalation Soil	0.05	0.10	-0.05
San Mateo Elementary School	Inhalation Soil	0.03	0.10	-0.07
Almadale Christian School	Inhalation Soil	0.03	0.09	-0.06
Panama Park	Inhalation Soil	0.03	0.08	-0.05
Ft. Caroline Elementary School	Inhalation Soil	0.01	0.04	-0.03

cancer risks than the CBC Alternative. This suggests the CBC Alternative has the least impact on cancer risk of the three alternatives.

4.2.2.2 Non-carcinogenic Risks

The potential non-carcinogenic health impacts of the CBC Alternative and the SK-only Alternative are presented in Table 4-23. The highest chemical hazard index estimated for the CBC Alternative was 0.1 at the Cedar Bay Road residential location, which is below the 0.2 benchmark. The hazard indices estimated for all other locations were all 0.03 or less. This also indicates that all hazard quotients for individual chemicals at all locations are much less than one and that the CBC Alternative should not pose any non-cancer health effects on the local population.

The SK-only Alternative also had hazard indices less than the benchmark and would not likely pose any non-cancer risk to the local community. However, as can be seen in Table 4-23, the SK-only Alternative has the same or higher hazard indices at the majority of evaluated locations (except Cedar Bay Road and Arlington) than the CBC Alternative. As was mentioned for cancer risks, the AES Alternative (CBCP as proposed) has greater predicted emissions for all of the chemicals evaluated and would likely have greater non-cancer risks than the CBC Alternative (CBCP as constructed). This suggests the CBC Alternative also has the least impact on non-cancer health risks of the three alternatives.

4.3 SURFACE WATER IMPACTS

The potential impacts of the alternatives on surface water resources are a direct result of discharges to the St. Johns and Broward Rivers. These two rivers have been classified as Class III marine waters with protected uses that include: propagation and maintenance of a healthy, well-balanced population of fish and wildlife, recreation (e.g., boating, water skiing and fishing), navigation and non-potable water use (e.g., cooling water). These water uses are protected through state and federal water quality criteria. These criteria are pollutant concentrations below which no adverse toxic impact (either acute or chronic) on the biotic community would be expected. Discharges, associated with either construction and/or operation of the CBCP and SK, can cause or contribute to an exceedance of a criteria, which would impact the waterbodies protected uses. The potential surface water impacts are summarized in this section.

TABLE 4-23

POTENTIAL HUMAN HEALTH NON-CANCER RISK COMPARISON FROM THE CBC ALTERNATIVE AND THE SK-ONLY ALTERNATIVE

Location	Exposures	Hazard Index		Ratio of CBCP/SKC
		CBCP and Package Boilers	SKC Existing	
Dames Point Manor	Inhalation Soil Foodchain	0.02	0.03	0.7
Cedar Bay Road	Inhalation Soil Foodchain	0.1	0.05	2.0
Polly Town	Inhalation Soil Foodchain	0.02	0.02	1.0
Arlington	Inhalation Soil Foodchain	0.02	0.01	2.0
Kraft Rd. Ballfield	Inhalation Soil	0.03	0.03	1.0
San Mateo Elementary School	Inhalation Soil	0.002	0.009	0.2
Almadale Christian School	Inhalation Soil	0.002	0.008	0.3
Panama Park	Inhalation Soil	0.002	0.007	0.3
Ft. Caroline Elementary School	Inhalation Soil	0.0008	0.004	0.2

4.3.1 Construction-Related

Two types of construction-related surface water discharges expected from the AES Alternative were stormwater runoff and groundwater dewatering. Groundwater dewatering was eliminated from the CBC Alternative and only stormwater was expected to be discharged.

To minimize construction-related runoff impacts (e.g., suspended solids and siltation) on the St. Johns and Broward Rivers, an approved erosion and sedimentation control plan was implemented at the CBCP. This plan included: seeding and mulching of exposed areas; conscientious use of equipment; installation of a barrier (e.g., silt fences) along the western perimeter; and a stormwater management system. The stormwater system directed runoff generated on the site, via temporary ditches and piping, to one of two permanent retention ponds (YARP and SARP) or temporary sedimentation basins located southwest of the railroad spur. Ponds were also equipped with fabric filter perforated pipes to reduce suspended solids and discharges were directed to the Broward River. Only during extreme rain events was unfiltered runoff discharged; however, surface water impacts were minimal due to high ambient suspended solids and flows under these extreme conditions.

The AES Alternative also would have included a discharge of construction dewatering wastewater to the YARP prior to discharge to the Broward River. This dewatering, approximately 200 gpm, had been expected to last for a period of six to nine months. The quality of this water was not known; however, the SK treatment system would have likely reduced any pollutant contained in this discharge.

The remaining source of wastewater during construction is associated with the work forces use of portable, self contained toilet facilities and temporary and permanent facilities. Wastes from portable units were disposed at off-site facilities by licensed contractors and the remainder were collected, treated and discharged by the SK wastewater treatment system. No other construction-related surface water impacts were expected or occurred.

4.3.2 Operation-Related Impacts

Proposed/expected surface water discharges to the St. Johns and Broward River vary considerably from one alternative to the next and include process, cooling and stormwater discharges. The various discharges and potential impacts from each alternative are summarized below. The only discharge common to all three alternatives is the release of treated process wastewater from SK recycling operations, with a composition as summarized in Table 4-24. The SK wastewater flow varies between alternatives and will be included in the summaries.

TABLE 4-24

COMPOSITION OF TREATED PROCESS WASTEWATER FROM THE SK RECYCLING OPERATIONS

Constituent	Concentration (mg/l)	Constituent	Concentration (mg/l)
pH (units)	6-8	Antimony	<0.005
Conductivity, (umhos)	2500	Silver	<0.05
Alkalinity (as $CaCO_3$)	560	Aluminum	<2.2
Total Suspended Solids	115	Copper	<0.015
Total Dissolved Solids	2300	Arsenic	<0.005
BOD_5	70	Barium	<1.0
COD	500	Beryllium	<0.005
Calcium	560	Cadmium	<0.005
Magnesium	260	Chromium, total	<0.05
Sodium	680	Cobalt	<0.10
Phosphate, Total (as PO_4)	3.4	Lead	<0.05
Potassium	15	Manganese	<0.7
Sulfate (as SO_4)	388	Mercury	<0.005
Chloride	84	Nickel	<0.1
Silica (as SiO_2	55	Tin	<0.05
Ammonia Nitrogen	1.5	Titanium	<0.1
Iron	1.0	Thallium	<0.01
		Zinc	<1.0

4.3.2.1 AES Discharges

The AES Alternative proposed a variety of process, cooling water and stormwater discharges that are summarized in Table 4-25. The major source of wastewater (i.e., cooling tower blowdown), with a discharge volume of almost 1 MGD, was to be discharged directly to the St. Johns River via the SK discharge system. Table 4-26 contains the estimated quality of the combined wastewater discharge from the AES Alternative.

A number of infrequent, low volume waste streams (e.g., metal cleaning and demineralizer regeneration waste), were to be generated on an infrequent basis during operation of the CBCP. These waste streams were to be pre-treated at the CBCP using caustic to remove metals and then discharged to the SK wastewater treatment system for further treatment.

In addition, stormwater runoff from the materials (coal and limestone) storage area and yard area was to be detained in the SARP and YARP and discharged via the SK discharge to the St. Johns River. AES did not estimate quality of these discharges, because water quality would be dependent on coal and limestone characteristics; however, the storage area runoff could have contained high metal concentrations (e.g., iron, aluminum, manganese) from oxidation of sulfide minerals associated with coal, suspended solids, and high acidity. The ponds were to be designed to release stormwater at a rate equal to background flows up to a 24-hour storm event that occurs at a frequency of 25 years.

Under the AES Alternative, SK operations would have discharged all of their treated process wastewater, which would have been a flow of approximately 10 MGD. The expected composition is summarized in Table 4-24. Therefore, under normal operating conditions the total amount of wastewater that would have been discharged by the AES Alternative to the St. Johns and Broward Rivers would have exceeded 11 MGD.

4.3.2.2 CBC Discharges

The CBC Alternative, under normal operating conditions, will be the CBCP as a zero discharge facility. The zero discharge system (discussed in section ??) will produce cooling water for the CBCP from treatment of process wastewater, cooling water blowdown, stormwater runoff, and a portion of treated SK wastewater.

Metal cleaning, floor drains and the demineralizer system are all sources of infrequent to periodic wastewater. These wastewaters will be directed into the zero discharge system at the pre-treatment clarifier where the wastewater will be treated to remove particulates and

TABLE 4-25

SUMMARY OF AES ALTERNATIVE WASTEWATER DISCHARGES

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

(1) Flow will occur only during maintenance outages.

TABLE 4-26

ESTIMATED QUALITY OF THE WASTEWATER DISCHARGED BY THE AES ALTERNATIVE (mg/l)

Constituent	Average Concentration (mg/l)	Maximum Concentration (mg/l)
BOD 5-day	11	11
COD	32	83
TOC	17	32
TSS	39	58
Ammonia	1.1	1.1
pH	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
Alkalinity (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
Total Phosphorous	0.06	0.07
Cyanide	0.00054	0.0016
Iron	2.2	6.6
Manganese	0.27	0.94
Aluminum	1.8	6.3
Nickel	0.01	0.04
Zinc	0.05	0.16
Copper	0.005	0.05
Cadmium	0.0002	0.00069
Chromium	0.006	0.02

TABLE 4-27
(Continued)

ESTIMATED QUALITY OF THE WASTEWATER DISCHARGED BY THE AES ALTERNATIVE (mg/l)

Constituent	Average Concentration (mg/l)	Maximum Concentration (mg/l)
Beryllium	0.00015	0.00052
Arsenic	0.000045	0.00015
Selinium	0.00004	0.00014
Antimony	0.000018	0.000063
Mercury	0.000037	0.00013
Barium	0.02	0.067
Silver	0.0001	0.0004
Lead	0.01	0.027
Thallium	0.000018	0.000063

metals. This system will also recycle and reuse all cooling tower blowdown, a major source of wastewater at the CBCP. This blowdown will enter the zero discharge system at the cooling tower blowdown clarifier. The blowdown will be treated by a number of processes prior to reuse as a cooling water for the CBCP.

In addition, the system will use stormwater runoff from the yard and storage area that is retained in the YARP and SARP as a cooling water source. Water retained in the YARP and SARP will enter the zero discharge system at the cooling tower blowdown clarifier and the pre-treatment clarifier, respectively. Under normal operating and meteorologic conditions, the CBCP should be able to use all stormwater runoff that is generated on the site; however, under extreme meteorologic conditions (e.g., 25 year, 24 hour rainfall event) the CBCP will not be able to use all the stormwater generated and a discharge will occur. USGen has estimated the YARP and SARP will be able to retain (i.e., no stormwater discharge), when at maximum storage capacity, up to 24 hour rainfall frequency events of 25 year and 50 year, respectively. Greater rainfall then these extreme events will result in a discharge from the YARP and SARP. The effect of longterm precipitation events (e.g., cumulative five and ten day rainfall) were not compared to CBCP operating conditions, which might result in more frequent discharges; however, discharges from the ponds are not likely to exceed a frequency of twice per year. At the "worst-case" pond discharge frequency and flow, the impacts on the receiving waterbodies (i.e., Broward River) are expected to minimal, due to the high dilution of pollutants with rain water and high receiving waterbody flow that would be associated with the extreme meteorologic conditions. The stormwater NPDES permit issued for the CBCP will contain monitoring requirements for all discharges from the two ponds, which can be used to identify any impacts from the discharge of stormwater that will require mitigation.

The cooling water needs of the CBCP will also require use of a portion of SK treated wastewater. The SK wastewater will enter the CBCP zero discharge system at the pre-treatment clarifier, where it will be treated with chemical agents that will remove contaminants that could affect the cooling water system. The CBCP will require on average approximately 3.7 MGD of SK wastewater.

Through pretreatment and reuse of SK mill effluent as cooling water makeup, operation of the CBCP is expected to reduce SK treated process water to an average of 6.3 MGD (composition summarized in Table 4-24), which is a 37% reduction in discharge to the St. Johns River. This reduction as well as the CBCP zero discharge system will result in an average discharge flow of approximately 6.3 MGD, which is the discharge from the SK.

4.3.2.3 SK-Only Discharges

The SK-only Alternative would have three types of discharge, treated process wastewater, cooling water and stormwater runoff, to the St. Johns and Broward River. The treated wastewater will have a composition similar to that summarized in Table 4-24 and will be discharged at an average flow of 11 MGD, which is slightly less than the SK flow (12 to 14 MGD) prior to conversion to a recycling facility.

The SK-only Alternative would require the continued use of the three power boilers and two bark boilers, which are currently utilizing recirculated cooling water. It is our understanding the cooling tower blowdown, less than 1 MGD, would be discharged to the St. Johns Rivers along with treated process water. No information was provided regarding the characteristics of this wastewater; however, general water quality conditions can be evaluated. Discharged cooling water can have temperatures greater than receiving waterbodies by between 5 to 10°C (9 to 18°F) and can have much greater dissolved solids from evaporation in cooling towers. In addition, leaching of metals from condenser tubes (e.g., copper, zinc and lead) and chemical agents (e.g., chlorine) added to reduce biofouling can cause or contribute to toxic conditions in receiving waters. This discharge would not be expected to cause any surface water impacts due to high dilution, and dissolved solids in the St. Johns River.

In addition to cooling water and process water, stormwater would be discharged from the site of the CBCP. Stormwater runoff would have come into contact with the lime mud disposal area, which was relocated and capped by USGen, and could have been potentially contaminated. Based on this summary, the average discharge from the SK-only Alternative would have slightly exceeded 12 MGD and would have had an unknown contamination level associated with the stormwater runoff and cooling water. This discharge volume would have been a slight decrease (2 to 4 MGD) from pre-conversion conditions at SK.

4.3.2.4 Water Quality Comparison

No water quality modeling was conducted by the applicant for the pre-existing discharges or discharge expected from the alternatives. The net average freshwater flow of 6000 MGD (9300 cfs) in the St. Johns River should provide adequate dilution of the discharges to minimize any water quality impacts; however, small areas of degraded water quality within mixing zones can potentially affect receiving stream biota. In general, water quality impacts are likely to be controlled by quantity and quality of the discharges. A qualitative evaluation based on a quality and quantity comparison is summarized below.

All three alternatives had a discharge of treated process water from SK, which is expected to have the same water quality for all three alternatives. The AES Alternative also had a cooling tower blowdown discharge with a quality summarized in Table 4-26, a process water discharge, and a stormwater discharge from the storage and yard areas with variable water quality. The CBC Alternative did not have any additional discharges other than the SK operation discharge, except for infrequent stormwater discharges from the yard and storage areas. The SK-only Alternative had two additional discharges, a cooling water discharge and stormwater runoff from the lime mud disposal area. Based on this analysis the least water quality impacting alternative would be the CBC Alternative, because it has one discharge with similar water quality as the other alternatives compared to multiple discharges for the AES and SK-only Alternatives. The AES and SK-only Alternatives are likely to have similar water quality since both contain similar diascharges (i.e., SK wastewater, cooling tower blowdown and stormwater runoff); therefore, no difference in quality can be ascertained between these two alternatives.

The St. Johns River flow provides dilution ratios of 550:1 for the AES Alternative discharges, 950:1 for the CBC Alternative discharge, and 590:1 for the SK-only Alternative discharges. In general, for discharges of similar characteristic, the higher the ratio the less the water quality impacts. This suggests, at least with respect to SK wastewater, the CBC Alternative (6.3 MGD) would have lower impacts than the other alternatives (10 MGD). Further, due to collection and use of stormwater, the CBC Alternative would likely discharge lesser quantities of stormwater than the other alternatives. Since these are the only two discharges associated with the CBC Alternative, this alternative, with respect to quantity, would be least impacting. Of the other two alternatives, the SK-only Alternative would have lower impacts than the AES Alternative; however the differences are minimal.

Based on this comparison, the CBC Alternative is likely to result in the lowest water quality impacts. The AES Alternative would have greater water quality impacts than the CBC Alternative, but impacts similar to the SK-only Alternative. In comparison to pre-existing conditions at the SK, all three alternatives would lower water quality impacts, including the SK-only Alternative. Water quality improvements would be the result of reduced SK wastewater flow by between 2 and 8 MGD, depending on the alternative. In addition, the preconversion SK had a 60 MGD discharge of once-through cooling water, which was eliminated by use of a mechanical cooling towers under all three alternatives. Surface water impacts from once-through cooling water can include: the release of heated cooling water can create a thermal plume with temperatures that can cause deleterious effects on receiving water biota; leaching of metals from condenser tubes (e.g., copper, zinc and lead) and chemical agents (e.g., chlorine) added to reduce biofouling can cause or contribute to toxic conditions in receiving waters.

4.4 GROUNDWATER IMPACTS

4.4.1 Construction-Related

The construction of the CBCP as originally proposed (the AES Alternative) required drilling of pumping wells that would have been used to dewater the construction site. During excavation and structural construction of the coal receiving structure, it was estimated that 200 gpm would have been withdrawn from the shallow aquifer for a period of six to nine months. This groundwater would have been discharged directly to the Broward River.

The CBC Alternative did not require groundwater dewatering during construction. Dewatering was eliminated by raising elevations in some areas with fill and by localized pumping inside temporary sheet pile. Pumped water from inside the sheet pile was returned to the outside.

Groundwater quality impacts resulting from infiltration of stormwater during construction activities for either the AES or CBC Alternative were expected to be negligible. Studies indicated that infiltrating storm water flows to the shallow water table and travels nearly horizontally towards the Broward River and the St. Johns River. Further, surface runoff from the construction site will be directed to the SARP and YARP for settling before ultimate discharge to surface waters. Any seepage from the un-lined YARP will flow to the water table and into the Broward River.

In addition to impacts on the shallow aquifer, water for construction purposes was supplied by the SK production wells in the Floridan Aquifer. Flows required for construction were minimal and within SK's permitted withdrawal rate.

4.4.2 Operation-Related

The operation of the CBCP will affect both shallow and deep aquifers. Impacts on shallow aquifers will be the result of reduced infiltration from impervious (i.e., buildings and pavement) and lined (coal and limestone storage) areas. These waters will be captured and detained in the YARP and SARP. The stored waters would have been discharged to the Broward River under the AES Alternative, but will be used for cooling water under the CBC

Alternative. Although the AES and CBC Alternatives reduce infiltration, both alternatives protect the quality of the shallow aquifer by inhibiting potentially contaminated water from infiltrating into the aquifer.

Impacts on shallow groundwater quality from the SK-only Alternative are related to the lime mud disposal area, which was relocated during the construction of the CBCP. This waste material would not have been relocated to a more secure site and would have continued to cause contamination of the shallow aquifer from the leachate released by the lime mud and would eventually enter the Broward and/or St. Johns Rivers.

Impacts on the deeper Floridan Aquifer are the result of water withdrawals necessary for production processes (10 to 12 MGD) and boiler cooling water (less than 1 MGD) at the SK, and cooling and make-up water at the CBCP. Approximate breakdowns of average water requirements for the three alternatives are summarized in Table 4-27. The AES Alternative will require 17.44 MGD, the CBC Alternative will require 12.76, and the SK-only Alternative will require an average of 12 MGD of Floridan Aquifer water via the SK production wells. The SK-only Alternative water consumption is based on use prior to conversion to a recycling operation and actual use may be somewhat lower due to changes in manufacturing processes.

TABLE 4-27

BREAKDOWN OF AVERAGE WATER REQUIREMENTS FOR THE THREE ALTERNATIVES

Alternative	Average Water Use (MGD)				
	Process Water at SK	Boiler Make-up at CBCP	Cooling Water at CBCP	Misc. at CBCP	Total
AES	12	1.385	3.99	0.065	17.44
CBC	12[1]	0.70	N/A	0.065	12.76
SK-only	12[1]	N/A	<1	N/A	12
Notes: [1] actual volumes will be slightly less because CBCP will supply cooling water.					

The Floridan Aquifer is the primarily source of public water for Duval County as well as surrounding counties. Currently, this aquifer is artesian with a potentiometric surface at about 35 feet above mean sea level. Excessive withdrawal from this aquifer can lower this pressure head possibly resulting in costly installation of pumps on potable water supplies. In addition, due to the proximity to the coast and saline waters, excessive withdrawal can lead degradation of drinking water quality from salt water intrusion. To evaluate effects of the proposed withdrawal for the AES Alternative on existing users, AES conducted detailed hydrologic groundwater modeling.

AES-CB used two USGS groundwater models to evaluate possible impacts to groundwater which could result from the CBCP as originally proposed (the AES Alternative). The MODFLOW model was used to evaluate the degree to which groundwater pumping would lower water levels in the main layer of the Floridian aquifer used for water supply, i.e. the upper water bearing zone. The MOC model was used to evaluate whether chloride concentrations (salt) would be expected to increase (known as saltwater intrusion). Both the groundwater flow and transport models used a withdrawal rate of 7.0 MGD, which was the maximum projected use at CBCP. The modeling results are presented in a report entitled "Ground Water Investigation Report". The modeling was independently reviewed by the SJRWMD, BESD, and EPA Region IV and is summarized below.

MODFLOW, developed and supported by the USGS, is one of the most common models currently being used for groundwater flow modeling. MODFLOW simulates groundwater flow in two directions and uses a system of layers to approximate flow in a third direction. MODFLOW does not exactly model groundwater flow, but rather approximates flow between rectangular cells using a finite difference solution procedure. The use of MODFLOW requires input of a number of parameters including: aquifer layers and depth, fixed water levels, flow boundaries, well locations, pumping rates, hydraulic characteristics, etc. Many of the parameters must be approximated due to variability throughout the aquifer, and lack of specific information; therefore, MODFLOW predictions are never exact and must be evaluated with a "sensitivity analysis"(i.e., multiple iterations using a range of possible input parameters).

Similar to MODFLOW, MOC is a commonly used groundwater transport model developed by the USGS. MOC uses a finite difference procedure to approximate groundwater flow in two directions for one layer. Transport of mobile groundwater pollutants within the flow field is estimated using the method of characteristics solution procedure. Pollutants are assumed to be uniformly distributed over the depth of the aquifer. As is the case with MODFLOW, MOC predictions are never exact due to model and input data limitations.

The MODFLOW modeling conducted indicated withdrawals of less than 7.0 MGD, for power generation and cooling tower makeup for the AES Alternative, will not cause adverse impacts to existing legal users or cause adverse water quality problems. MOC modeling was performed for this project to determine whether chloride concentrations would increase in the upper water bearing zone of the Floridan Aquifer from the proposed groundwater withdrawal.

The modeling suggests chloride concentrations in the upper water bearing zone should not increase by more than a few milligrams per liter; however, there is a high degree of uncertainty in these predictions. Based on the MODFLOW and MOC analyses the CBC and SK-only Alternatives, which have lower groundwater withdrawal rates, would not cause adverse effects on groundwater use.

Future growth in Duval County will increase the demand for water (potable and non-potable) from the Floridan Aquifer. This increased demand has the potential for inducing chloride increases (salt water intrusion) at sensitive locations within the aquifer (e.g., Blount Island). 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 (e.g. Fernandina Beach, the City of Jacksonville well field, and the Eastport area west of the Seminole Kraft site). Increases in chloride concentrations with time can also occur, as has been observed at wells near the site (from about 25 mg/l in 1973 to 40 mg/l in 1979).

Based on longterm declines in the potentiometric surface and recent effects of shorter term drought conditions, additional consumptive use of Floridan Aquifer water should be evaluated based on the need for a high quality water source. Process water at the SK is a pre-existing permitted water use that can not be considered in this evaluation. In the case of the CBCP, high quality water is needed only for boiler make-up water and potable use; cooling water typically does not require high quality water. Therefore, although the modeling does not indicate any impact at the 7.0 MGD withdrawal, the use of Floridan Aquifer water for cooling water should be considered a substantial impact.

The AES and SK-only Alternatives both use Floridan Aquifer water as a cooling water source. The CBC Alternative's cooling water sources are stormwater and SK wastewater. The SK-only Alternative's groundwater consumption is within the permitted withdrawal amount for the facility and is not an increase in water use. New uses of groundwater withdrawal are only a consideration for the AES Alternative and should be considered a substantial impact since it is a cooling water use.

4.5 ECOLOGICAL IMPACTS

4.5.1 Construction-Related

Construction-related impacts of the AES and CBC Alternatives on surrounding ecology are likely to be similar, since both consider the same site. Although the SK-only Alternative would not have entailed any proposed construction, past and ongoing SK operations at the site have associated impacts that must be considered.

4.5.1.1 Terrestrial

The impacts of construction for the three alternatives on terrestrial wildlife and habitat would be similar. Construction of the CBCP, either as proposed (the AES Alternative) or as constructed (the CBC Alternative), disturbs approximately thirty acres of land adjacent to SK. A large portion of this area is converted to stockpiles and facilities necessary for operation of the CBCP. The area involved in construction of CBCP facilities was identified as containing poor quality wildlife habitat, due to industrial activities associated with SK operations. Future activities or plant expansion by SK (the SK-only Alternative) in this area would continue to degrade or impact the area similar to the other alternatives.

In addition to the thirty acres, the CBCP requires improvement of a rail spur to bring coal to the site. A resident gopher tortoise (*Gopherus polyphemus*) population, which often has threatened and endangered companion species, was identified during field studies in the vicinity of the rail spur. Both the AES and CBC Alternatives included mitigation, through relocation, of the gopher tortoise population and cohort species. The SK-only Alternative (future SK operation) would not likely have involved any impact to the area.

The marshes adjacent to the site, which appear to be ecologically important as feeding grounds for numerous aquatic and terrestrial species, are not expected to be directly impacted by construction (AES and CBC Alternatives). Run-off from the construction site may impact the area; however, the impacts are likely to be minimal with proper sediment and erosion control. In addition, under the the SK-only Alternative these areas would continue to receive runoff from the SK industrial complex and the lime mud disposal area.

4.5.1.2 Aquatic

Site preparation and construction activities associated with either Alternative A or B may adversely affect aquatic biota in the adjacent surface waters (Broward and St. John's Rivers) through stormwater runoff that can cause sedimentation and increased turbidity; however, proposed control measures during construction would likely provide adequate protection to surface waters. Therefore, construction impacts on aquatic life are not expected to be of concern.

In addition, the relocation of a SK lime mud disposal area from the site to a lined and capped area adjacent to the site has occurred as a result of the CBCP construction (AES or CBC Alternatives). As discussed in the Surface Water Section (4.3), this action, which would not have been performed in the SK-only Alternative, will likely provide some water quality benefits to adjacent waters. Therefore, the AES and CBC Alternatives may provide greater protection to aquatic biota.

4.5.2 Operation-Related

A number of operation-related impacts of the three alternatives on terrestrial wildlife and aquatic biota will occur. Deposition of combustion-related pollutants and cooling tower salt drift could have potential deleterious impacts on surrounding ecology. On behalf of USGen, ENSR conducted an Ecological Risk Assessment for the CBCP (ENSR 1993), which is summarized below. The Executive Summary of this document is contained in Appendix K.

Additional operation-related impacts of the three alternatives on aquatic and terrestrial biota are evaluated in the sections following the Ecological Risk Assessment.

4.5.2.1 Ecological Risk Assessment

Similar to the human health risk assessment, the ecological risk assessment conducted by the applicant was performed to determine incremental impacts for combustion products emitted from two of the alternatives: the CBC Alternative--CBCP as constructed; and the SK-only Alternative--SK as a recycling facility (No Action Alternative). The AES Alternative (CBCP as proposed) was not included in the evaluation, because the higher emissions from this alternative than the CBC Alternative would likely result in higher ecological risk.

The procedures used for the ecological assessment were similar to the human health risk assessment (Section 4.2). Chemicals identified for this assessment were the same as the human health assessment. Chemical specific dose response data used in the ecological assessment are summarized in Table 4-28 (mammalian) and Table 4-29 (avian).

In order to evaluate potential risk to all species of the surrounding area, the applicant selected representative mammal and avian species based on examination of the surrounding habitat and ecology. Representative species are those that best characterize major groups of animals (e.g., mammals, birds, reptiles and amphibians) and are potentially more highly exposed than other species. The species selected were the eastern mole (*Scalopus aquaticus*), river otter (*Lutra canadensis*), belted kingfisher (*Ceryle alcyon*), and snowy egret (*Egretta thula*).

TABLE 4-28

MAMMALIAN CHEMICAL DOSE-RESPONSE VALUES USED IN THE ECOLOGICAL RISK ASSESSMENT

Chemical	NOAEL (mg/kg/day)	Species	Reference
Antimony	0.262	rat	ATSDR, 1990
Arsenic	0.7	rat	ATSDR, 1991
Barium	0.7	rat	ATSDR, 1990
Beryllium	0.54	rat	ATSDR, 1987
Cadmium (1)	0.19	mouse	ATSDR, 1992
Chromium III	0.46	rat	ATSDR, 1991
Chromium VI	3.5	rat	ATSDR, 1991
Cobalt (2)	0.25	rat	ATSDR, 1990
Copper (3)	0.42	mouse	ATSDR, 1989
Lead	0.9	rat	ATSDR, 1991
Manganese (4)	4	rat	ATSDR, 1990
Mercury-organic	0.003	rat	ATSDR, 1989
Mercury-inorganic	0.32	rat	ATSDR, 1989
Molybdenum			
Nickel	0.7	rat	ATSDR, 1991
POM (PAH) (5)	1	mouse	ATSDR, 1989
Selenium	0.025	rat	ATSDR, 1988
TCDD	7E-07	guinea pig	ATSDR, 1987
Vanadium	0.54	mouse	ATSDR, 1990
Zinc (6)	0.38	mouse	ATSDR, 1988

(1) The LOAEL presented was for "intermediate exposure" and was converted for chronic exposure by use of a safety factor of 10. This was below the observed NOAEL of 1.8 for chronic exposure.
(2) The NOAEL presented was for "intermediate exposure" and was converted to a NOAEL chronic exposure by use of a safety factor of 10.
(3) A LOAEL presented was for chronic exposure and was converted to a NOAEL for chronic exposure by use of a safety factor of 10.
(4) LOAELs presented were for two chronic exposure studies which were converted to a NOAEL for chronic exposure by use of a safety factor of 10.
(5) The NOAEL presented was for "acute exposure" and was converted to a NOAEL for chronic exposure by use of a safety factor of 10.
(6) A LOAEL presented was for chronic exposure and was converted to a NOAEL for chronic exposure by use of a safety factor of 10.

TABLE 4-29

AVIAN CHEMICAL DOSE-RESPONSE VALUES USED IN THE ECOLOGICAL RISK ASSESSMENT

Chemical	NOAEL (mg/kg/day)	Species	Reference
Lead (1)	0.028	Starling	Eisler, 1988
Mercury-organic (2)	0.044	Coturnix	Eisler, 1987
Mercury-inorganic (3)	0.352	Coturnix	Eisler, 1987
Nickel (4)	7.9		EPA, 1992
TCDD (5)	1E-06	Chicken	Eisler, 1986
Zinc (6)	3		EPA, 1992

NOTES:
For those chemicals that avian dose-response information was not found, the mammalian dose-response values in Table 5-3 were used.
(1) The NOAEL presented was for an 11 day exposure. This converted to a NOAEL for chronic exposure by use of a safety factor of 100.
(2) The NOAEL of 4 mg/kg in diet was converted to a daily dose. This was converted to a NOAEL for other species by use of a safety factor of 10.
(3) The NOAEL of 32 mg/kg in diet was converted to a daily dose. This was converted to a NOAEL for other species by use of a safety factor of 10.
(4) The NOAEL was converted to a NOAEL for other species by use of a safety factor of 10.
(5) A LOAEL presented was for a 21 day exposure. This was converted to a NOAEL for chronic exposure for other species by use of a safety factor of 1000.
(6) A LOAEL presented was for chronic exposure. This was converted to a NOAEL for other species by use of a safety factor of 100.

An exposure scenario, similar to the human health risk assessment (see Figure 4-1), was developed for each of the representative species. Some of the pathways considered included: fish consumption; water ingestion; soil ingestion; and invertebrate consumption. A lifetime average daily dose was calculated for each species based on the exposure pathways for that species at locations with high modeled deposition rates. Similar to the human health non-cancer risk assessment, a hazard quotient was calculated for each species and chemical combination. The hazard quotient is simply the ratio of the estimated species-chemical dose to the dose-response value for that chemical. The hazard quotient would have to be greater or equal to one for a substantial impact to be predicted.

The results of the ecological risk assessment for the CBC Alternative are summarized in Table 4-30. The highest estimated hazard quotient was 0.1 (vanadium) for the eastern mole, which is an order of magnitude below the quotient at which an effect would be observed. The margin of safety built into the risk assessment procedure suggets that this is a conservative estimate. The hazard quotients for the remaining chemicals and species were all several orders of magnitude below one, which suggests no ecological risk is likely to occur.

The results of the ecological risk assessment for the SK-only Alternative are summarized in Table 4-31. As was observed for the CBC Alternative, the highest hazard quotient of 0.5 (vanadium) was estimated for the eastern mole. This value is approaching one and suggests the SK-only Alternative may cause some deleterious impacts to the surrounding ecology. Comparison of Tables 4-30 and 4-31 indicates that predicted hazard quotients for the SK-only Alternative are substantially greater than the quotients estimated for the CBC Alternative.

4.5.2.2 Terrestrial

The CBCP operations are expected to have only minimal adverse impacts on terrestrial ecology. Operational impacts of the AES and CBC Alternatives, other than described in the Ecological Risk Section (4.5.2.1), may include: contamination of soils and vegetation from deposition of toxic pollutants; contamination and toxic effects associated with salt drift from cooling towers; mortality of migrating birds and mammals during roadway and railroad crossings; and possible collisions of night flying birds with high CBCP structures (e.g., the stack). The majority of these are likely to pose minimal ecological risk to terrestrial communities. Terrestrial impacts associated with deposition and salt drift are discussed below.

4.5.2.2.1 Deposition Impacts

Release of toxic pollutants into the atmosphere, primarily as suspended particulates, can impact soils by deposition and vegetation by uptake of deposited pollutants. Evaluation of

TABLE 4-30

SUMMARY OF POTENTIAL HAZARD QUOTIENTS FROM THE CBC ALTERNATIVE

Chemical	Snowy Egret	Belted Kingfisher	River Otter	Eastern Mole
Antimony	0.0000004	0.0000005	0.0000003	0.003
Arsenic	0.000001	0.000002	0.000001	0.009
Barium	0.000005	0.000006	0.000004	0.06
Beryllium	0.000002	0.000002	0.000002	0.002
Cadmium	0.000006	0.000007	0.000005	0.003
Chromium III*	0.000003	0.000004	0.000002	0.01
Chromium VI	0.000000004	0.000000005	0.000000003	0.00002
Copper	0.000008	0.00001	0.000006	0.03
Lead	0.0004	0.0004	0.00001	0.004
Organic Mercury**	0.0002	0.0002	0.002	0.002
Inorganic Mercury***	0.0007	0.0008	0.0006	0.001
Nickel	0.0000003	0.0000004	0.000003	0.01
POM	0.0000003	0.0000003	0.0000002	0.0001
Selenium	0.00004	0.00004	0.00003	0.0007
Vanadium	0.00002	0.00002	0.00002	0.1
Zinc	0.000004	0.000005	0.000002	0.04

Notes:
* - Deposition rates for chromium III are assumed to be one hundred times deposition rates for chromium VI.
** - Deposition rates for organic mercury are assumed to be 1 percent of total mercury.
*** - Deposition rates for inorganic mercury are assumed to be 99 percent of total mercury.

TABLE 4-31

SUMMARY OF POTENTIAL HAZARD QUOTIENTS FROM THE SK-ONLY ALTERNATIVE

Chemical	Snowy Egret	Belted Kingfisher	River Otter	Eastern Mole(#675)	Eastern Mole(#901)
Antimony	0.0000007	0.0000008	0.0000005	0.004	0.003
Arsenic	0.0000006	0.0000007	0.0000005	0.002	0.001
Barium	0.0000006	0.000007	0.000004	0.02	0.03
Beryllium	0.000001	0.000001	0.000001	0.0005	0.0004
Cadmium	0.00001	0.00001	0.000009	0.005	0.004
Chromium III*	0.000001	0.000002	0.000001	0.005	0.004
Chromium VI	0.000000002	0.000000002	0.000000001	0.000006	0.000006
Copper	0.000008	0.00001	0.000006	0.04	0.04
Lead	0.001	0.001	0.00003	0.005	0.005
Organic Mercury**	0.00005	0.00006	0.0006	0.0003	0.0002
Inorganic Mercury***	0.0002	0.0002	0.0002	0.0002	0.0002
Nickel	0.000002	0.000002	0.00002	0.1	0.1
POM	0.000007	0.000008	0.000006	0.00001	0.00002
Selenium	0.000004	0.000005	0.000004	0.007	0.005
Vanadium	0.0001	0.0001	0.00007	0.5	0.4
TCDD	NA	NA	NA	0.00003	0.00004
Zinc	0.000003	0.000003	0.000002	0.009	0.01

Notes: * - Deposition rates for chromium III are assumed to be one hundred times deposition rates for chromium VI.
** - Deposition rates for organic mercury are assumed to be 1 percent of total mercury.
*** - Deposition rates for inorganic mercury are assumed to be 99 percent of total mercury.
NA - Not applicable.

deposition impacts requires: a review of the soils and vegetation in the area influenced by the source; identification of emission rates of pollutants by the source; determining levels of soil and vegetation exposure to the emissions; and a comparison of exposures with screening levels of acceptability. This section discusses potential impacts of the CBC Alternative on soils and vegetation in the two PSD Class I areas (the Okefenokee and Wolf Island Wilderness Areas (WA)), in the immediate vicinity of the CBCP, and in the Timucuan Preserve. This analysis was only performed for the CBC Alternative; however, impacts of the SK-only Alternative, which emitted similar levels of toxics (see Section 4.1.2.3), should be similar and impacts associated with the AES Alternative, which emitted higher amounts of toxic chemicals, should have greater impacts.

The applicant performed an analysis as part of their "Air Quality Analysis" (Appendix J), using methods described in the document "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" (Smith and Levenson, 1980) to determine adverse effects of trace elements in the four identified areas. The multi-step procedure requires estimation of annual average concentrations of the trace elements, long-term soil concentrations and expected tissue concentrations. Maximum annual average concentrations were estimated for each toxicant and location using the ISCST2 model. Long-term soil concentrations were determined based on this concentration, the interactive soil depth (3 cm), the expected life of the CBCP (30 years). Plant tissue concentrations are based on the estimates of soil concentration and conservative bioconcentration ratios. The estimated concentration of the trace element in the soil and aerial plant parts were then compared to appropriate screening concentrations.

The calculated concentrations for each pollutant and location are summarized in Tables 4-32 through 4-35, which also include the EPA screening concentrations for each pollutant. The soil and plant tissue concentrations for each pollutant at all four locations (i.e., the Okefenokee, Wolf Island, the immediate vicinity of the CBCP, and the Timucuan Preserve) are well below the EPA screening concentrations. This indicates the deposition of the trace elements into the four areas by the CBC Alternative would not result in adverse deposition impacts and are likely to be similar to deposition impacts for the SK-only Alternative and less than deposition impacts for the AES Alternative.

4.5.2.2.2 Salt Drift Impacts

Salt drift is caused by the discharge of salt particles or concentrated droplets from cooling towers during convectional heat transfer. The suspended particles settle onto surrounding plants and soils and can cause damage to some plant species. The severity of salt drift impacts is directly related to the volume of evaporated water, the salt concentration in the circulating cooling water, and the efficiency of the cooling tower drift eliminators. The CBC Alternative incorporated the use of drift eliminators on the cooling towers, which were not proposed to be used in the AES Alternative and should lower the impacts of salt drift for the CBC Alternative. The use of the eliminators for the CBC Alternative are expected to lower drift from 0.003 to 0.001 percent of circulation. The SK-only Alternative would have much lower salt drift due to much lower cooling water requirements for the power and bark boilers.

ENSR determined the magnitude of salt drift for the CBC Alternative using a model developed by The Electric Power Research Institute (EPRI) called the Seasonal and Annual Cooling Tower Impacts (SACTI) model. In determining salt drift deposition the SACTI model considers plume dispersion, droplet breakaway, droplet evaporation, and deposition. Droplet breakaway refers to the process by which the drift droplets settle out of the dispersing plume. Variables such as the drift rate, the salt concentration of the circulating water, density of the salt, and the drift droplet distribution are input to the SACTI model in addition to the tower design data.

Salt deposition resulting from the CBC Alternative was predicted by dispersion modeling to occur over a wide area; however, rates greater than 100 mg/m^2 were limited to an area within 500 meters in an area predominately east of the cooling tower location. Most of this area is located on either CBCP or SK property. Vegetation in this area is sparse, comprised primarily of intertidal wetland plant species associated with the St. Johns River. Coastal plants in tidal regions are adapted to saline conditions and should not be adversely affected by the operation of CBCP cooling towers. Therefore, the impacts of salt drift associated with the CBC Alternative are likely to be minimal.

4.5.2.3 Aquatic

The majority of aquatic biota impacts associated with the three alternatives are related to water quality and were discussed in the Water Quality Section (4.??). Additional aquatic biota impacts associated with the three alternatives include: impacts from introduction of freshwater in a saline estuary; and impingement and entrainment impacts (pre-conversion SK operations).

A potential impact associated with the AES Alternative would be the discharge of cooling tower blowdown with the SK discharge, which was suggested as possibly attracting the West Indian manatee (*Trichechus manatus*). The AES Alternative proposed the use of fresh groundwater for cooling water, which is likely to result in a blowdown discharge less saline than receiving waters. Also, the AES Alternative would have eliminated the SK's use of cooling

TABLE 4-32

OKEFENOKEE SWAMP COMPARISON OF ELEMENTAL DEPOSITION WITH EPA SCREENING LEVELS[1]

Element	Maximum CBCP ANNUAL IMPACT ($\mu g/m^3$)	Deposited Concentration	Plant Tissue Concentration	Plant:Soil Concentration Ratios	EPA Screening Concentration[2]	
					Soil	Plant Tissue
Antimony	22.22×10^{-6}	4.77×10^{-4}	---	---	NA	NA
Arsenic	3.00×10^{-5}	6.45×10^{-3}	9.03×10^{-4}	0.14	3	0.25
Barium	1.27×10^{-4}	2.73×10^{-2}	---	---	---	---
Beryllium	1.82×10^{-6}	3.91×10^{-4}	---	---	NA	NA
Cadmium	6.60×10^{-6}	1.42×10^{-3}	1.52×10^{-2}	10.7	2.5	3
Chromium	2.20×10^{-7}	4.73×10^{-5}	9.46×10^{-7}	0.02	8.4	1
Cobalt	8.02×10^{-6}	1.72×10^{-3}	1.89×10^{-4}	0.11	NA	19
Copper	1.75×10^{-5}	3.76×10^{-3}	1.77×10^{-3}	0.47	40	0.73
Fluoride	1.55×10^{-4}	3.33×10^{-2}	9.99×10^{-4}	0.03	400	310
Lead	1.26×10^{-5}	2.71×10^{-3}	1.22×10^{-3}	0.45	1,000	126
Manganese	1.04×10^{-4}	2.24×10^{-2}	1.48×10^{-3}	0.066	2.5	400
Mercury	6.02×10^{-6}	1.29×10^{-3}	2.58×10^{-5}	0.02 - 0.5	455	NA
Molybdenum	2.10×10^{-5}	4.52×10^{-3}	---	---	NA	NA
Nickel	1.73×10^{-5}	3.72×10^{-3}	1.67×10^{-4}	0.045	500	60
Selenium	3.32×10^{-6}	7.14×10^{-4}	7.14×10^{-4}	1.0	13	100
Vanadium	6.89×10^{-5}	1.48×10^{-2}	1.48×10^{-4}	0.01	NA	NA

[1] All units in parts per million by weight, unless otherwise noted.
[2] Source: Dvorak and Lewis, et al. 1978, as cited in Smith and Levenson 1980
NA - Not Available

TABLE 4-33

WOLF ISLAND COMPARISON OF ELEMENTAL DEPOSITION WITH EPA SCREENING LEVELS[1]

Element	Maximum CBCP ANNUAL IMPACT ($\mu g/m^3$)	Deposited Concentration	Plant Tissue Concentration	Plant:Soil Concentration Ratios	EPA Screening Concentration[2]	
					Soil	Plant Tissue
Antimony	1.23×10^{-6}	2.64×10^{-4}	---	---	NA	NA
Arsenic	1.66×10^{-5}	3.57×10^{-3}	5.00×10^{-4}	0.14	3	0.25
Barium	7.02×10^{-5}	1.51×10^{-2}	---	---	---	---
Beryllium	1.01×10^{-6}	2.17×10^{-4}	---	---	NA	NA
Cadmium	3.65×10^{-6}	7.85×10^{-4}	8.40×10^{-3}	10.7	2.5	3
Chromium	1.20×10^{-7}	2.58×10^{-5}	5.16×10^{-7}	0.02	8.4	1
Cobalt	4.46×10^{-6}	9.59×10^{-4}	1.05×10^{-4}	0.11	NA	19
Copper	9.78×10^{-6}	$2.10 \text{ X } 10^{-3}$	9.87×10^{-4}	0.47	40	0.73
Fluoride	8.56×10^{-5}	1.84×10^{-2}	5.52×10^{-4}	0.03	400	310
Lead	6.94×10^{-6}	1.49×10^{-3}	6.71×10^{-4}	0.45	1,000	126
Manganese	5.76×10^{-5}	1.24×10^{-2}	8.18×10^{-4}	0.066	2.5	400
Mercury	3.33×10^{-6}	7.16×10^{-4}	1.43×10^{-5}	0.02 - 0.5	455	NA
Molybdenum	1.16×10^{-5}	2.49×10^{-3}	---	---	NA	NA
Nickel	9.63×10^{-6}	2.07×10^{-3}	9.32×10^{-5}	0.045	500	60
Selenium	1.84×10^{-6}	3.96×10^{-4}	3.96×10^{-4}	1.0	13	100
Vanadium	3.84×10^{-5}	8.26×10^{-3}	8.26×10^{-5}	0.01	2.5	NA

[1] All units in parts per million by weight, unless otherwise noted.
[2] Source: Dvorak and Lewis, et al. 1978, as cited in Smith and Levenson 1980
NA - Not Available

TABLE 4-34

TIMUCUAN PRESERVE COMPARISON OF ELEMENTAL DEPOSITION WITH EPA SCREENING LEVELS[1]

Element	Maximum CBCP ANNUAL IMPACT ($\mu g/m^3$)	Deposited Concentration	Plant Tissue Concentration	Plant:Soil Concentration Ratios	EPA Screening Concentration[2]	
					Soil	Plant Tissue
Antimony	1.14×10^{-5}	2.45×10^{-3}	---	---	NA	NA
Arsenic	1.51×10^{-4}	3.25×10^{-2}	4.55×10^{-3}	0.14	3	0.25
Barium	6.38×10^{-4}	1.37×10^{-1}	---	---	---	---
Beryllium	9.27×10^{-6}	1.99×10^{-3}	---	---	NA	NA
Cadmium	3.38×10^{-5}	7.27×10^{-3}	7.78×10^{-2}	10.7	2.5	3
Chromium	1.12×10^{-6}	2.41×10^{-4}	4.82×10^{-6}	0.02	8.4	1
Cobalt	4.37×10^{-5}	9.40×10^{-3}	1.03×10^{-3}	0.11	NA	19
Copper	1.03×10^{-4}	2.21×10^{-2}	1.04×10^{-2}	0.47	40	0.73
Fluoride	7.80×10^{-4}	1.68×10^{-1}	5.04×10^{-3}	0.03	400	310
Lead	6.36×10^{-5}	1.37×10^{-2}	6.17×10^{-3}	0.45	1,000	126
Manganese	5.24×10^{-4}	1.13×10^{-1}	7.46×10^{-3}	0.066	.25	400
Mercury	3.04×10^{-5}	6.54×10^{-3}	1.31×10^{-4}	0.02 - 0.5	455	NA
Molybdenum	1.08×10^{-4}	2.32×10^{-2}	---	---	NA	NA
Nickel	9.61×10^{-5}	2.07×10^{-2}	9.32×10^{-4}	0.045	500	60
Selenium	1.73×10^{-5}	3.72×10^{-3}	3.72×10^{-3}	1.0	13	100
Vanadium	3.87×10^{-4}	8.32×10^{-2}	8.32×10^{-4}	0.01	2.5	NA

[1] All units in parts per million by weight, unless otherwise noted.
[2] Source: Dvorak and Lewis, et al. 1978, as cited in Smith and Levenson 1980
NA - Not Available

TABLE 4-35

CLASS II AREA (VICINITY OF CBCP) COMPARISON OF ELEMENTAL DEPOSITION WITH EPA SCREENING LEVELS[1]

Element	Maximum CBCP ANNUAL IMPACT ($\mu g/m^3$)	Deposited Concentration	Plant Tissue Concentration	Plant:Soil Concentration Ratios	EPA Screening Concentration[2]	
					Soil	Plant Tissue
Antimony	4.00×10^{-5}	8.60×10^{-3}	---	---	NA	NA
Arsenic	1.90×10^{-4}	4.09×10^{-2}	5.73×10^{-3}	0.14	3	0.25
Barium	8.10×10^{-4}	1.74×10^{-1}	---	---	---	---
Beryllium	2.00×10^{-5}	4.30×10^{-3}	---	---	NA	NA
Cadmium	1.00×10^{-4}	2.15×10^{-2}	2.30×10^{-1}	10.7	2.5	3
Chromium	1.00×10^{-5}	2.15×10^{-3}	4.30×10^{-5}	0.02	8.4	1
Cobalt	6.20×10^{-4}	1.33×10^{-1}	1.46×10^{-2}	0.11	NA	19
Copper	2.76×10^{-3}	5.93×10^{-1}	2.79×10^{-1}	0.47	40	0.73
Fluoride	1.00×10^{-3}	2.15×10^{-1}	6.45×10^{-3}	0.03	400	310
Lead	9.00×10^{-5}	1.94×10^{-2}	8.73×10^{-3}	0.45	1,000	126
Manganese	6.70×10^{-4}	1.44×10^{-1}	9.50×10^{-3}	0.066	2.5	400
Mercury	4.00×10^{-5}	8.60×10^{-3}	1.72×10^{-4}	02.05	455	NA
Molybdenum	4.80×10^{-4}	1.03×10^{-1}	---	---	NA	NA
Nickel	1.69×10^{-3}	3.63×10^{-1}	1.63×10^{-2}	0.045	500	60
Selenium	1.10×10^{-4}	2.37×10^{-2}	2.37×10^{-2}	1.0	13	100
Vanadium	7.42×10^{-3}	1.59	1.59×10^{-2}	0.01	2.5	NA

[1] All units in parts per million by weight, unless otherwise noted.
[2] Source: Dvorak and Lewis, et al. 1978, as cited in Smith and Levenson 1980
NA - Not Available

water from the brackish Broward River, which is also discharged at through this outfall. The U.S. Fish and Wildlife Service (USFWS) concluded that while the possibility existed that the originally proposed increased discharge could become an attraction for the manatee, it was not likely to happen based on several reasons that included: the existing SK outfall does not attract manatee; the outfall is located in the river at a depth of 20 feet; the area is located on the shipping channel where currents are very strong; there is no bottom vegetation which would be consumed by manatees for food; and manatees are not known to use the area.

The pre-conversion SK operations included operation of an intake structure on the Broward River for once-through cooling water (60 MGD). Mortality of larger aquatic organisms (e.g., fish and turtles) can occur as a result of impingement on screens that protect the cooling system from impact damage. Entrainment of aquatic organisms (e.g., fish larvae and zooplankton) can cause substantial mortality due to exposure to high temperature increases near condenser tubes and from exposure to anti-biofouling chemicals (e.g., chlorine). No entrainment and/or impingement information was provided by SK for their intake structure. During permit reviews at power plants with cooling water intake structures for once-through cooling systems, entrainment and impingement impacts on aquatic biota have frequently been considered substantial. Mitigation for these impacts typically require installation of cooling towers.

All three alternatives would result in elimination of the once-through cooling system by: shut down of all boilers at SK (the AES Alternative); providing SK with closed cycle cooling water for their package boilers (the CBC Alternative); or use of shutdown recovery boilers' cooling towers for power and bark boilers (SK-only Alternative). Elimination of the intake and water withdrawal at the SK operation would likely reduce impacts on biotic communities in the St. Johns and Broward Rivers.

4.6 NOISE IMPACTS

Noise impacts associated with the AES and CBC Alternatives, will be similar and will result from construction and operation of the CBCP. Noise impacts associated with the SK-only Alternative result from the continued operation of SK and are in essence background noise levels.

All noise and sound data relate to an "A-weighted" sound level since this sound level is the closest to the range of human hearing. The A-weighted sound level is measured in decibel (dB) units and is expressed in various metric descriptors that average sound energy over given time periods. Noise conditions are usually expressed as: an equivalent sound level for 24-hour periods Leq_{24}, which is a time-weighted average of the sound energy present over 24 hours; and a day-night average sound level (DNL or Ldn), which considers the intrusiveness of nighttime noise by adding 10 dB to noise events occurring between 10 pm and 7 am.

There are no federal or state noise control regulations that apply directly to CBCP off-site noise levels. City of Jacksonville noise ordinances (Noise Pollution Control, Rule 4.0) promulgated by the Jacksonville Environmental Protection Board require that noise from a Class D (industrial) emitter can not exceed an octave band limit or an overall A-weighted level at Class B (residential) areas as summarized in Table 4-36.

TABLE 4-36

JACKSONVILLE NOISE ORDINANCE OCTAVE BAND FREQUENCY LIMITS AND OVERALL A-WEIGHTED LEVELS AT CLASS B AREAS

Octave Band Center Frequency (Hz)	31.5	63	125	250	500	1k	2k	4k	8k	dB
Daytime (7:00-22:00)	80	78	73	67	61	56	52	48	45	65
Nighttime (22:00-7:00)	75	74	67	63	56	51	47	45	40	60

EPA is responsible for the enforcement and, like all federal agencies, must comply with the Noise Control Act (NCA) of 1972. EPA is also part of the Federal Interagency Committee on Noise (FICON), which has recommended criteria for airport analyses of DNL 65 dB and an increase of DNL 1.5 dB or more (FICON, 1992). In addition to the EPA guidelines, the U.S. Department of Housing and Urban Development (HUD) has established three categories of noise acceptability that provide minimum standards to protect citizens against excessive noise in their communities and residential areas of: acceptable if the Ldn is less than 65 dB; normally unacceptable if the Ldn is greater than 65 dB and less than 75 dB; and unacceptable if the Ldn is greater than 75 dB (HUD, 1979).

4.6.1 Construction-Related

Construction-related noise impacts at the CBCP have occurred at different levels during the several phases of construction including site preparation, concrete paving, machine and equipment installation, and site clean-up. Intrusive single-event noise levels (e.g., pile drivers and steam blow-out cleaning) also can contribute to noise impacts if noise levels exceed tolerance levels.

Site preparation involved the use of heavy diesel-powered earth moving equipment such as bulldozers, graders, dump trucks, backhoes and front-end loaders. Concrete pouring involved the use of equipment such as concrete trucks, and some of the equipment used in site preparation such as backhoes, front-end loaders and dump trucks. The machinery/equipment installation phase required the use of cranes in varying sizes, air compressors, welding equipment and material delivery trucks. The site clean-up stage was considerably quieter than the previous phases due to use of smaller equipment for less duration. The use of noise controls such as mufflers and limiting heavy equipment use to daytime hours substantially reduced these impacts.

Construction noise levels (excluding pile during and steam blow out of boiler tubes) were less than 65 dB, which complies with local ordinances at residential areas. In addition, heavy construction activities occurred during daylight hours, which further reduced noise impacts.

Two sources of intermittent noise, pile driving and steam blowouts, occurred during construction. Pile driving occurred early on in the placement of footers for building construction and had peak levels of approximately 100 dB at 50 feet. The levels decreased with distance to between 60 and 65 dB at the nearest residential area and to a distant thumping sound. Steam blowout is post-construction cleaning procedure whereby high pressure steam is injected into all steam lines in order to remove any debris left after construction. This activity, which will occur intermittently over a two week period, can generate high frequency noise levels as high as 129 dB at 50 feet. To reduce this impact the applicant employed, which would not have been used for the project as proposed (the AES Alternative), the use of a muffler system. This muffler system decreased noise levels to about 90 dB at 5O feet and which would decrease to below 65 dB at the nearest residential areas. In addition, steam blowout was restricted to daytime hours and with public notice was given to inform the public of the event.

4.6.2 Operation-Related

Potential operational noise impacts associated with the project include CFB boilers, steam turbine driven electrical generator, mechanical cooling towers, zero discharge water treatment system (the CBC Alternative only), ash pelletizers, limestone and coal crushers, and unloading activities. To evaluate impacts of operational noise a computer noise emission model was used to predict noise levels at surrounding residential areas (e.g., Cedar Bay Road).

Using the engineering drawings of the plant, the applicant identified each piece of equipment with the potential to generate a significant amount of noise. For each of these sources, an initial sound power level was calculated according to the methodologies and formulas contained in the "Electric Power Plant Environmental Noise Guide" prepared by the Edison Electric Institute. These formulas, based on functionally dependent parameters (e.g., horsepower and megawatt output) contain a statistical allowance toward the higher noise levels, and are therefore considered conservative.

The CBCP contains two processes, the fly and bed ash pelletizer (the AES and CBC Alternatives) and the zero discharge water system (the CBC Alternative only), that are relatively new technology and for which there are no noise data or formulas available. To avoid making any possibly erroneous assumptions with regard to this source, operating systems similar to the systems under construction at CBCP were located at an existing plant in Texas (zero discharge system) and an operating plant in Connecticut (pelletizer). Sound surveys were made to measure actual noise outputs from each system and the resulting data was added to the model.

Once all source sound levels were obtained, the resultant sound pressure level at the receptor point (Cedar Bay Road) was calculated by taking into consideration the decay of sound with distance, normal absorption of sound by air, the effects of terrain, reflections, directivity, and the effects of intervening barriers or disclosures. In the case of the Cedar Bay residential area, no excess attenuation, other than normal air absorption, was included in the model since the majority of the distance between source and receiver is over highly reflective water surface.

The model predicts the CBCP, as currently designed and constructed (the CBC Alternative), to produce a noise level of approximately 57 dB at the nearest point on Cedar Bay Road. A slight difference between the day and nighttime noise levels emitted by the CBCP, due to some fuel handling functions only occurring during the day; however, the predicted levels are all below the Jacksonville Noise Ordinance's allowable nighttime octave band spectrum, as well as the overall A-weighted limit of 60 dB. Based on these analyses, the completed plant will be in compliance with all applicable noise regulations.

It is likely, however, that the plant will be audible to residents on Cedar Bay Road, similar to the SK operation (the SK-only Alternative), because of relatively low existing sound levels. Since the SK operation is currently audible, and the CBCP will also be audible, but at levels below the local ordinances, the three alternatives are not considered to be substantially different with respect to noise impacts.

CBC will continue to monitor noise levels as the CBCP begins operation to determine actual compliance of the facility. This monitoring will be used as a comparison to predicted noise levels and in the event of an exceedance enable CBC to identify and mitigate noise emission problems.

4.7 GEOLOGIC IMPACTS

Geologic impacts from the project are either on-site or off-site impacts and are almost exclusively associated with the AES and CBC Alternatives. On-site impacts would occur almost exclusively as a result of CBCP construction activities. Off-site impacts would result primarily from mineral extraction (i.e., coal and limestone), and waste disposal (i.e., ash pellets, water treatment sludge and crystallizer solids).

4.7.1 Construction-Related

Construction activities, such as clearing of the site, building temporary or permanent roads, waste disposal, grading and filling, are phases of construction of the CBCP (the AES and CBC Alternatives) that will affect the site geology. In addition, relocation of the lime mud storage area to a capped and vegetated location will affect both the geology of the removal and disposal site.

Erosion of soil from the site can cause destruction of existing soils and change receiving stream erosion and sedimentation equilibrium. The AES and CBC Alternatives employed erosion control measures including seeding, mulching and barriers to reduce erosion. In addition, heavily traveled construction areas and roads were stabilized with shell or rock and wind loss (i.e., dust) from these high traffic areas was controlled with water sprinkling.

Construction wastes were disposed of in accordance with applicable rules and regulations. A number of waste materials such as scrap wood and iron were separated, stock piled, and, when possible salvaged. General waste materials were disposed in dumpsters and disposed at suitable and approved local landfill areas. The amount of waste generated during construction was likely to be minimal and should not substantially impact local landfill capacity.

Lime mud waste was excavated from its original disposal area and moved to a location on the north of the SK mill property. This disposal area was capped with an impervious material to prevent leaching from the lime mud. Soil was placed on top of the cap and seeded with grasses. The impacts of the relocation are likely to be minimal, particularly when compared to the likely water quality (ground and surface) benefits of the activity.

Fill material was brought on to the site to raise site elevation between one and two feet for the CBC Alternative. This was necessary to reduce shallow groundwater dewatering that would have been required for the AES Alternative. Removal of fill from the donor site and placement of fill on the CBCP can have impacts on one or both areas; however, if this activity is done in accordance with state regulations impacts will most likely be minimal.

The AES and CBC Alternatives are very similar with respect to on-site geologic impacts with the only major difference being the use of fill for the CBC Alternative. The SK-only Alternative on-site impacts are related to the SK mill operation (the SK-only Alternative) which has affected much of the site as a lime mud disposal, bark and general waste storage area.

4.7.2 Operation-Related

The operation of the CBCP (the AES and CBC Alternatives) will also impact land areas associated with mineral extraction of coal and limestone. Expected coal and limestone use are 950,000 and 180,000 tons per year, respectively. This will result in mining (surface) of between 3,000 and 5,000 acres of land area for coal (assuming 85 pounds of coal per cubic foot and an average coal depth of four feet) and 75 acres of land for limestone (assuming 165 pounds of limestone per cubic foot and an average depth of 20 feet) over the 30 year life of the CBCP. Mining activities result in extensive changes to overburden and can cause deleterious impacts to land use, habitat, groundwater and surface water in and around the mined area. However, these impacts should be minimized if suppliers comply with state and/or federal mining and reclamation regulations.

Solid waste is generated from a number of sources during operation of the CBCP. The largest quantity of solid wastes produced by the operation of the CBCP is generated by coal combustion in the form of fly and bed ash. Approximately 280,000 tons per year of fly and bed ash are expected to be generated by the CBCP (the AES and CBC Alternatives). Maximum rate of production of bed and fly ash is expected to be about 33 tons/hour for all units. The ash will be pneumatically conveyed to temporary storage silos, before mixing with water to form pellets. The pellets will be highly alkaline ($CaCO_3$) and contain gypsum ($CaSO_4$) and other metals (e.g., iron, aluminum. manganese, etc.). After pelletizing, the material will be transported back to the coal supplier and disposed in accordance with Kentucky's Residual Landfill regulations at a site in close proximity to coal mining and load-out operations or at an out-of-state permitted disposal facility. If landfilled this ash material would equate to between five and six acres of capacity over the 30 year life of the facility (assuming a 30 foot landfill depth).

Compared to the high volume solid wastes, small quantities of solid wastes will be generated by operations at the CBCP for both the AES and CBC Alternatives. The wastes produced by both alternatives, except where indicated, include: sediments collected from the sedimentation pond at a frequency of once per year or less; accumulated solids from cooling towers at a frequency of approximately once per year; clarifier sludge and crystallizer solids from the zero discharge water system quantities of which will depend on the stormwater and SK wastewater characteristics (for CBC Alternative only); and oil-bearing wastes from the oil-water separators (collected for off-site disposal or reuse by licensed vendors). These miscellaneous solid wastes, which will average 80 tons per day (primarily for the zero discharge water system included in the CBC Alternative) will be, except where indicated, sent to a recycling facility and/or to a permitted non-hazardous landfill. Therefore, the CBC Alternative will produce slighlty more wastes than the AES Alternative.

4.8 SOCIOECONOMIC IMPACTS

The analysis of socioeconomic impacts focuses primarily on the CBCP region, which is considered to be the City of Jacksonville and Duval County. Socioeconomic impacts of a project of this nature are likely to include distant areas (e.g., mining, disposal, and power recipient areas); however, only the local area was considered for this evaluation because it is likely to have the greatest impacts and concerns.

4.8.1 Population

Population impacts (increases) are only anticipated for the AES and CBC Alternatives. Total employment during construction was between 600 and 700 local and immigrant workers. Immigrant workers, which will most likely impact local populations, 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. During peak construction, the immigrant population was approximately 300 persons with the greatest concentration of immigrant population residing in Duval County. Clay and Nassau Counties are also expected to have increases in population, but at levels much less than Duval. These populations are temporary and are expected to depart the area once construction is complete.

Permanent employment of 75 personnel at the CBCP should result in a direct population increase of 200 for the area, which is based on an estimate of 2.6 individuals per employee (household). Secondary population growth, from service oriented employment growth, can be as high as 100% of the direct population growth; however, much of this growth would be outside the region (e.g., coal mining, trucking and rail transport). To be conservative a secondary population growth of 200 was considered and was primarily expected to occur in Duval County (75%) with lesser amounts in surrounding counties. With respect to Duval County population, the increase from the AES and CBC Alternatives would amount to less than 1% of projected ten year growth and less than 0.1% of existing population. This growth for the AES and CBC Alternatives is minor with respect to projected population growth and may in fact be part of the Duval County projected growth.

4.8.2 Economic Conditions

During peak construction, the CBCP (the AES and CBC Alternatives) is expected to generate a total of approximately 633 new on-site jobs and 1,000 new off-site secondary jobs. The cumulative income effect of the proposed facility during the entire construction period is projected to be in excess of $288 million. This economic benefit would not occur for the SK-only Alternative.

Expected employment during operation of the CBCP will be approximately 75 full time employees over three shifts. The average salary of the personnel is expected to be approximately $30,000 per year, which equates to an overall salary increase of over two million dollars for the area. The average salary at the CBCP equates to $11,540 per capita salary, which is greater than the 1985 average salary of $10,565 per year. This indicates that in comparison to the SK-only Alternative, the AES and CBC Alternatives will increase employment and have higher average per capita income than the surrounding area. In addition, services required for operation and management of the CBCP should also be of economic benefit to the area.

4.8.3 Community Services

The population evaluation (section 4.8.1) indicated that increases associated with the AES and CBC Alternatives are minor and probably already reflected in projected population growth for the area. Based on this analysis potential impacts of the two alternatives on community services (e.g., schools, water, sewer) have probably been addressed by local planning organizations, which typically base decisions regarding community needs on population growth projections. The SK-only Alternative, which is not expected to change current employment levels at SK or local population, would not likely impact community services either.

4.8.4 Land Use

Impacts of the alternatives on land use would occur if the land use of the site was redesignated or if because of the project land use of the surrounding area would change. The project site for the CBCP (the AES and CBC Alternatives) is located on land which is currently used or zoned for heavy industry and is located adjacent to and within SK (the SK-only Alternative), a container manufacturer. Land area in the vicinity of the proposed site, along the St. Johns River, contains industrial, commercial, residential and recreational areas. Based on current trends in development, the area along Heckscher Drive from Interstate 93 to north Blount Island (includes the project area) is projected to experience major industrial development with or without the CBCP. The CBCP (the AES and CBC Alternatives) is an industry that neither requires additional service industries nor will cause development of auxiliary industries. the SK-only Alternative (SK operations) is a long established industry and no new auxiliary industries are anticipated. Therefore, the alternatives are not expected to change current land use of the site or alter land use patterns of the surrounding area.

4.8.5 Aesthetic

The aesthetic quality of an area can be degraded by unsightly construction projects. The CBCP (the AES and CBC Alternatives) facility will have a number of visible features that includes, but is not limited to, boiler structures, turbine and control room housing, relay stations, a pelletizer, ash silos, coal and limestone stockpiles, mechanical draft cooling towers and a 425 feet high stack. No additional structures other than what already exists at SK would be required for the SK-only Alternative; however, the SK operation contains a variety of operational and abandoned industrial facilities. The majority of facilities associated with the CBCP are in close proximity to SK and conform to the industrial type visual quality of the SK. The only facility at the CBCP that does not conform to the existing visual profile is the 425 foot stack; however, the degree of protection the high stack provides to local air quality (see section 4.1) out-weighs the visual impacts of the stack. This suggests, with respect to aesthetic impacts, the three alternatives (other than the stack) are similar.

4.8.6 Recreation

None of the three alternatives are expected to directly impact recreation on the Broward and St. Johns River and surrounding areas. Indirectly, through improvements to water quality and ecological resources (see section 4.3. and 4.5.), the AES and CBC Alternatives may improve local fisheries and recreational fishing.

4.9 CULTURAL RESOURCE IMPACTS

There are presently no areas on, nominated to, or eligible for the National Register of Historic Places of the National Registry of Natural Landmarks within the boundaries of the CBCP site. The site contains neither lands specially designated under state programs, nor known areas valued as natural landmarks or for their historic, scenic or cultural significance. Subsequently, the alternatives will have no known impacts on cultural resources on the site.

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 the 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, which as an impact was discussed in the Air Quality section (4.1.).

4.10 TRANSPORTATION IMPACTS

Only two of the alternatives (the AES and CBC Alternatives) are likely to effect local transportation through increase in traffic flow or access for emergency vehicles at train crossings. The SK-only Alternative (SK as a recycling facility) is not expected to change vehicular or train traffic. Heckscher Drive, Eastport Road and Main Street are expected to provide access to the CBCP for construction and operation. Traffic counts indicate that all signalized locations and roadways in the area operate at the standard minimum acceptable level and have additional available capacity. At the employment levels during construction (approximately 200 to 600 personnel per shift) and operation (between 25 and 50 personnel per shift) traffic patterns from increased commuter are not expected to cause any substantial traffic problem.

The additional train traffic during operation of the CBCP (the AES and CBC Alternatives) may cause temporary access problems to communities during road crossings. Both alternatives reduce the impact by scheduling trains during off-peak traffic hours. In addition, train traffic is not expected to limit emergency vehicle accessibility to residents of the San Mateo area, which lies south of Eastport Road and east of North Main Street, because at no time will all access and egress routes to San Mateo be closed. Further, the NDP had previously (prior to this project) recommended overpasses at a number of locations to reduce traffic impacts of long coal trains that serve SJRPP.

The height of the flue gas stack at the CBCP (the AES and CBC Alternatives) is 425 feet and could interfere with local air traffic; however, although the stack is located within a take-off or approach zones for the Jacksonville International Airport, a non-directional radio beacon will eliminate any adverse effect of the stack on take-off and approach procedures. Therefore, no impacts of the stack on air traffic are anticipated.

4.11 ENERGY IMPACTS

A number of energy-related impacts of each alternative must be evaluated. The present and future need of electricity and the impacts of the alternatives on this need and a comparison of energy efficiencies of the alternatives and local utilities are two factors considered and summarized below.

Under Section 403.519, FS, a need for the electricity produced by a power generating facility must be demonstrated. This need, or lack of it, is determined by the FPSC, which, in the case of CBCP (the AES and CBC Alternatives), has rendered a judgment that there is a need. Based on power output at the CBCP and customer (residential, commercial and industrial) consumption rate, the AES Alternative (225 MW) and CBC Alternative (250 MW) will be required to meet the present and/or future demand of approximately one-half million Florida electricity customers. The SK-only Alternative would not supply any power to meet the electricity demand of Florida and could result in the utilities satisfying energy needs by a variety of means including: constructing their own base load facility; purchasing electricity from other utilities (if available); imposing conservation measures on consumers; limiting future population and economic growth of Florida; and/or inflicting "Brown-Outs" on areas when capacity is exceeded.

Energy efficiency is another consideration to ensure maximum energy return and minimization of waste heat from combustion of fossil fuels. Cogeneration is the concurrent production of electricity and utilization of waste thermal energy (e.g., steam) for industry from combustion of a fuel. Generally, cogeneration is a more efficient use of fossil-fuels than would occur at two individual facilities, one producing electricity and the other producing using thermal energy for a manufacturing process. The applicant also indicated the CBCP will be more efficient with an avoided unit heat rate of 8200 Btu/KWh than the FPSC average of 9790 Btu/KWh. This comparison suggests both the AES and CBC Alternatives would have a more efficient use of fossil-fuels than the SK-only Alternative and the Florida utilities.

CHAPTER 5

SUMMARY AND MITIGATION OF ADVERSE IMPACTS

5.0 SUMMARY AND MITIGATION OF ADVERSE IMPACTS

The consequences of the alternatives on the natural and man-made environments were evaluated in Chapter 4.0. Construction-related impacts were minimal and mitigated by use of appropriate control measures. Operation-related impacts on the different environments varied considerably between alternatives; however, results of Chapter 4.0 indicate the CBC Alternative has the least overall impact on the environment. A summary of the alternatives impacts and possible mitigation recommendations follow.

5.1 SUMMARY OF IMPACTS

The combustion of fossil fuels releases pollutants into the air environment that can have deleterious impacts. Evaluation of expected emissions from each alternative indicated the CBC Alternative would release the lowest amount of regulated air pollutants and similar amounts of non-regulated air pollutants as the SK-only Alternative. The lower emission estimates of the CBC Alternative were due to efficiency of boilers and emission control measures (e.g., baghouse, CFB and SNCR). With respect to air quality, the CBC Alternative was predicted to have lower impacts on air quality than the other alternatives and improve air quality in comparison to pre-conversion air quality from SK operations. Further, the modelling indicated the CBC Alternative would not cause or contribute to any violation of state and federal AAQSs, state NTLs and PSD in Class I and II attainment areas. In addition, the emission would not cause any visibility impacts in Class II areas and the plume from the stack was only visible in close proximity to the project. Expected regional impacts of acid forming gases were lowest for the CBC Alternative, which had lowest emission estimates for SO_x and NO_x. Contributions of CO_2, a known "Greenhouse Gas", from combustion of fossil fuels at the CBCP were expected to be less than 2.5 million metric tons per year, but may represent a substantial global concern.

With respect to human health concerns, the CBC Alternative was predicted to have lower carcinogenic and non-carcinogenic risks than the other alternatives. The CBC Alternative had predicted cancer risk probabilities, using conservative assumptions, of less than 0.1 in 100,000 at all sensitive receptors except one, which had a predicted probability less than 1 in 100,000. The estimated hazard indices for the CBC Alternative were all less than 0.1, indicating a minimal non-carcinogenic human health risk. The lower risks associated with the CBC Alternative were due to emission controls included at the CBCP and the high stack height, which increases dispersion of airborne pollutants.

All three alternatives reduced potential surface water impacts from pre-conversion SK operations, which were a result of lower discharge volumes of treated process wastewater and elimination of a once-through cooling water discharge at SK. Based on a comparison of quantity and quality of discharges expected from each alternative, the CBC Alternative was determined to have the least potential impact of the three alternatives. The lower predicted impact was due to a zero discharge system included in the CBC Alternative that recycled CBCP waste streams (i.e., boiler blowdown, cooling tower blowdown and cleaning wastes), and used stormwater runoff collected in the YARP and SARP and treated SK wastewater as a cooling water source for the CBCP.

Construction impacts on groundwater would have only occurred for the AES Alternative, which included groundwater dewatering during construction. Based on groundwater modelling conducted by the applicant, none of the expected operational withdrawal rates for the alternatives would impart any impacts on other Floridan aquifer users capacity or quality. The SK-only Alternative was predicted to have the lowest groundwater withdrawal rate; however, the CBC Alternative rate was only slightly greater (less than 1 MGD) than the SK-only Alternative. The AES Alternative had the greatest expected withdrawal rates and was the only alternative to use a large volume of groundwater for cooling water purposes. Groundwater withdrawal rates for both the CBC or SK-only Alternative would be substantially lower than rates utilized at pre-conversion SK operations.

Due to pre-construction site conditions, construction related impacts on terrestrial and aquatic biota for the AES and CBC Alternatives were minimal. Operational impacts on the surrounding ecology were assessed by the applicant for the CBC and SK-only Alternatives using ecological risk models, deposition models and salt drift models. Based on these analyses, the impacts on aquatic and terrestrial biota were predicted to be lowest for the CBC Alternative. The modeling indicated only slight ecological risk for one indicator species (eastern mole) at locations within the project site. In addition, all three alternatives would eliminate sources of aquatic impacts by closure of the once-through cooling system for recovery boilers at the pre-conversion SK operations and by removal of the unlined lime mud storage area.

Geologic impacts during construction were minimal and operational impacts would be limited to mineral extraction impacts and increased solid waste production associated with the AES and CBC Alternatives. Mineral extraction (coal and limestone) will disturb between 3,000 and 5,000 acres of Kentucky land over the life of the CBCP; however impacts should be minimized if the coal suppliers comply with state and/or federal mining and reclamation regulations. Limestone mining will impact a substantially smaller area. Fly and bed ash, produced at a annual rate of 280,000 tons per year, will be the predominate source of waste produced by the CBCP. Landfilling in the vicinity of the coal mining will require between five and six acres of landfill capacity over the life. In addition, the zero discharge system incorporated in the CBC Alternative will produce approximately 75 tons per day of dewatered sludge. This will require additional landfill space at an approved and permitted site located outside the Jacksonville region; however, the CBCP will also burn fiber rejects thereby eliminating the material from being landfilled.

Construction-related noise impacts at the CBCP varied during the several phases of construction; however, monitored noise levels were in compliance with local ordinances. The applicant evaluated operation noise impacts in surrounding areas by modelling expected equipment noise levels. The modeling indicated the facility noise levels will be noticeable and will increase background levels at the closest residential area, but will not exceed the federal 10 dB benchmark or local noise ordinances. Monitoring will continue as the facility begins operation to determine noise compliance of the CBCP.

A number of socioeconomic impacts were evaluated for the AES and CBC Alternatives including population, economic, community service, recreation, aesthetics and land use. The two alternatives projected population increases of only one percent of the area's projected ten year growth suggests the growth may be part of projected growth. This low increase in population suggests the CBC Alternative will not adversely effect community services. Based on construction cost, increased employment, and above average salaries (with respect to local average salaries), the AES and CBC Alternatives will be economically beneficial to the area. In addition, the CBCP project site is within an industrially zoned area and was designed to conform with the surrounding industrial SK complex.

Only two of the alternatives, the AES and CBC Alternatives, were likely to effect local and regional transportation. Increased train traffic may cause temporary congestion at road crossings; however off-peak scheduling should minimize the impacts. In addition, the NDP had recommended overpasses to reduce traffic congestion of trains servicing the SJRPP. The height of the stack at the CBCP was also found to interfere with regional air traffic to and from the Jacksonville International Airport. This impact will be mitigated by installation of a non-directional navigation beacon.

The evaluation of energy requirements for the area indicated the CBCP is essential to future needs of the region. The CBCP, found to have a lower avoided heat rate and utilization of waste heat at SK, suggests the CBC Alternative is a more efficient use of energy than the SK-only Alternative and other Florida utilities.

This summary indicates the environmentally preferred alternative is the CBC Alternative, which has lower environmental impacts than the AES Alternative (originally proposed) and the SK-only Alternative (no action alternative). The following section addresses mitigation measures for impacts of the CBC Alternative.

5.2 SUMMARY OF MITIGATION

The CBC Alternative contained a number of environmentally protective control systems (e.g., CFB, baghouse, SNCR and zero discharge system) to reduce impacts on local and regional environments. These mitigation measures were found to adequately address the majority of impacts that are associated with power generation. Additional suggested mitigation measures are minimal and discussed below.

Several mitigation measure can be implemented to offset increased regulated gases (e.g., CO) and global warming gases (CO_2). An old automobile "purchase program" to remove high-polluting low-efficiency automobiles can be used to offset a variety of pollutants including CO, VOC, CO_2 and NO_x. With respect to regulated pollutants the purchase program has been used by a number of facilities. However, the application of this measure to mitigate greenhouse gases is difficult to guage and impractical as it requires excessive capitol expenditures. An additional mitigation scheme to offset global warming gases is the reforestation of open lands. Tree growth uptakes CO_2 and stores it as plant material (i.e., wood). The growth and CO_2 fixation of an individual tree can be extrapolated to an area requirement; however, the required area for this type of mitigation measure requires excessive land areas and capitol expenditures.

The geologic impacts from landfilling wastes generated at the CBCP can be mitigated in a variety of methods. The ash and sludge wastes generated by the CBCP can be used in the manufacture of commercial products, which reduce the amount of waste that would be landfilled. Reuse of waste materials requires site specific evaluation of the materials and the evaluation of need for the product. Fly and bed ash have been used in the manufacture of concrete products (e.g., roads) at a number of power plants. It is our understanding that the applicant intends to investigate the feasibility of this type of mitigation. An additional mitigation alternative would be to initiate a public recycling involvement program to reduce flow of recyclable products to receiving landfills. This mitigation measure would reduce waste flow indirectly by compensation for the volumes of landfilled wastes regenerated by the CBCP.

CHAPTER 6

EPA'S RECOMMENDATIONS

6.0 EPA'S RECOMMENDATIONS

Based on the environmental review of the CBCP, EPA finds that environmental impacts of the CBCP, with proposed mitigation, will be minimized. Furthermore, the CBCP as certified by the state is preferable to the project as it was originally proposed (AES Alternative) and to the SK-only Alternative (no CBCP).

The CBCP has gone through the state's Site Certification process and, after several modifications, has received Certification from the Siting Board. Most modifications have been improvements to project design that lessen environmental impacts. It should also be noted that, historically, the site has been used for industrial activities. The site is zoned for heavy industrial use (IH).

Environmental improvements offered by the CBCP include:

- The CBCP will produce steam for the SK mill, allowing for removal of old boilers. This will reduce existing ambient air quality impacts.

- Relocation and capping of SK lime mud has improved groundwater and surface water quality at the site.

- The CBCP zero discharge system will make use of SK and internal wastewaters, reducing the existing SK discharge to the St. Johns River. Stormwater runoff will be the only potential discharge. This discharge is expected to happen only in high rainfall events; otherwise the collected stormwater will be treated and used in the CBCP water system.

- The CBCP will provide cooling water to SK, reducing SK's existing groundwater withdrawals.

Unavoidable adverse impacts of the project include: impacts of coal and limestone extraction; disposal of solid wastes; increased rail traffic and noise; and contribution to global climate change.

EPA proposes to issue the NPDES permit for the CBCP. Permit issuance would allow stormwater overflow discharges to the Broward River up to the limits specified in the permit. All proposed limitations of the draft NPDES permit are tentative and subject to comment from all reviewers during the public comment period. A copy of the NPDES permit (No. FL0061204) is in Appendix A.

If EPA were to deny the NPDES permit (no Federal Action), the applicant could still operate the CBCP if confident that no discharges would occur. The CBCP is considered a zero discharge facility with the infrequent possibility of a stormwater discharge. Without an NPDES permit, any discharge from the site would be considered a violation of the Clean Water Act.

CHAPTER 7

PUBLIC PARTICIPATION

7.0 PUBLIC PARTICIPATION

The public has been involved throughout preparation of this EIS. A scoping meeting was held to solicit public comment on the project. The Draft EIS/SAR was distributed for public comment and review. A Public Hearing was held to present the results of the Draft EIS/SAR and to receive public comments.

EPA held a public meeting to report on the progress of the EIS and to invite public comments. A Public Hearing was held concurrently on the NPDES construction permit (see Section 1.3 History of the Project).

Issues raised at all EPA public meetings are summarized below. Copies of transcripts and written comments are part of EPA's administrative record and are available upon request from Heinz J. Mueller, Chief; Environmental Policy Section; FAB-4; EPA Region IV; 345 Courtland Street, N.E.; Atlanta, Georgia 30365.

This Final EIS and draft NPDES operation permit will be distributed for public review and comment. No additional public meetings are planned unless there is significant public demand for it or important issues are raised which were not addressed in previous meetings or in this document. Written comments are encouraged and will be considered in the NEPA process.

Several public meetings have been held at the state and local levels throughout the Site Certification process.

7.1 SCOPING

EPA and FDER held a public scoping meeting on January 24, 1989, at the San Mateo Elementary School in Jacksonville, Florida, to discuss the scope of the Draft EIS/SAR. The meeting was attended by approximately 70 citizens and leaders from Jacksonville/Duval County, and state and federal agency representatives. Issues raised at the meeting included the following: (*issues are addressed in the section of this Final EIS noted in parentheses*)

- The need for producing power in Jacksonville that would be sold to FPL for other areas of the state (*Section 1.1.1 Purpose and Need of Project*);

- Impacts of a proposed coal conveyor to be built across the Broward River below the Hecksher Street Bridge (*AES-CB eliminated the conveyor from project design*);

- Impacts on the air quality around the Jacksonville area from plant emissions, especially SO_2, CO_2, NO_x, TRS, and particulates (*Section 4.1 Air Quality Impacts*);

- Potential for coal combustion emissions producing acid rain which in turn would dissolve or deteriorate historic structures such as those made from coquina in St. Augustine (*Sections 4.1 Air Quality Impacts, and 4.9 Cultural Resource Impacts*);

- Noise from increased rail traffic, plant construction and operation (*Section 4.6 Noise Impacts*).

- Potential deterioration of water quality in the Broward River and impacts on recreational fishing (*all wastewater discharges have been eliminated except stormwater overflows - Section 4.3 Surface Water Impacts*);

- Use of large amounts of high quality groundwater for cooling water makeup (*groundwater will not be used for cooling - Section 4.4 Groundwater Impacts*);

- Impacts on wetlands (*wetland impacts during construction were avoided; potential impacts of emissions are discussed in Section 4.5 Ecological Impacts*);

- Disposal of waste products from plant operation and the lime sludge located on the plant site (*Section 4.7 Geologic Impacts*); and,

- Impacts of increased truck and rail car traffic on transportation corridors and residential areas (*Section 4.10 Transportation Impacts*).

7.2 PUBLIC HEARING ON DRAFT EIS/SAR AND DRAFT NPDES PERMIT

EPA distributed the Draft EIS/SAR and draft NPDES permit in June 1990 for public review and comment. On July 12, 1990, EPA held a Public Hearing at the Oceanway

Community Center in Jacksonville, Florida, and was attended by approximately 150 people. Written comments were accepted through July 23, 1990.

At this Hearing, representatives of AES-CB and SK provided an overview of the project. Also, EPA and FDER representatives explained the federal NPDES and EIS processes, and the state's Site Certification process. The NPDES permit writer described proposed wastewater discharges and potential construction and operational impacts of the discharges.

The following concerns were expressed (*comments are addressed in the section noted in parentheses*):

- The need for producing power in Jacksonville that would be sold to FPL for other areas of the state (*Section 1.1.1 Purpose and Need for the Project*);

- Emissions from the CBCP would exceed present emissions by SK -- most of which are heavy metals not present in SK emissions (*Section 4.1 Air Quality Impacts*);

- Pollutants from the CBCP will create greater impacts on air quality during winter months because of still air (*Section 4.1 Air Quality Impacts*);

- Current odor problems at SK (*paper mill odor has been virtually eliminated due to conversion to recycle mill - Section 4.1 Air Quality Impacts*);

- The height proposed for the stacks of the CBCP will not reduce emissions but would distribute more pollutants over a broader area -- thereby creating more impacts to other communities (*Section 4.1 Air Quality Impacts*);

- Cumulative impacts of existing coal and oil-fired generating plants and CBCP on air, water, human, animal and plant life (*Sections 4.1 Air Quality Impacts, 4.2 Human Health Impacts, 4.6 Noise Impacts, and 4.5 Ecological Impacts*);

- Impacts on respiratory and cardiopulmonary patients (*Section 4.2 Human Health Impacts*);

- Noise impacts (*Section 4.6 Noise Impacts*);

- The amount of pollutants to be discharged into the Broward River during construction dewatering (*this discharge was eliminated from project design*);

- Impact of pollutants that settle out and are later washed through the storm water system into ditches, creeks, streams, and rivers (*Sections 4.3 Surface Water Impacts and 4.5 Ecological Impacts*);

- The proposed use of groundwater in light of an existing water shortage in Jacksonville; also, the impact of groundwater withdrawals on the Floridan aquifer and drinking water quality due to salt water intrusion from excessive pumping (*groundwater withdrawals were reduced - Section 4.4 Groundwater Impacts*);

- Petroleum leakage from existing SK storage tanks (*these tanks were stabilized so contamination would not spread; also elimination of dewatering reduced concern about migration of contaminants - Section 4.4 Groundwater Impacts*);

- Impact on adjacent ecosytems, wildlife habitats, and national and state parks (*Section 4.5 Ecological Impacts*);

- Light pollution impacts (*Section 4.8 Social Impacts - Aesthetics*);

- Impact of coal and limestone transport and unloading activities on nearby residences (*Section 4.1 Air Quality Impacts, Section 4.6 Noise Impacts, and Section 4.10 Transportation Impacts*);

- Apparent conflict between CBCP and local comprehensive plan policies regarding sitings and impacts (*the CBCP site was (and is) designated for industrial use; Section 4.8 Social Impacts - Land Use*);

- Proximity of CBCP to San Mateo and Cedar Bay communities, which will experience greater adverse impacts; proximity of schools within 5 and 7 mile radii of the CBCP, and impacts on children (*Section 4.2 Human Health Impacts*);

- Economic benefits are outweighed by environmental losses (*comment noted; substantive environmental impacts need to be compensated regardless of project benefits*); and,

- Increased traffic due to coal train passage; also impact of coal train passage on emergency routes (*Section 4.10 Transportation Impacts*).

7.3 PUBLIC INFORMATION MEETING NPDES CONSTRUCTION RUNOFF PERMIT PUBLIC HEARING

On March 11, 1992 EPA held a public meeting at the Marina Hotel in Jacksonville to discuss the progress of the EIS. Approximately 500 people, almost equally divided between project opponents and proponents, attended the meeting.

A Public Hearing on the construction-related stormwater NPDES permit began at 8 o'clock at the Marina Hotel. Only comments relative to the NPDES permit were accepted at the Hearing. Approximately 50 people attended the Hearing.

Issues raised at the "information meeting" included (*issues are addressed in the section of this Final EIS noted in parentheses*):

- The Jacksonville City Council's opposition to the project should be given strong consideration by EPA; and that EPA consider the citizens who are against the project (*all comments from the public, their elected officials, governmental agencies and other commentors are given due consideration*);

- AES-CB's past operating record should be strongly considered (*AES-CB is no longer project owner or manager*);

- Natural gas is more acceptable than coal because of its impact on air and the environment (*although natural gas does burn cleaner than coal, the long-term availability of natural gas as a fuel source for the CBCP is questionable; in addition, some federal and state policies encourage the use of domestic coal to reduce dependence on foreign oil*);

- Union versus non-union employment (*EPA cannot speak to this issue; it is our understanding that employment issues have been resolved*);

- EPA should follow guidelines established by Congress, which has constituents in Jacksonville (*Section 1.2 Role of Federal and State Agencies*);

- AES-CB's ability to construct without all necessary permits; the NPDES process is unfair because it allows AES-CB to build without permits (*by February 1991, AES-CB had received all state approvals necessary to initiate construction; AES-CB had eliminated the dewatering discharge which made a new source NPDES permit and Final EIS unnecessary for construction activities, see Section 1.3 History of the Project*);

- That the economic impact of the project outweighs the environmental impact (*comment noted; substantive environmental impacts need to be compensated regardless of project benefits*);

- Quality of life issues such as poverty would be relieved due to employment by the project (*comment noted*);

- The cumulative environmental impact of CBCP and existing power plants, paper mills and other industries (*Section 4.1 Air Quality Impacts*);

- The impact on air quality from high sulfur coal (*the applicant has agreed to a lower average sulfur content in the coal to be burned, Section 4.1 Air Quality Impacts*);

- Impact of air emissions on public health (*Sections 4.1 Air Quality Impacts, and 4.2 Human Health Impacts*);

- Whether the operation of the project and the subsequent elimination of the SK boilers will provide cleaner air (*Section 4.1 Air Quality Impacts*);

- Concern for persons in the Jacksonville area that have respiratory illnesses (*Section 4.2 Human Health Impacts*);

- Impacts of the wastewater discharge into the St. John's River (*this discharge has been eliminated*);

- AES-CB is permitted to use water from the Floridan aquifer even thought they have said they will use wastewater from the SK mill (*groundwater withdrawals have been significantly reduced and will be used only where high quality water* *is required; CBC will recycle as much water as possible; Sections 2.3.3.4 Water Systems, and 4.4 Groundwater Impacts*);

- Particulates produced by the project are going to contaminate the soil and the water (*Sections 4.2 Human Health Impacts, and 4.3 Surface Water Impacts*); and,

- The project site remains contaminated (*the lime mud on site was relocated, covered with a geomembrane cap and seeded thereby reducing the likelihood of contaminant leaching to groundwater; leaking petroleum tanks on the SK site were stabilized - Section 4.4 Groundwater Impacts*).

Issues brought out at the Public Hearing on the NPDES permit for construction runoff are presented and addressed in the draft permit (see Appendix A).

7.4 STATE AND LOCAL PUBLIC HEARINGS

Other meetings on the CBCP have been held on the state and local levels throughout the Site Certification process. A Land Use and Zoning Hearing was held on February 14, 1989. The Hearing Officer found the applicant's SCA to be in compliance with existing City land use plans and zoning ordinances. The FPSC held a hearing on April 24 and 25, 1989 in Tallahassee regarding the need for the project. The FPSC issued an order granting a determination of need on June 30, 1989.

State Certification Hearings were held in Jacksonville during the weeks of February 5 and 19, 1990. Only formal intervenors are allowed to testify at these hearings. FDER held a meeting which was open to the public on February 7, 1990. Additional Certification hearings were held in on October 29 and 30, 1990, that dealt with the Siting Board's remand.

During June 11 through 20, 1991, the Jacksonville City Council held public hearings to discuss the project and a proposed resolution in opposition to it. The resolution, which stated the City Council's opposition to the project and requested that EPA hold a public hearing, passed on June 25, 1991.

See Section 1.3 History of the Project for more details.

There were other opportunities for the public to be involved throughout the state's Site Certification process. For more information about the state's process, contact Hamilton S. Oven, Jr., Siting Coordination Office; Florida Department of Environmental Protection; Marjory Stoneman Douglas Building; 3900 Commonwealth Boulevard; Tallahassee, Florida 32399-3000.

7.5 AGENCIES, ORGANIZATIONS INCLUDED IN THE EIS REVIEW PROCESS

Federal

U.S. Environmental Protection Agency
- Headquarters
- Region IV, Regional Administrator

U.S. Department of Agriculture
- Forest Service
- Agricultural Research Service
- Economic Research Service
- Soil Conservation Service

U.S. Department of the Army
- Corps of Engineers

U.S. Department of Commerce
- Economic Development Administration
- National Marine Fisheries Service

U.S. Department of Energy

Energy Research and Development Administration

Federal Energy Regulatory Commission

U.S. Department of Health and Human Services
Centers for Disease Control

U.S. Department of Interior
- Headquarters
- Fish and Wildlife Service
- National Park Service

U.S. Department of Transportation
- Coast Guard
- Federal Highway Administration

State

Florida Department of Environmental Regulation
(now Florida Department of Environmental Protection)

Florida Department of Administration
- Bureau of Intergovernmental Relations

Florida Department of Community Affairs

Florida Department of Natural Resources
(now Florida Department of Environmental Protection)

Florida Department of State
- State Historic Preservation Office

Florida Game and Fresh Water Fish Commission

Florida Department of Health and Rehabilitative Services

Florida Public Service Commission

Northeast Florida Regional Planning Council

St. Johns River Water Management District

Florida Department of Transportation

Local

City of Jacksonville

- City Council
- Office of General Counsel
- Planning Department
- Public Utilities Department
- Regulatory Environmental Services Division
- Wastewater Division

REFERENCES

REFERENCES

Abolafia, Eliot. February 1989. Competition will Change the Electric Utility Industry, published by Power Engineering.

AES-CB. 1988. Site Certification Application - The Cedar Bay Cogeneration Project.

AES-CB. 1989. Responses to First Set of Interrogatories Propounded by the Staff of the FPSC, Docket No. 881472-EQ, prepared by Frederick M. Bryant and William J. Peebles of Moore, Williams, Bryant, Peebles & Gautier, P.A.

Babcock & Wilcox. 1978. Steam/Its Generation and Use.

Blot, J.W., E.D. Davis, E.L. Morris, C.W. Nordwall, E. Buiatti, N.G. Alan, and J.F. Fraumeni. 1981. Occupation and the high risk of lung cancer in northeast Florida (to be published in Cancer Magazine).

Council of the City of Jacksonville. 1989. Citizen's Committee Report.

Department of Housing and Urban Development (HUD). 1979. Noise Abatement and Control, Environmental Criteria and Standards. Title 24, Code of Federal Regulations, Part 51, Subpart B.

EPA. 1991. Final Environmental Impact Statement: Florida Power & Light Company, Martin Coal Gasification/Combined Cycle Project. Prepared by U.S. Environmental Protection Agency, Region IV, Atlanta, GA. EPA 904/9-91-001(a).

EPA, FDER. October 21, 1981. St. Johns River Power Park Draft EIS/SAR, prepared by EPA, FDER, WAPORA, Inc., and Energy and Environmental Analysis, Inc.

EPRI. National Gas for Electric Power Generation: Strategic Issues, Risks, and Opportunities.

FCG, 1988. 1989 Planning Hearing-Generation Expansion Planning Studies.

FCG, 1988. 1989 Planning Hearing-20 Year Plan.

FDCA Bureau of State Planning. May 26, 1989. Final Report on the Cedar Bay Cogeneration Project Power Plant SCA.

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August 21, 1992. U.S. Air Force, EPA, FAA.

Florida Department of State, Division of Archives, History and Records Management, Bureau of Historic Sites and Properties. 1980. Historical, architectural and archaeological survey of Duval County, Florida. Prepared for the Florida Bicentennial commission and the Historical and Cultural Conservation Commission, City of Jacksonville.

Florida Governor's Energy Office. 1981. Annual report to the Legislature (1980): Save it Florida. Tallahassee, FL.

FP&L. April 1, 1989. Ten Year Power Plant Site Plan 1989-1998.

FP&L. May 1992. Ten Year Power Plant Site Plan 1992-2001.

FPSC. April 30, 1987. Annual Hearings on Load Forecasts, Generating Expansion Plans and Cogeneration Prices for Peninsular and Northwest Florida, Order No. 17480, Docket Nos. 860004-EU and 860004-EU-A.

FPSC. June 30, 1989. Order Granting Determination of Need for the CBCP, Order No. 21491, Docket No. 881472-EQ.

Jacksonville Electric Authority (JEA). 1976. Northside Generating Station 316 demonstration. Jacksonville, FL.

Jacksonville Electric Authority/Florida Power and Light Company (JEA/FP&L). 1981a. Site certification application - environmental information document for proposed St. Johns River Power Park. Prepared by Envirosphere, Inc.

Jacksonville Planning Department (JPD). June 1986. North District Plan.

Jacksonville Planning Department (JPD). 1987. The 1987 Annual Statistical Package. Jacksonville Planning Department, Jacksonville, FL.

Jacksonville Planning Department. April 1990. Comprehensive Plan 2010 Traffic Circulation Element.

Kuchler, A.W. 1965. Potential natural vegetation of the U.S. American Geographical Society Publication No. 36.

McDonagh, Dennis J., M.D., Donna L. Mohr, Ph.D., Phyllis M. Tousey, R.N., M.S.P.H., and William A. Monaco, Ph.D. 1991. An Assessment of Lung Cancer Mortality in Duval County, Florida, 1975-1984. Heart and Lung Institute at St. Vincent's Medical Center, Jacksonville, Florida.

Moulding, John. 1981. Personal communication, John Moulding, U.S. Corps of Engineers, Jacksonville, FL, 12 August 1981.

Singer, Joseph G. 1981. Combustion Fossil Power Systems, published by Combustion Engineering, Inc.

REFERENCES
(Continued)

Smith, Douglas J. March 1989. Independent Power Producers Are Leading the Way, published by Power Engineering.

Smock, Robert. February 1989. Power Plant Life Extension Trend Takes New Directions, published by Power Engineering.

U.S. Army Corps of Engineers (USCOE), Jacksonville District. 1976. Cross Florida barge canal restudy report, draft environmental impact statement. Department of the Army, Jacksonville, FL.

U.S. Army Corps of Engineers (USCOE), Jacksonville District. 1980a. Metropolitan Jacksonville, Florida water resources study: Annex III - flood plain management. Jacksonville, FL.

U.S. Department of Justice (USDOJ) and U.S. Environmental Protection Agency (EPA), 1993. Enforcement News. Two Companies Pay $900,000 Civil Penalty for Inaccurately Labeling Ear Plug Ratings. Wednesday, April 7, 1993.

U.S. Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. EPA/550-9-74-004.

Weston, Inc. 1978. Metropolitan Jacksonville, Florida water resources study. Annex I. Submitted to U.S. Corps of Engineers.

Wood, W. Dean, and Teresa P. Rudolph. 1981a. A cultural resource reconnaissance of a proposed coal-fired power plant site. Duval County, Florida. Prepared by Southeastern Wildlife Resources, Inc. for Envirosphere Company, New York, NY.

Wood, W. Dean, and Teresa P. Rudolph. 1981b. Testing of eleven archaeological sties in the vicinity of a proposed power plant, Duval county, Florida. Prepared by Southeastern Wildlife Resources for Envirosphere Co., New York, NY.

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GLOSSARY

GLOSSARY

ALLOWANCE FOR FUNDS USED DURING CONSTRUCTION (AFUDC) - The cost of financing the construction of new facilities before the facilities are included in the rate base. When regulated utilities are not allowed to earn a return to cover their financing costs during construction, they are allowed to accumulate these costs during construction for future recovery through AFUDC.

AVOIDED UNIT - A hypothetical unit that would have to be built if no new qualifying facilities were placed in service in peninsular Florida after 1988.

BITUMINOUS COAL - The most common coal; it is soft, dense and black with well- defined bands of bright and full material.

BLOWDOWN - Contaminated water removed periodically or continuously from a boiler and/or cooling tower. This water volume is replaced by higher quality feedwater to maintain a desired quality of water in the unit. See Makeup.

BRITISH THERMAL UNIT (Btu) - A standard unit for measuring the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

BTU CONTENT OF FUEL (Average) - An average heat value per unit quantity of fuel expressed in Btu as determined from tests of fuel samples or defined by contract specifications. (Example: Btu per pound of coal, Btu per gallon of oil, Btu per cubic foot of gas).

CAPACITY - The load for which a generating unit, generating station or other electrical apparatus is rated either by the user or by the manufacturer.

CAPACITY FACTOR - The ratio of the average load placed on a machine or piece of equipment for the period of time considered, to the capability of the machine or equipment.

CAPACITY MARGIN - The difference between generating capacity and peak system load expressed as a percent of generating capacity. It is a variation of the reserve margin.

CERTIFIED UNIT - A proposed unit that has received a certificate of need from the FPSC and the utility has committed to the construction of the unit.

CIRCULATING FLUIDIZED BED BOILER (CFB) - A coal fired boiler in which crushed coal is burned on a bed of crushed limestone. The limestone is introduced into the boiler for the purpose of stripping sulfur out of the combustion gases prior to emission through the plant's stack.

COGENERATOR - A power generating unit that simultaneously produces electrical energy and useful thermal energy from the same fuel such as steam or heat.

GLOSSARY

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COMBINED CYCLE PLANT - A combined cycle module is basically a combination of one or more oil or gas fired combustion turbine (CT) electric generating unit(s), one heat recovery steam generator per CT (which converts waste heat from the CT into steam) and a steam turbine electric generating unit.

COMBUSTION TURBINE - Similar to a steam turbine, except it expands hot gases (ignited fuel-air mixture) instead of steam through the turbine. These turbines also have a compressor to increase the pressure of the air which increases the temperature of the fuel-air mixture.

COOLING TOWER - A device for cooling hot water by bringing it into contact with large quantities of air. Heat from the water is transferred to the air and discharged into the atmosphere. Evaporation of a portion of the water is the primary cooling mechanism. This evaporation (pure water) results in an increase in dissolved materials contained in the cooled water as the dissolved solids which were in the evaporated water are left behind. At CBCP, the dissolved solids in the cooling water will be approximately 5.2 times the concentrations in the intake water.

DEMAND - The rate at which electric energy is delivered to or by a system, part of a system, or piece of equipment at a given instant or averaged over any designated period of time (see LOAD).

DEMINERALIZER TRAIN - A demineralizer train consists of a number of duplicate water treatment processes which remove minerals from a water stream producing successively higher quality water as it moves through the train. Typically, this system consists of a number of ion exchange systems in series, where the output of each system becomes the input to the next.

DISTILLATE FUEL - The lighter fuel oils, such as kerosene and jet fuel, which are distilled off during the refining process. Virtually all of the oil used in internal combustion and gas turbine engines is distillate, or "light", fuel oil.

DRIFT - That small portion of the hot water which is entrained as very small droplets in the air as it contacts the water in passing through the cooling tower, and is discharged with the air at the top of the cooling tower. Drift contains the same concentration of dissolved materials as the water in the tower.

EMERGENCY FORCED OUTAGE - Occurs when a unit must be quickly removed from service because of an equipment problem.

ENERGY BROKER - A mechanism for marketing electric energy among electric utilities that have sufficient generating capacity to meet their individual loads. It matches potential sellers of electric energy with potential buyers every hour.

EQUIVALENT FORCED OUTAGE RATE - The percent of time a unit is on forced outage.
EXPECTED UNSERVED ENERGY (EUE) - Expected amount of energy that will not be served due to insufficient generation. This figure includes all 8,760 hours of the year.

GLOSSARY

(Continued)

FIRM DEMAND OR FIRM POWER - Power or power producing capacity intended to be available at all times during the period covered by the associated commitment, even under adverse conditions.

FIXED OPERATION COST - Monies other than those associated with investment in plant which do not vary or fluctuate with changes in operation or utilization of plant.

FORCED OUTAGE - An outage of generating equipment that results from the failure of one or more components of the facility, rendering it inoperable.

FOSSIL FUEL - Any naturally occurring fuel of an organic nature, such as coal, crude oil and natural gas.

FUEL INVENTORY - A supply of fuel accumulated for future use.

FUEL EFFICIENCY - See Thermal Efficiency.

GENERATING UNIT - A collection of fuel feeders, heat producers, energy converters and electrical generators which must be operated as a single entity in order for electricity to be produced. A unit may consist of several boilers supplying steam to one or more turbines that drive one or more electric generators.

HEAT RATE - A measure of generating station thermal efficiency, generally expressed in Btu per kilowatt hour. It is computed by dividing the total Btu content of fuel burned for electric generation by the resulting kilowatt-hour of electricity generated.

HIGH-BAND FORECAST - A forecast which represents more growth than the "base" forecast.

INCREMENTAL GENERATING COST - The ratio of the additional cost incurred in producing an increment of generation to the magnitude of that increment of generation. (Note: All variable costs should be taken into account including maintenance).

INSTALLED GENERATING CAPACITY - The guaranteed continuous output of a genera- tor at full load, under specified conditions, as designated by the manu- facturer.

INTERRUPTIBLE LOAD - That load which may be disconnected at the supplier's discretion.

INVESTOR-OWNED ELECTRIC UTILITY - Those electric utilities organized as tax- paying businesses usually financed by the sale of securities in the free market and whose properties are managed by representatives regularly elected by their shareholders. Investor-owned electric utilities may be owned by an individual proprietor or a small group of people but are usually corporations owned by the general public.

LEVELIZED FIXED CHARGE RATE OR FIXED CHARGES - A fraction which is a function of the AFUDC amount, the book life of the technology and other financial factors. The fraction, when multiplied by the capital cost of the equipment, will yield an annual amount (levelized) that will have the same present worth as the present worth of the actual annual capital costs (not levelized) of the equipment).

LOAD - The amount of electric power delivered or required at any specific point or points on a system.

LOAD FACTOR - In percent, is calculated by multiplying the annual net energy for load (NEL) by 100 and dividing it by the product of the peak demand and the number of hours in the year.
LOAD SERVING CAPABILITY - The additional amount of load that a system can serve as a result of the addition of a generating unit while still providing the same level of reliability. The load serving capability is always less than the rated capacity of the unit since the unit capacity must be reduced by the additional system capacity margin required because of the addition of the unit.

LOSS OF ENERGY PROBABILITY (LOEP) - An alternate method of expressing the Expected Unserved Energy (EUE); it is adjusted so the effect of system size can be removed.

LOSS OF LOAD HOURS (LOLH) - A variation on the LOLP method, it represents the expected number of hours by considering all the hours in the year, not just the daily peak hours.
LOSS OF LOAD PROBABILITY (LOLP) - A mathematical reference which represents the expected number of days per year when the generation will be insufficient to serve the daily peak load. This indicates the relative reliability of electric power systems. Generally the availability of assistance from inter- connected neighboring utilities is included in the calculation of the LOLP whereas voltage reductions, requests for voluntary load reductions and load curtailments arenot modeled in the calculations.

LOW-BAND FORECAST - A forecast which represents less growth than the "base" forecast.
MAINTENANCE OUTAGE - Occurs when a generating unit is taken out of service for routine maintenance.

MAKEUP - Water taken in by a power generating unit to "makeup" for water losses resulting from evaporation, contamination (blowdown), absorption, etc.

NATURAL GAS - A mixture of hydrocarbon gases, principally methane, occurring in porous geologic formations beneath the earth's surface, often found in association with petroleum.

NET CAPACITY - The continuous gross capacity, less power required by all auxiliaries associated with the unit, or the capacity as specified by "SERC Guideline Number 2 for Uniform Generator Ratings for Reporting".

NET ENERGY FOR LOAD (NEL) - Net system generation plus energy received from Class I and Class II systems less energy delivered to Class I and Class II systems.

NET ENERGY FOR SYSTEM (NES) - NEL plus energy received from Class III and Class V - energy delivered to Class III and Class V systems.

<u>OIL</u> - A mixture of hydrocarbons existing in the liquid state in natural underground reservoirs. Oil is often found in association with gas.

<u>OUTAGE</u> - Describes the state of a generating transmission or distribution component when it is not available to perform its intended function due to some event directly associated with the component. An outage may or may not cause an interruption of service to consumers, depending on system configura- tion.

<u>OUTAGE RATE</u> - For a particular system component, the number of outages per unit of time.
<u>PEAK DEMAND OR PEAK LOAD</u> - The net 60-minute integrated demand, actual or adjusted. Forecasts are for normal weather conditions.

<u>PENINSULAR FLORIDA</u> - Those utilities located east of the Apalachicola River.

<u>PERCENT CAPACITY MARGIN</u> - The difference between capacity and peak load expressed as a percentage of capacity. Does not explicitly evaluate the effects of unit size or performance, the size of the system or the strength of its interconnections.

<u>POLISHING</u> - Polishing consists of final water treatment process by which certain small quantities of a substance (e.g.: minerals, hardness) is removed prior to final discharge or usage.

<u>PUBLICLY-OWNED ELECTRIC UTILITY</u> - Electric systems owned by municipals and federal and state public power projects and cooperatives that are owned by their customers.

<u>PURPA</u> - Public Utility Regulatory Policies Act of 1978. Enacted to give preferential rights to non-utility developers of qualifying facilities (QF). QF status enables the developer of production facilities to receive backup power, to claim state and federal exemptions and to sell electricity to a utility at its avoided cost, i.e., the cost that the utility avoids in generating electricity itself or not purchasing it from another source.

<u>QUALIFYING FACILITY (QF)</u> - Defined in the federal law known as the Public Utility Regulatory Policies Act of 1978 (PURPA). It includes small-power producers and cogenerators of electricity and steam (or other form energy) that are not themselves electric utilities.

<u>RATED CAPACITY</u> - See Capacity.

<u>RECIRCULATING COOLING TOWER</u> (also called off-stream or closed-cycle cooling tower) - A cooling tower in which the water is returned to the power plant after cooling for reuse. This process of heating and cooling of the water in continuous. In a recirculating tower, a portion of the cooled water is discharged as "blowdown" in order to maintain a proper chemical equilibrium in the tower and balance the concentration of dissolved material resulting from evaporation. Intake of ambient water is required as "make-up" to equal the blowdown, evaporation, draft, and other small losses from the tower.

GLOSSARY

(Continued)

RESERVE MARGIN - The difference between generating capacity and peak system load expressed as a percent of the peak system load.

RESIDUAL FUELS - The fuel oils remaining after the lighter oils have been distilled off during the refining process. Except for start-up and flame stabilization, virtually all the oil used in steam plants is residual, or "heavy", fuel oil.

SMALL POWER PRODUCER - A power generating unit with a capacity of 80 MW or less and uses as its primary energy source, biomass, waste, renewable resources or geothermal resources.

STATE OF FLORIDA - Peninsular Florida utilities plus Gulf Power Company, West Florida Electric Cooperative, Choctawhatchee Electric Cooperative, Escambia River Electric Cooperative, Gulf Coast Electric Cooperative, City of Blountstown, Florida Public Utilities Company (Marianna) and Alabama Electric Cooperative.

STEAM TURBINE - Steam expands and cools as it passes through the turbine blades, turning the blades which are connected to a shaft. This turbine shaft turns the electric generator shaft.

SUMMER - June 1 through September 30.

TAXA - Classes of organisms.

THERMAL EFFICIENCY - A measure of the amount of electrical energy obtained (the work) per unit of input (the fuel); it is measured in the generating station by the heat rate (see Heat Rate).

WATT - The electrical unit of power or rate of doing work.

WINTER - December 1 through March 31.

YEAR - The calendar year from January 1 through December 31.