DOE/EIS-0383

# FINAL
# ENVIRONMENTAL IMPACT STATEMENT
# FOR THE
# ORLANDO GASIFICATION PROJECT

## ORLANDO, FLORIDA

**January 2007**

## U.S. DEPARTMENT OF ENERGY

# COVER SHEET

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## RESPONSIBLE AGENCY

U.S. Department of Energy (DOE)

## TITLE

Final Environmental Impact Statement for the Orlando Gasification Project (DOE/EIS-0383)

## LOCATION

Orlando, Florida

## CONTACTS

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## ABSTRACT

This EIS assesses the potential environmental impacts that would result from a proposed DOE action to provide cost-shared funding for construction and operation of facilities at Orlando Utilities Commission's (OUC's) existing Stanton Energy Center near Orlando, Florida. The project has been selected for further consideration by DOE under the Clean Coal Power Initiative (CCPI) to demonstrate advanced power generation systems using Integrated Gasification Combined Cycle (IGCC) technology. Although DOE funding would support only the Orlando Gasification Project (i.e., coal gasifier, synthesis gas cleanup systems, and supporting infrastructure), the project would be integrated with a privately funded, combined-cycle unit, which together would constitute the IGCC facilities. The facilities would convert coal into synthesis gas to drive a gas combustion turbine, and hot exhaust gas from the gas turbine would generate steam from water to drive a steam turbine. Combined, the two turbines would generate 285 MW (megawatts) of electricity.

The EIS evaluates potential impacts of the proposed facilities on land use, aesthetics, air quality, geology, water resources, floodplains, wetlands, ecological resources, social and economic resources, waste management, human health and safety, and noise. The EIS also evaluates potential impacts on these resource areas for a scenario resulting from the no-action alternative (DOE would not provide cost-shared funding) in which the combined-cycle facilities would be built on the site and operate using natural gas with no gasifier, synthesis gas cleanup systems, or supporting infrastructure.

## PUBLIC PARTICIPATION

***DOE encourages public participation in the NEPA process. Comments were invited on the draft EIS for a period of 45 days after publication of the Notice of Availability in the Federal Register on August 24, 2006. DOE considered late comments to the extent practicable. DOE conducted a formal public hearing to receive comments on the draft EIS at Timber Creek High School, 1001 Avalon Park Boulevard, Orlando, Florida, on September 13, 2006. An informational session was held prior to the hearing for the public to learn more about the proposed project. The***

***public was encouraged to provide oral comments at the hearings and to submit written comments to DOE by the close of the comment period on October 10, 2006. In preparing the final EIS, DOE considered both oral and written comments.***

***CHANGES FROM THE DRAFT EIS***

***All changes, which have been made to improve the usefulness of the document to the decision maker and to be responsive to the public, are shown in boldface italics font (as is this paragraph), except for Appendix F, which contains the comments and responses on the draft EIS.***

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ADT | average daily traffic |
| AERMAP | terrain preprocessing program for the AERMOD air dispersion model |
| AERMET | meteorological preprocessing program for the AERMOD air dispersion model |
| AERMOD | AMS/EPA Regulatory MODel (an air dispersion model) |
| AMS | American Meteorological Society |
| amsl | above mean sea level |
| BMP | best management practices |
| BPIP | Building Profile Input Program |
| Btu | British thermal unit |
| °C | degrees Celsius |
| CCPI | Clean Coal Power Initiative |
| CEQ | Council on Environmental Quality |
| CFR | *Code of Federal Regulations* |
| cm | centimeter |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| COS | carbonyl sulfide |
| dB | decibel |
| dBA | decibels as measured on the A-weighted scale |
| DLL | days of lost life |
| DOE | U.S. Department of Energy |
| ECT | Environmental Consulting & Technology, Inc. |
| EIS | environmental impact statement |
| EMF | electromagnetic fields |
| EPA | U.S. Environmental Protection Agency |
| EPRI | Electric Power Research Institute |
| ERF | Exposure-response function |
| ERPG | Emergency Response Planning Guide |
| °F | degrees Fahrenheit |
| FDEP | Florida Department of Environmental Protection |
| FDOT | Florida Department of Transportation |
| FEMA | Federal Emergency Management Agency |
| FHWA | Federal Highway Administration |
| *FR* | *Federal Register* |
| ft | feet |
| $ft^3$ | cubic feet |
| FWC | Florida Fish and Wildlife Conservation Commission |
| FWS | U.S. Fish and Wildlife Service |
| g | acceleration due to gravity |
| gal | gallon |
| GAQM | Guideline on Air Quality Models |
| GEP | Good Engineering Practice |
| gpm | gallons per minute |
| $H_2$ | hydrogen gas |
| $H_2O$ | water |
| $H_2S$ | hydrogen sulfide |

| | |
|---|---|
| HCN | hydrogen cyanide |
| HEM | human exposure model |
| HRSG | heat recovery steam generator |
| in. | inch |
| IGCC | Integrated Gasification Combined Cycle |
| IPCC | Intergovernmental Panel on Climate Change |
| ISCST | Industrial Source Complex Short-Term (an air dispersion model) |
| KBR | (formerly Kellogg, Brown and Root) |
| kg | kilogram |
| L | liter |
| lb | pound |
| m | meter |
| $m^2$ | square meter |
| $m^3$ | cubic meter |
| µg | microgram |
| µm | micrometer |
| µS | microsiemens |
| MCLG | Maximum Contaminant Level Goal |
| mg | milligram |
| mgd | million gallons per day |
| MIR | maximum individual risk |
| MRI | Midwest Research Institute |
| mV | millivolt |
| MW | megawatt |
| N | Newton |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NIEHS | National Institute of Environmental Health Sciences |
| NO | nitric oxide |
| $NO_2$ | nitrogen dioxide |
| $NO_x$ | oxides of nitrogen |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NRC | U.S. Nuclear Regulatory Commission |
| NSC | National Safety Council |
| $O_3$ | ozone |
| ORNL | Oak Ridge National Laboratory |
| OSHA | Occupational Safety and Health Administration |
| OUC | Orlando Utilities Commission |
| Pb | lead |
| pH | hydrogen-ion concentration notation |
| PHA | process hazard analysis |
| PM | particulate matter |
| PM-2.5 | particulate matter less than 2.5 µm in aerodynamic diameter |
| PM-10 | particulate matter less than 10 µm in aerodynamic diameter |
| ppm | parts per million |
| PRIME | Plume RIse Model Enhancements |
| PSD | Prevention of Significant Deterioration |
| psi | pounds per square inch |
| R&D | research and development |
| RCRA | Resource Conservation and Recovery Act |

| | |
|---|---|
| RGM | reactive gaseous divalent mercury ($Hg^{2+}$) |
| RMP | risk management plan |
| s | second |
| SAIC | Science Applications International Corporation |
| SCREEN3 | a screening air dispersion model |
| SHPO | State Historic Preservation Office |
| $SO_2$ | sulfur dioxide |
| SPCCP | Spill Prevention, Control, and Countermeasures Plan |
| SPLP | Synthetic Precipitation Leaching Procedure |
| U.S. | United States |
| USC | *United States Code* |
| USGS | U.S. Geological Survey |
| VOC | volatile organic compound |
| $yd^3$ | cubic yard |
| YLL | years of lost life |

# GLOSSARY

**Aerodynamic diameter**—a term used to describe particles with common aerodynamic properties, which avoids the complications associated with varying particle sizes, shapes, and densities. For example, PM-10 is defined in 40 CFR 50 as consisting of particles 10 micrometers or less in aerodynamic diameter, meaning particles that behave aerodynamically like spherical particles of unit density (1 gram per cubic centimeter) having diameters of 10 micrometers or less.

**Air dispersion model**—a computer program that incorporates a series of mathematical equations used to predict downwind concentrations in the ambient air resulting from emissions of a pollutant. Inputs to a dispersion model include the emission rate; characteristics of the emission release such as stack height, exhaust temperature, and flow rate; and atmospheric dispersion parameters such as wind speed and direction, air temperature, atmospheric stability, and height of the mixed layer.

**Aquifer**—a body of rock or sediment that is capable of transmitting groundwater and yielding usable quantities of water to wells or springs.

**Artesian**—groundwater conditions in which water in wells rises above its level in the aquifer, including conditions in which groundwater rises to the ground surface or above.

**Ash**—the mineral content of a product remaining after complete combustion.

**Baghouse**—an air pollution control device that filters particulate emissions, consisting of a bank of bags that function like the bag of a vacuum cleaner; the bags intercept particles that are mostly larger than 10 micrometers in aerodynamic diameter.

**Biocide**—a substance (e.g., chlorine) that is toxic or lethal to many organisms and is used to treat water.

**Blowdown**—the portion of steam or water removed from a boiler at regular intervals to prevent excessive accumulation of dissolved and suspended materials.

**Bottom ash—**combustion residue composed of large particles that settle to the bottom of a combustor from where they can be physically removed.

**Brackish—**describes water that has high concentrations of salts (typically 1,000 to 10,000 parts per million of dissolved solids) but that may still be suitable for some uses.

**Building downwash**—the downward movement of an elevated plume toward the area of low pressure created on the lee side of a structure in the wake around which the air flows.

**Capacity factor**—the percentage of energy output during a period of time compared to the energy that would have been produced if the equipment operated at its maximum power throughout the period.

**Census tract**—a small, relatively permanent statistical subdivision of a county. Census tracts, which average about 4,000 inhabitants, are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions.

**Coal gasification**—a process that converts coal into a gaseous product, which involves crushing coal into a powder and heating the powder in the presence of steam and oxygen. After impurities (e.g., sulfur) are

removed, the gas can be used as a fuel or further processed and concentrated into a chemical or liquid fuel.

**Combustor**—equipment in which coal or other fuel is burned at high temperatures.

**Confined aquifer**—an aquifer that is bounded by two confining units, and in which the water level in wells usually rises above the top of the aquifer.

**Confining unit**—a geologic formation or bed that has lower permeability than layers above and below it, and therefore restricts vertical water movement. (Confining units are also called aquitards.)

**Cooling tower**—a structure that cools heated condenser water by circulating the water along a series of louvers and baffles through which cool, outside air convects naturally or is forced by large fans.

**Cooling water**—water that is heated as a result of being used to cool steam and condense it to water.

**Electrostatic precipitator**—a device that removes particles from a stream of exhaust gas; it imparts an electrical charge to the particles, which causes them to adhere to metal plates that can be rapped to cause the particles to fall into a hopper for disposal.

**Evapotranspiration**—the amount of water removed from a land area by the combination of direct evaporation and plant transpiration.

**Floodplain**—the lowlands adjoining inland and coastal waters and relatively flat areas and floodprone areas of offshore islands.

**Flue gas**—residual gases after combustion that are vented to the atmosphere through a flue or chimney.

**Fly ash**—combustion residue composed of fine particles (e.g., soot) that are entrained with the draft leaving the combustor.

**Formation**—the primary unit associated with formal geological mapping of an area. Formations possess distinctive geological features and can be combined into “groups” or subdivided into “members.”

**Fresh water**—water with a low concentration of salts (typically less than 1,000 parts per million of dissolved solids).

**Gaussian**—concentrations of pollutants downwind of a source are assumed to form a normal distribution (i.e., bell-shaped curve) from the centerline of the plume in the vertical and lateral directions.

**Groundwater**—water below the ground surface in a zone of saturation.

**Hazardous waste**—a category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

**Integrated gasification combined-cycle**—a process that uses synthesis gas derived from coal to drive a gas combustion turbine and exhaust gas from the gas turbine to generate steam from water to drive a steam turbine.

**Laydown area**—material and equipment storage area during the construction phase of a project.

**Leachate**—solution or product obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.

**Liquefaction**—the process of transforming a gas into a liquid.

**Magnitude (of an earthquake)**—a quantity that is characteristic of the total energy released by an earthquake. Magnitude is determined by taking the common logarithm of the largest ground motion recorded on a seismograph during the arrival of a seismic wave type and applying a standard correction factor for distance to the epicenter. A one-unit increase in magnitude (e.g., from magnitude 6 to magnitude 7) represents a 30-fold increase in the amount of energy released.

**Makeup pond**—pond used to store makeup for cooling water.

**Maximum Contaminant Level Goal (MCLG)**—the maximum concentration of a substance in drinking water at which there is no known or anticipated adverse effect on human health, and which allows an adequate margin of safety, as determined by the U.S. Environmental Protection Agency.

**Mixing height**—the height in the lower atmosphere within which relatively vigorous mixing of pollutant emissions occurs.

**pH**—a measure of the relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7, and basic (i.e., alkaline) solutions have pH values higher than 7.

**Plume (atmospheric)**—a visible or measurable, elongated pattern of emissions spreading downwind from a source through the atmosphere.

**Potentiometric surface**—imaginary surface defined by the elevations to which the groundwater in an aquifer would rise in wells completed in the aquifer.

**Reference concentrations**—estimates of continuous inhalation exposure to human population (including sensitive subgroups) that are likely to be without an appreciable risk of deleterious effects during a lifetime.

**Saline—**describes water with high concentrations of salts (typically more than 10,000 parts per million dissolved solids), making it unsuitable for use.

**Scrubber**—chemical/physical devices, also known as flue gas desulfurization systems, that remove sulfur compounds formed during coal combustion by combining the sulfur in gaseous emissions with another chemical medium to form inert sludge, which is removed for disposal.

**Secondary drinking water standards**—non-enforceable federal guidelines regarding cosmetic effects (e.g., tooth or skin discoloration) or aesthetic effects (e.g., taste, odor, or color) of drinking water.

**Selective catalytic reduction**—a system to reduce $NO_x$ emissions by injecting a reagent such as ammonia into exhaust gas to convert $NO_x$ emissions to nitrogen gas and water via a chemical reduction reaction.

**Sludge**—a semi-solid residue containing a mixture of solid waste material and water from air or water treatment processes.

**Spring**—a location on the land surface or the bed of a surface water body where groundwater emerges from rock or soil without artificial assistance.

**Steam blow(down)**—during the start-up phase, the high-energy steam piping in a heat recovery steam generator (HRSG) would require steam blows to prepare new pipes for service. These scheduled blows would generally occur over a one-week period and utilize silencers to reduce the noise generated. Prior to the blows, hand cleaning to remove any construction debris would be performed. The HRSG steam-generating surfaces would then be chemically cleaned, and the cleaning waste would be transported to a licensed facility for disposal. Following chemical cleaning, the HRSG would be operated to produce steam. The pressure would slowly be increased in the HRSG and then rapidly discharged to the atmosphere through the high-energy steam piping (this is referred to as a "steam blow"). This steam-blowing process is repeated until the HRSG and high-energy steam piping are completely cleaned.

**Subbituminous**—a type of coal, which is used primarily as fuel for electrical power generation, whose properties range between those of lignite and those of bituminous coal. It may be dull, dark brown to black, soft and crumbly, at the lower end of the range, to bright, jet black, hard, and relatively strong, at the upper end. Subbituminous coal contains 20 to 30% moisture by weight. Heating value varies from 7,000 Btu/lb to slightly over 9,000 Btu/lb.

**Synthesis gas**—a mixture of gases produced as feedstock, especially as a fuel produced by controlled combustion of coal in the presence of water vapor.

**Transmission corridor—**area used to provide separation between the transmission lines and the general public and to provide access to the transmission lines for construction and maintenance.

**Wetlands**—areas that are inundated by surface water or groundwater with a frequency sufficient to support, under normal circumstances, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflow areas, mudflats, and natural ponds.

**Wind rose**—a graph in which the frequency of wind blowing from each direction is plotted as a bar that extends from the center of the diagram. Wind speeds are denoted by bar widths and shading; the frequency of wind speed within each wind direction is depicted according to the length of that section of the bar.

# SUMMARY

This environmental impact statement (EIS) has been prepared by the U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act of 1969 (NEPA) as amended (42 USC 4321 et seq.), Council on Environmental Quality regulations for implementing NEPA (40 CFR Parts 1500-1508), and DOE NEPA regulations (10 CFR Part 1021). The EIS evaluates the potential environmental impacts associated with the construction and operation of a project which was proposed by Southern Company in partnership with the Orlando Utilities Commission (OUC) and which has been selected by DOE under the Clean Coal Power Initiative (CCPI) program. The proposed project would demonstrate advanced power generation systems using Integrated Gasification Combined Cycle (IGCC) technology at OUC's existing Stanton Energy Center near Orlando, Florida. The CCPI Program accelerates commercial deployment of advanced coal-based technologies for generating clean, reliable, and affordable electricity in the United States by moving promising technologies from research and development (R&D) to the commercial marketplace through demonstration.

The EIS will be used by DOE ***to decide*** whether to provide, through a cooperative agreement with Southern Company, a total of $235 million (about 41% of the total cost of approximately $569 million) in cost-shared funding for the design, construction, and demonstration of the proposed Orlando Gasification Project. The proposed action is for DOE to provide the funding. DOE determined that providing funding for the proposed project would constitute a major federal action that may significantly affect the quality of the human environment. Therefore, DOE has prepared this EIS to assess the potential impacts of the proposed action and reasonable alternatives.

Although DOE funding would support only the Orlando Gasification Project (i.e., coal gasifier, synthesis gas cleanup systems, and supporting infrastructure), the project would be integrated with a privately funded, combined-cycle unit, which together would constitute the IGCC facilities. The facilities would convert coal into synthesis gas to drive a gas combustion turbine, and hot exhaust gas from the gas turbine would generate steam from water to drive a steam turbine. Combined, the two turbines would generate 285 MW (megawatts) of electricity. This proven, reliable combined-cycle approach of using a gas turbine and steam turbine in tandem increases the amount of electricity that can be generated from a given amount of fuel. The project is expected to provide a source of electricity that is reliable, low-cost, environmentally-sound, and efficient (approximately 40% of the energy in the fuel would be converted to electricity compared to about 33% for conventional coal-fired power plants). The facilities would substantially reduce emissions of sulfur dioxide ($SO_2$), oxides of nitrogen ($NO_x$), and mercury, as compared to conventional coal-fired power plants.

The purpose of the proposed Orlando Gasification Project is to demonstrate advanced coal gasification for power generation applications using IGCC technology at a sufficiently large scale to allow industries and utilities to assess the project's potential for commercial application. A successful demonstration would generate technical, environmental, and financial data from the design, construction, and operation of the facilities to confirm that the technology can be implemented at the commercial scale. The cost-shared contribution by DOE would help reduce the risk to the Southern Company team in

demonstrating the technology at the level of maturity needed for decisions on commercialization. The transport gasifier technology that would be demonstrated offers a simpler and more robust method for generating power from coal than other alternatives. It is unique among coal gasification technologies in that it is cost-effective when handling low rank coals and when using coals with high moisture or high ash content. These coals make up half the proven reserves in both the U. S. and the world. Moreover, the transport gasifier is capable of both air- and oxygen-blown operation. This inherent flexibility will allow it to readily adapt to other applications beyond power generation including chemical production and possible future carbon management requirements.

The proposed project would be located at OUC's 3,280-acre Stanton Energy Center in eastern Orange County near Orlando, Florida. The site is located approximately 3 miles east of the eastern city limits of Orlando and about 13 miles east-southeast of the downtown area. Land use in the vicinity includes undeveloped areas interspersed with a mixture of residential and commercial buildings, as well as a park, correctional facility, and landfill. The topography of the area is relatively flat. The project would be constructed on approximately 35 of the 1,100 acres of land that were previously cleared, leveled, and licensed for power plant use. The project equipment would be located between existing coal-fired units and an existing natural gas-fired combined-cycle unit. A short transmission line (approximately 3,200 ft in length) proposed to serve as an electrical interconnection from the proposed facilities to an existing onsite substation would occupy a small amount of additional land.

Construction of the proposed facilities would begin in late 2007 and continue until early 2010. An average of about 350 construction workers would be on the site during construction. Approximately 600 to 700 workers would be required during the peak construction period between fall 2008 and spring 2009. After mechanical checkout of the proposed facilities, demonstration (including data analysis and process evaluation) would be conducted over a 4.5-year period from mid 2010 until late 2014. If the demonstration is successful, commercial operation would follow immediately. The combined workforce (i.e., including the proposed Orlando Gasification Project and the combined-cycle generating unit) would consist of approximately 72 employees added to the existing Stanton Energy Center staff of 204 employees. Of the 72 new employees, 19 workers would provide support only during the startup and demonstration phases of the project, while 53 employees would be needed over the lifetime of the facilities (i.e., during startup, demonstration, and commercial operation), unless the gasifier and related equipment would no longer be required because the demonstration was unsuccessful. Under this latter scenario, only 21 employees would be needed over the lifetime of the remaining combined-cycle unit using natural gas exclusively. The facilities would be designed for a lifetime of at least 20 years, including the 4.5-year demonstration period.

The new coal gasifier would operate entirely on coal, consuming a total of approximately 1,020,000 tons per year to produce synthesis gas. Two to three trains per week would deliver low-sulfur subbituminous coal from the Powder River Basin in Wyoming. The heating value of the coal would average about 8,760 Btu/lb and the sulfur content would average about 0.26%. Most air emissions would result from combustion of synthesis gas in the gas combustion turbine during normal operations. The exhaust gas would be released to the atmosphere via a 205-ft stack.

The EIS considers the proposed action (funding the demonstration) and the no-action alternative (not funding the demonstration), including a scenario reasonably expected to result as a consequence of the no-action alternative. Other alternatives to the proposed action have been examined and found not to be reasonable alternatives under NEPA. No other sites to host the proposed project were given detailed consideration or evaluation by Southern Company team members during their site selection process. During the preparation of previous proposals for similar efforts to commercialize the gasification technology, Southern Company initially considered other sites; however, because the Stanton Energy Center is an existing site at which the private partners have already established a business relationship, it was the only location identified in their CCPI proposal. The environmental impacts likely would be much greater at a site without existing infrastructure than at the Stanton Energy Center. Based on the above considerations, other sites are not reasonable alternatives and are not evaluated in this EIS.

Other technologies have been dismissed as not reasonable. Other CCPI projects were selected to demonstrate other coal-based technologies. The use of other technologies and approaches that are not applicable to coal (e.g., natural gas, wind power, solar energy, and conservation) would not contribute to the CCPI Program goal of accelerating commercial deployment of advanced coal-based technologies. Other alternatives, such as reducing the size of the proposed project, have been dismissed as not reasonable. The design size for the proposed project was selected because it is sufficiently large to show potential customers that the gasification technology, once demonstrated at this scale, could be applied commercially without further scale-up. The size of the proposed project is also related to OUC's projected need for power.

Potential impacts that could result from construction and operation of the proposed facilities, as well as potential impacts resulting from the scenario under the no-action alternative, were evaluated in the areas of land use, aesthetics, air quality, geology, water resources, floodplains, wetlands, ecological resources, social and economic resources, waste management, human health and safety, and noise. While the proposed project consists of the gasifier, synthesis gas cleanup systems, and supporting infrastructure only, the EIS includes the combined-cycle generating unit in the analyses of environmental impacts because the facilities are so intertwined. Further, the EIS considers the impacts from these facilities combined with those from other, existing facilities at the Stanton Energy Center.

***Comments received on the Draft EIS were considered by DOE in preparation of this Final EIS. The major comments can be grouped into the following categories: $CO_2$ emissions and mitigation options; issues related to vehicle and rail traffic; mercury deposition and bioaccumulation; ambient concentrations of ozone; environmental justice considerations; and air toxics impacts.***

***Comments on $CO_2$ emissions and mitigation options requested that DOE consider the feasibility of carbon sequestration for this project. In response, DOE evaluated the potential for carbon sequestration and has concluded that mitigation of $CO_2$ emissions through carbon capture and sequestration is not feasible for this project. The basis for this conclusion has been added to the text. Concerns about traffic congestion caused by vehicular traffic and possible mitigation through use of rail transport were raised in comments on the Draft EIS. DOE has added a discussion of mitigation required under the Site Certification process administered by the FDEP. DOE will also consider***

***adopting a condition of the use of rail transport to the maximum extent practicable as a mitigation measure in the Record of Decision. In response to comments on mercury deposition and bioaccumulation, DOE has confirmed the accuracy of the deposition analysis and cited more recent references regarding possible mercury deposition and bioaccumulation from power plant emissions. Also, DOE has updated the air quality monitoring data presented in the Final EIS in response to concerns about current levels of ozone. As requested in comments received, DOE has revised the environmental justice analysis to focus on impacts on the resource areas of greatest concern, and DOE's efforts to engage environmental justice communities during the NEPA process have been more clearly described. Finally, text has been added to address air toxics impacts from construction activities, and toxicity values for compounds of concern have been updated to address comments submitted in this area.***

The following sections provide key findings for areas of potential concern related to construction and operation of the proposed facilities.

## Potential Impacts

**Land Use and Aesthetics.** The proposed facilities would be confined to the existing Stanton Energy Center site and thus would not directly affect offsite land use. The 1,100-acre developed portion of the power plant site is designated specifically for power generation through the site certification process under the Florida Electrical Power Plant Siting Act. Through this process, power production has previously been approved by state and local agencies as an activity compatible with offsite land use, and the power plant has been determined to satisfy zoning requirements. Construction and operation of the proposed facilities within the "Institutional" portion of the Stanton Energy Center site would be consistent with the Orange County Comprehensive Plan because the facilities (1) would be similar to and compatible with the surrounding area and consistent with the pattern of development, (2) would not be a detrimental intrusion into the surrounding area, and (3) would meet the performance standards and buffer yard requirements of the Farmland Rural (A-2) zone.

The tallest structures to be constructed as part of the proposed facilities would be the 205-ft heat recovery steam generator (HRSG) stack, the 174-ft structure to house the gasifier, and the 114-ft HRSG. These structures would be shorter than the existing two 550-ft stacks serving Units 1 and 2, the two 431-ft natural-draft cooling towers serving Units 1 and 2, and the 225-ft Unit 1 and 2 boiler buildings. Aesthetic impacts of the proposed facilities would be further reduced because the facilities would be located between existing facilities, appearing as a continuation of the existing industrial character of the site rather than as a change in character. Although the existing power plant is visible from part of the surrounding local area, the 550-ft stacks and 431-ft cooling towers are the only conspicuous onsite structures that can be seen from nearby homes because of the forested buffer that visually screens most of the facilities. Consequently, the proposed facilities, which would be shorter than the existing 225-ft Unit 1 and 2 boiler buildings, would likely not be visible from nearby homes.

Because operation of the proposed multipoint flare would produce almost no visible flame during daylight hours, the flare would be nearly undetectable, except for shadows from heat effects. Blue/purple

flames would be visible during the nighttime from nearby locations with lines of sight to the flare. The flame height would rise to about 40 ft above the burners, which would be located 10 ft above ground level. A 20-ft tall thermal barrier would block the view of the burners and the lowest 10 ft of the 40-ft flames. The forested buffer would visually screen at least part of the flare from nearby homes.

**Air Quality.** ***Orange County is in attainment with National Ambient Air Quality Standards and state ambient air quality standards for all pollutants. Further, Orange County is not designated by the U.S. EPA as a maintenance area for any pollutant (i.e., an area that previously was a nonattainment area, which is striving to maintain attainment and comply with the state implementation plan). Consequently, no conformity determination is needed to demonstrate that activities associated with the proposed project would conform to applicable implementation plans for bringing the area into attainment with the standards (40 CFR Part 93, Subpart B).***

Sources of air emissions from the proposed facilities would include the HRSG stack, startup stack, multipoint flare, and 6-cell mechanical-draft cooling tower, of which the HRSG stack would generate the most emissions. Except during occasional startups, shutdowns, and upsets, the flare would normally have only minimal emissions associated with eight natural gas-fired pilot lights. Based on 100% load throughout the year (100% capacity factor) using the higher of estimated synthesis gas or natural gas emission rates, annual emissions of criteria pollutants would include 162 tons of $SO_2$, 1,006 tons of $NO_x$, 189 tons of particulate matter, 654 tons of carbon monoxide (CO), and 0.03 tons of lead (Pb). Annual $NO_x$ emissions from the Stanton Energy Center overall would not be expected to increase because OUC has agreed, as part of the permitting process, to reduce $NO_x$ emissions from other units at the Stanton Energy Center so that there would be a net decrease in $NO_x$ emissions. Annual emissions of volatile organic compounds (VOCs), a precursor of the criteria pollutant ozone, would be 129 tons.

A computer-based, ***EPA-approved*** air dispersion model ***(AERMOD – EPA 2004a, EPA 2004b)*** was used to estimate maximum increases in ground-level concentrations of $SO_2$, nitrogen dioxide ($NO_2$), particulate matter less than or equal to 10 μm in aerodynamic diameter (PM-10), and CO that would occur at any location as a result of emissions. In this analysis, the significance of the maximum predicted concentrations was evaluated using "significant impact levels" (a form of ambient air quality standards, as described below). According to U.S. Environmental Protection Agency (EPA) guidelines, a preliminary modeling analysis using significant impact levels should include only the emissions associated with the proposed facilities to determine if the facilities would have a significant impact on ambient air quality. If the maximum predicted concentrations are less than the significant impact levels, additional modeling, including other sources and background concentrations, would not be required for regulatory purposes.

Results indicate that maximum concentrations are predicted to be less than their corresponding significant impact levels. Therefore, additional modeling including other sources and background concentrations would not be required by EPA for regulatory purposes for any of the pollutants. Because of the conservative assumptions used in the analysis, actual degradation of air quality should be even less than the small amounts predicted. Maximum concentrations for all pollutants and averaging periods were predicted to occur at or near the Stanton Energy Center property boundary at approximately 3,400 ft north

of the proposed HRSG stack. Concentrations at other locations, including nearby residences, would be less.

Concentrations of pollutants would be negligible at the nearest Prevention of Significant Deterioration (PSD) Class I area, about 90 miles to the west-northwest, because dispersion of pollutants at that distance would reduce atmospheric concentrations to a small fraction of the maximum modeled concentrations, which are predicted to be less than PSD Class I increments at the location of their maximum impact. Because the impact of emissions from the proposed facilities would be negligible, the cumulative impact of the proposed facilities combined with those from existing Stanton Energy Center sources, would likewise not be a concern.

Although additional modeling including other sources and background concentrations would not be required for regulatory purposes for any of the pollutants, nevertheless the modeling results for the proposed facilities for $SO_2$, $NO_2$, PM-10, and CO were added to the highest ambient concentrations measured in the Orlando area. The results were compared with the ambient air quality standards. The total impact was the sum of each modeled concentration and its corresponding ambient background concentration measured in the Orlando area. The highest total impact for $SO_2$, $NO_2$, PM-10, and CO was less than 60% of its respective standard. Consequently, significant cumulative air quality impacts from the sum of the proposed facilities and existing sources, including those at the Stanton Energy Center, would not be expected.

No significant impact levels or PSD increments currently exist for PM-2.5. However, assuming very conservatively that all particulate emissions from the proposed facilities are less than or equal to 2.5 μm in aerodynamic diameter (PM-2.5), the maximum modeled 24-hour PM-2.5 concentration of 4.4 $\mu g/m^3$ would be only 7% of its corresponding NAAQS of 65 $\mu g/m^3$. Similarly, the maximum modeled annual PM-2.5 concentration of 0.4 $\mu g/m^3$ would be about 3% of its corresponding NAAQS of 15 $\mu g/m^3$. These small percentages would not be expected to result in violations of the PM-2.5 NAAQS, for which Orange County is in attainment. The highest total impact for the 24-hour PM-2.5 concentration was about 59% of its respective standard (i.e., the sum of the modeled 4.4 $\mu g/m^3$ and the ambient background concentration of 34 $\mu g/m^3$ equaled 38.4 $\mu g/m^3$, which was 59% of 65 $\mu g/m^3$). Similarly, the highest total impact for the annual PM-2.5 concentration was about 83% of its respective standard (i.e., the sum of the modeled 0.4 $\mu g/m^3$ and the highest ambient background concentration of 12 $\mu g/m^3$ equaled 12.4 $\mu g/m^3$, which was 83% of 15 $\mu g/m^3$). Consequently, cumulative PM-2.5 impacts from the sum of the proposed facilities and existing sources, including those at the Stanton Energy Center, would not be significant.

Ozone ($O_3$) is not emitted directly from a combustion source but is formed from photochemical reactions involving emitted VOCs and $NO_x$. Because the reactions involved can take hours to complete, $O_3$ can form far from the sources of its precursors (the VOCs and $NO_x$ that initiate its formation). Therefore, the contribution of an individual source to $O_3$ concentrations at any particular location cannot be readily quantified. Annual $NO_x$ emissions from the HRSG stack would be less than 3% of Orange County's $NO_x$ emissions inventory. In addition, as part of the air permitting process OUC has agreed to reduce $NO_x$ emissions from other units at the Stanton Energy Center so that there would be a net decrease in $NO_x$ emissions. Annual VOC emissions from the HRSG stack would be about 0.2% of the county's

VOC emissions inventory. Based on monitored $O_3$ concentrations, the small percentage increase in VOC emissions would not be likely to degrade $O_3$ concentrations sufficiently to cause violations in the $O_3$ NAAQS, but the magnitude of the degradation cannot be quantified.

Annual emissions of hazardous air pollutants from the HRSG stack would include 0.01 tons of mercury and 0.001 tons of beryllium. For comparison, the PSD Significant Emission Rate is 0.1 tons of mercury per year; neither the State of Florida nor the U.S. EPA PSD rules currently include a significant emission rate for beryllium. Ambient air quality standards do not exist for mercury and beryllium. Guideline concentrations are typically obtained by adjusting time-weighted (8-hour) averages specified by the American Conference of Governmental Industrial Hygienists as maximum allowable concentrations for healthy workers. The final result is a guideline maximum ambient air concentration; for concentrations below the guideline value, it is expected that the public would be protected from adverse impacts. Using the same modeling procedure as for criteria pollutants, the maximum ambient 24-hour concentration of mercury from the proposed HRSG stack is predicted to be 0.8% of its corresponding guideline value. ***Mercury is a persistent element and bioaccumulates in the aquatic species predominantly as methylmercury. Current scientific understanding of environmental fate and transport of mercury does not permit estimates of changes in mercury levels in aquatic systems as they might relate to localized plant emissions.*** The maximum ambient 24-hour concentration of beryllium from the stack is predicted to be 0.4% of its guideline value. These results indicate that mercury and beryllium emissions from the proposed facilities would pose no direct threat to human health in the area. Similarly, an evaluation of EPA's National-Scale Air Toxics Assessment database indicates that the cumulative impact of emissions from existing facilities including the Stanton Energy Center would pose no direct threat to human health in the area.

Some odors would be emitted during operation of the proposed facilities that would be noticeable on the site. Sources for these odors would include diesel engine exhaust from locomotives, trucks, maintenance equipment, and coal yard loaders; the coal pile and coal handling; sulfur storage and handling; and ammonia storage and handling. Any of these potential odors should be limited to the immediate site area and should not affect offsite areas.

The proposed facilities would emit about 1.8 million tons of $CO_2$ per year, which would be added to global emissions resulting from fossil fuel combustion, which were estimated at ***26,000*** million tons for the year ***1999 (IPCC 2001). A more recent study estimated global emissions of $CO_2$ from fossil fuel combustion to be 28,000 million tons in the year 2003 (Marland et al. 2006).***

**Geology.** Construction and operation of the proposed facilities would not change geologic conditions. A very low potential would exist for adverse effects to the facilities from geologic hazards. Because the new facilities would be built on a site in which about 5 ft of sandy fill material was deposited during construction of the Stanton Energy Center in the 1980s, proposed construction would not cause additional alteration of soil resources. Transmission line construction would disturb small areas of soils along the transmission line corridor.

**Water Resources.** Because facility construction would occur in developed site areas where surface water runoff is directed to onsite stormwater retention ponds and is used in the facilities, no impacts to

natural surface waters would be experienced, except in the unlikely event of a major storm that caused overflow of the site stormwater collection system. Transmission line construction outside of the main plant area could result in soil erosion and sediment deposition to streams, but best management practices such as silt fencing, straw bales, and revegetation of graded areas would minimize erosion and sedimentation. If required, an erosion control plan would be developed and implemented to minimize impacts from construction. Accordingly, impacts attributable to construction-related runoff would be minimal.

Dewatering during facility construction, which would be conducted to support initial excavation, backfill, and subsurface construction, would affect shallow groundwater. Collected groundwater would be pumped into the Stanton Energy Center stormwater system and subsequently would be routed to the onsite stormwater retention ponds for use in operations at the existing generating units. The lowering of the water table would be temporary and would be limited to the unconfined surficial aquifer within a small area of the previously developed portion of the Stanton Energy Center property. Because no effect should be detected on wetlands, surface waters, or recharge to the Upper Floridan aquifer, impacts from lowering the water table would be inconsequential.

Water use by the Stanton Energy Center would increase by a total of about 2.2 million gal per day during facility operation, primarily due to non-contact cooling water requirements for the gasifier and the combined-cycle unit. About 2.1 million gal per day of the additional water requirement would be supplied from the onsite makeup pond, which receives reclaimed wastewater and collects surface runoff. Water for potable uses and demineralized water for the gasifier and steam turbine (a total of about 0.1 million gal per day) would be obtained by increasing withdrawals from existing onsite groundwater wells that tap the Upper Floridan aquifer.

All water not lost to evaporation or otherwise consumed would be recycled within the Stanton Energy Center. Cooling tower blowdown and other process wastewaters would be collected, treated as needed, and discharged to the existing Stanton Energy Center water treatment and reuse systems. Process wastewaters containing oils would be collected in an oily wastewater sump, where an oil/water separator would remove the oil. Chemical feed area spillage, tank overflows, and liquid from area washdowns would be routed to the waste neutralization system for pH adjustment. Stormwater would be directed to existing, onsite stormwater retention ponds. No effluents would be discharged off the site.

Because operation of the proposed facilities would not withdraw surface water or discharge liquid effluent, surface waters would experience no direct impacts. Facility operations would, however, indirectly affect surface water by increasing the use of treated effluents ***(reclaimed water)*** from the Orange County Eastern Water Reclamation Facility. The Stanton Energy Center's use of treated effluent for addition to the on-site makeup pond, which in turn is used for cooling water and service water, would increase by an average of 2.1 million gal per day (from 10.2 million to about 12.3 million gal per day), thus reducing by a similar amount the water volume discharged to the wetlands downstream from the Eastern Water Reclamation Facility and correspondingly from those wetlands to the Econlockhatchee River. Releases to wetlands would be reduced on average from 4.2 million gal per day to 2.1 million gal per day, but would remain well above the minimum needed to sustain the wetlands hydrologically and as

wildlife habitat. In the river, the flow reduction (3.2 $ft^3/s$ on average) would be only about 4% of the average flow at the nearest downstream gauging station, but the flow reduction could increase the frequency and duration of no-flow episodes. Because the Econlockhatchee River is a negligible source of water supplies, reduced flow would not affect water users. Water quality in the river could be affected if reduced streamflow also reduced the river's capacity to dilute contamination discharged from other parts of the watershed. Over time, releases of water from the Eastern Water Reclamation Facility are expected to increase due to increased population growth in the facility service area, so any effects from reduced effluent discharge would be temporary.

Use of groundwater for proposed facility operations requiring high-quality water would increase the Stanton Energy Center's groundwater withdrawals from the Upper Floridan aquifer by about 0.1 million gal per day. Total withdrawals from the onsite wells (including withdrawals for existing uses) would be about 0.6 million gal per day on average (222 million gal per year), which would be less than the limits (2.0 million gal per day and 321.2 million gal per year) specified in the current Stanton Energy Center conditions of certification. Previous modeling and other evaluation of these withdrawal limits found that groundwater withdrawal at the permitted rate would cause water level declines of less than 0.6 ft in the Upper Floridan aquifer, less than 0.1 ft in the Lower Floridan aquifer, and less than 0.08 ft in the unconfined surficial aquifer. These small changes would not produce discernible impacts to surface waters, wetlands, or the position of interfaces between fresh water and salt water in the Floridan aquifer.

Facility operation could add localized contamination to shallow groundwater from the possible placement of additional waste in the onsite coal-combustion ash landfill. Because any contamination would be limited to the shallow aquifer and any contaminated groundwater would probably discharge to onsite stormwater collection systems, impacts to water users are unlikely.

**Floodplains and Wetlands.** The 35 acres on which the proposed facilities would be constructed and the existing onsite landfill that would be used for ash disposal lie completely within the 1,100-acre developed portion of the Stanton Energy Center. This 1,100-acre tract was previously filled to an elevation higher than the Federal Emergency Management Agency's determined 100- and 500-year floodplains. The corridor for the proposed 3,200-ft transmission line interconnection to the existing electrical substation northeast of the principal existing facilities is not within the Federal Emergency Management Agency's determined 100- and 500-year floodplains. No construction would occur within a floodplain.

Construction of the proposed electrical transmission line between the proposed combined-cycle unit and the existing onsite substation would have wetland impacts. The transmission line would be suspended from steel poles anchored by cement pads. The pads would be constructed on fill placed in wetland habitats within the buffer area in the northeast portion of the Stanton Energy Center site. The width of the proposed corridor would be 80 ft. Access to the transmission line would be from existing roads where practical, although a new access road would be required in most of the corridor. The access road and pads, which would be permanent features necessary for construction and maintenance of the transmission line, would be constructed on compacted native soil backfill with grass surface and side slope. As necessary, a geotextile fabric liner would be installed to stabilize these structures, and best management

practices for sediment and erosion control would be employed. Culverts would be installed in the road to prevent the disruption of any natural flow through the area.

The transmission line corridor would traverse one upland habitat type, pine flatwoods, and two wetland habitat types, hydric pine savanna and cypress swamp. The total area of the corridor would be approximately 5.8 acres. The majority of the corridor (3.83 acres) is currently hydric pine savannah, while cypress swamp occupies 0.12 acres of the corridor, and pine flatwoods occurs in 0.63 acres. Also in the corridor are an old access road (0.53 acres), other electric power facilities (0.67 acres), and a small stretch of roadside ditch (0.12 acres). Some of the wetland areas within the corridor (0.06 acres of cypress swamp and 0.67 acres of hydric pine savanna) would be filled during construction of the pads and access road.

During construction, wetland and other vegetation communities within the transmission corridor would be altered. Because tall-growing vegetation would be cut and kept at a height low enough to prevent interference with the conductors, forest cover habitats would be reduced and shrub or other low-growing vegetation would eventually dominate the corridor. Net wetland impacts would consist of 3.95 acres cleared, including 1.04 acres filled. Construction should not appreciably affect hydroperiod (the period of time during which a wetland is covered by water) because fill for the road and pads would be minimized, and culverts would be used as necessary to allow normal flow.

Construction would require submittal of a joint (1) Corps of Engineers Section 404 dredge-and-fill wetlands application and (2) Florida Department of Environmental Protection environmental resource permit. This permitting/approval process would also require a mitigation plan for any unavoidable wetland impacts. The net effect of clearing and maintaining 3.95 acres of wetland habitat for the transmission line would be (1) loss of 1.04 acres of wetland due to fill and (2) modification of vegetation in wetlands in the remainder of the corridor due to right-of-way maintenance. This would shift, to a small extent, the balance of wildlife habitat in the area away from wetland and forest toward shrub and brushland. The resultant vegetation communities in the corridor would be similar to those on other transmission line rights-of-way in the vicinity.

**Ecological Resources.** Except for the electrical transmission line interconnection, all proposed facilities would be constructed within the 1,100-acre tract of land that was previously cleared, leveled, and licensed for power plant use. This disturbed land is not important habitat for wildlife, and no areas of ecological sensitivity would be affected directly by construction of the proposed facilities. The 3,200-ft onsite transmission line interconnection would have direct impacts to pine flatwoods upland habitat and wetland habitat. Wildlife species typical to the area are present in the vicinity of the corridor and would be directly affected by construction activities and resultant loss of habitat. Smaller less mobile animals would be at greatest risk, whereas larger more mobile animals would likely move from the disturbed areas and increase utilization of surrounding habitats.

During the 28-month construction period, wildlife species sensitive to noise would likely move away from construction disturbance and reutilize habitats upon construction completion. Consequently, no long-term impacts on wildlife species would be expected from construction-generated noise. The main proposed facilities would be located between existing generating units in an area with noise levels typical of an operational power plant, where species present are adapted to the noise and human presence.

Because noise during proposed facility operations would be similar in character to existing noise and represent only a small addition to existing noise levels at the site, the incremental noise would not impact wildlife.

Operation of the proposed flare, which would be nearly invisible during the day, would create an altered visual environment at night when the 40-ft-high flame would be visible to active wildlife. A multipoint flare system with burners only 10 ft above ground level was selected for the proposed gasification facilities rather than a single tall stack because it would be visible to a smaller, more localized area, and should minimize any incidents with birds attracted to the light of the flare. Any impacts would occur infrequently because the flare would be operated only during gasifier startups and shutdowns and during plant upsets, which are anticipated to be uncommon.

No federally-listed threatened or endangered plant species are known to occur within the immediate vicinity of the main proposed facilities or the transmission line interconnection. Five plant species protected by the Florida Department of Agriculture and Consumer Services are known to occur along or in the vicinity of the proposed transmission line corridor. Clearing and maintenance activities on the right-of-way would be expected to destroy some individuals, but populations would persist in undisturbed areas on and outside of the transmission corridor.

Other than transient or incidental use by some wildlife species (e.g., sandhill crane, bald eagle), no federally-listed threatened or endangered animal species are found within the previously cleared 1,100 acres. Use of existing facility areas by these species is indicative of habituation to the current industrial conditions. Federal- or state-listed threatened or endangered or special status animal species (e.g., gopher tortoise) are present within or near the 2,180-acre buffer area. Red-cockaded woodpeckers forage in the northern buffer area, but the closest nesting clans are at least 1,500 ft south and east of the main proposed construction area and about 5,000 ft from the proposed transmission line corridor. The closest known active bald eagle nest is more than 1.5 miles from the main proposed construction area and 0.5 miles from the transmission corridor. No bald eagle nests, wading bird colonies, or red-cockaded woodpecker colonies are known to occur in the vicinity of the transmission corridor. These birds could possibly forage in or around the corridor’s habitats, however. Snowy egrets and Florida sandhill cranes have been observed foraging in the transmission corridor. These species would probably avoid the corridor during construction of the transmission line facilities and resume some use of habitat in the right-of-way area upon completion of construction.

Site-specific listed species surveys have been conducted as part of the Site Certification Application for the proposed facilities. Results indicate that no direct impacts are expected to listed species from proposed construction and operations, except for plants listed by the Florida Department of Agriculture and Consumer Services.

The Stanton Energy Center site contains no appreciable natural aquatic resources. During construction and operations, stormwater from the main proposed facilities would be routed via sheet flow (i.e., spread out at uniform depth across a flat surface, such as a parking lot) and directed to culverts and existing stormwater retention ponds. During construction of the transmission line interconnection, best management practices would be implemented for sediment and erosion control and stormwater handling,

including use of silt fences and geotextile materials. Stormwater runoff from permanent structures associated with the interconnection would be negligible. The coal storage area would include a synthetic liner and would utilize existing leachate and runoff collection systems. Due to implementation of best management practices during construction of the facilities and the current plantwide system of stormwater collection and handling, impacts to aquatic ecological resources would be highly unlikely.

Existing onsite facilities would be used for treatment of wastewater from the proposed facilities. Because no process waste streams or water treatment discharges would be released off the site, no aquatic ecological resources would be directly impacted.

**Social and Economic Resources.** Construction and operation of the proposed facilities would not result in major impacts to population, housing, local government revenues, or most public services in Orange County. Because the proposed facilities would be located within the county's relatively large and diverse labor market, a minimal number of construction and operations workers would be expected to relocate to the project area. Overall, construction of the proposed facilities would have short-term positive effects on employment and income in the region. Project operations would also have positive effects on employment and income and these effects would last longer than the effects of construction.

Because population growth associated with facility construction and operation would be minimal, little effect on the Orange County Public School District would normally be expected. However, Orange County's public schools are already above capacity, and even a small increase in the number of students would contribute to the existing problem. The Orange County Public School District plans to renovate or replace 136 of its schools, and expects that these measures will provide excess capacity by the 2010–11 school year. These school upgrades might not occur in time to help meet the additional demand created by the proposed facilities, however, as the peak construction period would occur from fall 2008 through spring 2009. The impact of this additional demand on the local school system would be mitigated somewhat by the taxes paid by Southern Company to the Orange County Public School District.

Orange County and most of the ***eight*** census tracts around the Stanton Energy Center have higher minority percentages than the state of Florida and the United States. Census Tract 167.22, in which the proposed facilities would be located, has a slightly higher minority percentage (45.7%) than Orange County (42.5%), and a much higher minority percentage than both the state of Florida (34.6%) and the United States (30.9%). Therefore, the relatively large minority populations in and around Census Tract 167.22 represent "environmental justice" populations to which any adverse impacts of constructing and operating the proposed facilities could be distributed disproportionately. However, serious air quality, water quality, and health impacts to these populations would not be expected.

Conversely, Orange County and ***seven*** of the ***eight*** census tracts evaluated have lower percentages of people below the poverty level than the state of Florida and the United States as a whole. Census Tract 167.22 has a much lower percentage of people below the poverty level (3.5%) than Orange County (12.1%), the state of Florida (12.5%), and the United States (12.4%). Only Census Tract 166.02 has a higher percentage of people below the poverty level (16.3%) than the county, state, and nation, but the difference is not large enough to classify Census Tract 166.02 as an "environmental justice" population

on the basis of poverty. Therefore, none of the populations in and around Census Tract 167.22 represent "environmental justice" populations on the basis of poverty.

Construction and operation of the proposed facilities would not affect cultural resources because most of the facilities would be sited within a previously disturbed area and the four documented resources within the Stanton Energy Center boundaries are not located within any area to be disturbed. DOE has consulted with the Florida State Historic Preservation Office (SHPO) regarding a determination of the potential for impacts on any historic resources that may be listed in or eligible for the *National Register of Historic Places* or that may have local importance. In response, the SHPO has stated that the proposed facilities would have no effect on historic properties.

**Waste Management.** Waste from construction of the proposed facilities would include excess materials, metal scraps, and pallets, crates, and other packing materials. Excess supplies of new materials would be returned to vendors or retained for future use. Surplus paint and other consumables, partial spools of electrical cable, and similar leftover materials would also be retained for possible future use in maintenance, repairs, and modifications. Other scrap materials could be recycled through commercial vendors. Because the main proposed facilities would be sited on land that has been cleared and leveled with fill material, land preparation for those facilities would produce minimal waste. Any excavated material could be used as fill on the site. Cleared vegetation from preparation of the transmission line right-of-way and debris from installation of the line would be chipped and burned on the site or transported for disposal to the Orange County Sanitary Landfill, which would have ample capacity to receive project construction wastes.

The proposed facilities would annually produce about 68,000 tons of gasification ash, which would not be considered a hazardous waste. Impacts associated with this material would depend on its ultimate disposition. The ash could be transported for disposal in the onsite landfill; however, gasification ash has been evaluated for several possible beneficial uses that could avoid such disposal. These uses include combustion in the Stanton Energy Center's existing coal-fired generating units, sale for use as fuel in a cement production kiln, and sale for use as a precursor for activated carbon (beneficiation by chemical activation and acid washing could make the material suitable for use in flue gas treatment and similar applications). Transport off the site for reuse of the gasification ash would require approximately 160 truck loads per week; fewer train shipments (about seven 100-car trains annually) would be needed if rail transport were used. All of these reuse options are technically feasible, but operational factors could limit their implementation, and specific markets have not yet been identified for use as either an activated carbon precursor or a cement-kiln fuel.

If no beneficial use were found, gasification ash would be transported for disposal in the onsite landfill, where it would increase disposal volume by about 14%, but would not change other potential impacts associated with the landfill. The 347-acre onsite area dedicated for landfill use would provide more than enough space to dispose of the material generated by the proposed facilities, as well as other coal combustion wastes generated by the Stanton Energy Center.

About 7,300 tons of anhydrous ammonia would be produced annually by the proposed facilities. The existing Stanton Energy Center generating units would use the ammonia to satisfy their requirements, and

any excess would be sold commercially. Because this chemical has many uses in agriculture and industry, markets should easily absorb any production in excess of onsite needs.

About 2,800 tons of elemental sulfur would be produced annually. If this material proves to be as pure as it is projected to be, it would be sold commercially. If the sulfur were not sufficiently pure for commercial sale, it would be placed in the onsite landfill. Elemental sulfur would not be a hazardous waste, and the quantity produced would be small in comparison with the total capacity of the landfill. However, disposal of this material could necessitate special handling procedures to assure appropriate containment in order to avoid adverse impacts on waste stability or leachate chemistry.

Used gasification-process catalysts would be regenerated and reused to the extent possible, thus avoiding most potential adverse impacts from their management. Used oils collected from the oil/water separator, spent lubricating oils, and used oil filters would be transported off the site by an outside contractor for recycling or disposal.

**Human Health and Safety.** Proposed facility operations would slightly increase air pollutant concentrations, with $SO_2$, $NO_x$, and particulate matter being the pollutants of particular concern. Based on the conservative (upper-bound) results of a computer-based, ***EPA-approved*** air dispersion model (AERMOD – EPA 2004a, EPA 2004b), the predicted increase in 24-hour average PM-10 concentration due to the proposed facilities would result in total and cardiopulmonary mortality rate increases estimated to be less than 0.1%. Hospital admissions and emergency room visits for acute morbidity effects such as respiratory infections, chronic obstructive pulmonary disease, asthma, and childhood croup are expected to be similarly small. Potential impacts on quality-of-life issues affecting daily life for asthmatics, such as restricted activity days and days with symptoms, indicate slightly higher (although still small) impacts. Based on the predicted annual PM-10 increase resulting from the proposed facilities, the prevalence of chronic bronchitis is estimated to increase by 0.01% among adults and 0.03% for children. Similar increases in the prevalence of adults with respiratory illness (0.02%) and children with chronic cough (0.04%) are predicted. Based on the predicted increase in annual average PM-10 concentration and assuming that the concentration of fine particulate matter (PM-2.5) would be 60% of the PM-10 concentration, the expected loss of life from the predicted annual PM-2.5 increase would range from 7 days for children (with an average of 68 years of life remaining) to less than 1 day for the elderly (with an average of 5 years of life remaining).

Acute mortality and hospital admissions for respiratory effects are expected to be minimally impacted by the short-term $SO_2$ increases from the proposed facilities predicted by the air dispersion model. The largest modeled impact would be slightly less than 1 day of lost life over the lifetime of a child (with an average of 68 years of life remaining). Regarding asthma attacks due to $SO_2$, the threshold of response in asthmatics is much greater than the predicted increases in ambient $SO_2$ concentrations. The small predicted increases would not likely produce an observable increase in asthma attacks due to $SO_2$.

Because epidemiological evidence does not point to a consistent causal relationship between $NO_2$ and human health effects as a primary pollutant and because $NO_x$ emissions will be offset by reductions from Units 1 and/or Unit 2, no public health impacts resulting from $NO_x$ emissions from the proposed facilities are expected.

EPA (1998) reported that the vast majority of coal-fired power plants were estimated to pose lifetime human cancer risks (i.e., increased probability of an exposed person getting cancer during their lifetime) of less than $1 \times 10^{-6}$ resulting from inhalation exposure to emissions of hazardous air pollutants. As an upper bound of risks, the increased lifetime cancer maximum individual risk (MIR) within a 31-mile radius of a coal-fired power plant is estimated to be no greater than $3 \times 10^{-6}$ due to inhalation exposure to all carcinogenic hazardous air pollutants. Arsenic and chromium are the hazardous air pollutants contributing the most to the risk ($2 \times 10^{-6}$ and $1 \times 10^{-6}$, respectively). All other hazardous air pollutants, including radionuclides, were estimated to present an inhalation risk of less than $1 \times 10^{-6}$. The cancer incidence in the United States due to inhalation exposure to hazardous air pollutants (including radionuclides) from all 426 coal-fired plants is estimated to be no greater than approximately 0.2 cancer cases per year, or 1 case every 5 years. The proposed facilities are expected to pose less risk than most of these existing plants, many of which were built decades ago.

The EPA (1998) also assessed noncancer risks (i.e., health effects other than cancer) due to short- and long-term inhalation exposure. Manganese, hydrogen chloride, hydrogen fluoride, and acrolein were found to be the four hazardous air pollutants of highest potential concern for noncancer effects. The measure of effect used to evaluate risk was the reference concentration — an estimate, with uncertainty spanning about an order of magnitude, of the daily inhalation exposure of human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. Based on modeling hazardous air pollutants with the human exposure model (HEM), the estimated long-term ambient hazardous air pollutant concentrations in the EPA study were generally 100 to 10,000 times below the reference concentration or similar benchmark. The highest estimated long-term ambient hazardous air pollutant concentration was 10 times below the reference concentration.

In addition to these EPA studies of coal-fired plants in general, a health risk analysis for specific hazardous air pollutants using ambient concentrations from AERMOD results for the proposed facilities was conducted as part of the Site Certification Application (OUC, 2006). The total cancer risk for all hazardous air pollutants included in the analysis was 4.1 x 10-7, with chromium being the largest contributor to the total risk, which is almost a factor of ten lower than the upper bound of risk predicted in the EPA study. The total noncancer risk was calculated as 4.8 x 10-3, which is in the range of that predicted by the EPA study.

Two “highly hazardous chemicals” are currently used at the Stanton Energy Center in quantities that have potential offsite impact: chlorine gas used for water treatment, and ammonia used for $NO_x$ removal. The health risk impact for each of these chemicals would increase due to the larger quantities being handled, but the increased risk would remain exceedingly small. For example, if the probability of a vessel failure resulting in a fire or explosion is taken as 1 occurrence per 100,000 years, the addition of a second vessel would nearly double this probability to 1.99 occurrences per 100,000 years. The risk management plan (RMP) for onsite storage is based on one 18,000-gal anhydrous ammonia tank located near the proposed gasifier. In the unlikely event of an accident involving the tank, an ammonia release from the site could travel slightly over 2 miles and potentially involve 2,300 people (worst-case release

resulting in total loss of contents over 10 minutes), as based on estimates from air dispersion modeling in the RMP.

During normal operations, anhydrous ammonia would be recovered by the process and shipped to offsite customers. Currently, one truck load of ammonia is trucked into the site per week. Ammonia generated by the proposed facilities would replace this delivery, but 5 trucks per week would transport ammonia off the site, thus increasing the hazard of anhydrous ammonia transport. Assuming shipments are made by tank truck to an anhydrous ammonia supplier in Jacksonville, Florida, the estimated likelihood of a large release is approximately equal to 1 accident per 15 years. In the unlikely event of a large ammonia release by a tank truck, an air dispersion model was used to predict toxic impacts. Altogether, about 13,000 people would require sheltering in place or evacuation to preclude exposures to ammonia concentrations of 25 ppm (which is the threshold to produce mild, transient health effects) or higher resulting from such a truck accident. ***The potential consequences of a hazardous materials release, whether resulting from accidental causes or an intentional destructive act, would be the same.***

**Noise.** Anticipated construction and operational noise levels from the proposed facilities would not present a potential for noise-induced hearing loss to the public. From the northern edge of the proposed principal site, the nearest property boundary is approximately 3,000 ft to the north and the nearest residence is about 6,500 ft to the northeast. During construction of the proposed facilities, noise would be generated by construction equipment including bulldozers, trucks, backhoes, graders, scrapers, compactors, cranes, pumps, pneumatic tools, air compressors, and front-end loaders. Noise levels during construction, which would be typical of industrial plant construction, would increase from current operational levels at the Stanton Energy Center. Steam blowdown would be required toward the end of the construction phase. For the HRSG and steam turbine, the activity would consist of five blows over a period of six days lasting approximately 18 to 24 hours each. For the gasifier steam lines, four additional blows of about 18 to 24 hours each over a 5-day period would be required. For all of these steam blows, the peak sound pressure level at a distance of 50 ft from the source would be approximately 102 dBA. The noise would attenuate to a level of about 66 dBA at the nearest property boundary and 60 dBA at the nearest residence. A level of 60 dBA would be typical of normal conversation. The estimated noise levels conservatively (i.e., as an upper bound) do not account for any additional sound attenuation that might result from structures or vegetation. The predicted noise levels apply to receptors outdoors; persons indoors would experience a reduced level of noise.

During operation of the proposed facilities, the principal sound sources would include equipment and structures such as the gas combustion turbine/generator, steam turbine/generator, heat recovery systems, turbine air inlets, exhaust stack, 6-cell mechanical-draft cooling tower, coal crusher, coal mill, pumps (e.g., feed, circulating), fans, and compressors, as well as noise from piping flow and flared gas. Most of these sound sources would be enclosed and acoustically insulated. Noise sources within buildings would be fitted with sound-attenuating enclosures or other noise dampening measures that would meet all state and federal regulations. During maintenance or repair events, workers would be required to wear hearing protection equipment.

During operation of the proposed facilities, a noise level of 53 dBA was predicted by a noise model at a location about 3,000 ft to the northeast of the proposed facilities. Correspondingly, the predicted noise level at the nearest residence (about 6,500 ft to the northeast of the proposed facilities) would be 47 dBA. No adverse community reaction would be expected as a result of noise levels below 50 dBA. For comparison, the Orange County noise limit is 60 dBA from 7 a.m. until 10 p.m. and 55 dBA from 10 p.m. until 7 a.m. for residential areas. A design engineer would determine the need for noise control on any equipment such that the cumulative Stanton Energy Center noise level would achieve compliance with the Orange County noise ordinance.

**Transportation.** Primary road access to the Stanton Energy Center is from the north via Alafaya Trail, a two-lane minor arterial road with an existing "F" level-of-service, which is the lowest possible rating. Although the Avalon Park Boulevard extension project (also known as Innovation Way) and the widening of Alafaya Trail to four lanes are expected to improve the local road network considerably in the next few years, work on these projects has not yet begun. Given the possibility of even minor delays, which are common in major road construction projects, these projects might not be completed in time to alleviate traffic flow during the peak construction period for the proposed facilities (fall 2008 through spring 2009). Much of the work on the road projects could coincide with construction of the proposed facilities, creating a major cumulative impact to traffic flow on the local road network. This impact would be reduced if the Avalon Park Boulevard extension is completed in mid-2008 before the peak construction period.

To address the impacts of facility construction on the local road network, Southern Company and OUC have committed to encourage workers to carpool, use other transit programs, and drive to and from work during off-peak times to the extent possible. In addition, as a condition of the state of Florida's certification of the proposed facilities, Southern Company and OUC would likely be required to develop a program for mitigating traffic impacts. Such a program might include contracting with the local public mass-transit system to provide park-and-ride services for the workers, staggering construction work schedules and shifts to avoid peak traffic hours, and working with the Florida Department of Transportation to install temporary traffic control devices and alter signal times to assist in maintaining proper traffic flow.

During operation of the proposed facilities, the additional traffic generated by facility workers and delivery trucks would have a noticeable impact to traffic flow on the local road network. This impact would be reduced if the Avalon Park Boulevard extension is completed on schedule in mid-2008, and reduced even further if the widening of Alafaya Trail to four lanes is completed on schedule in 2009. However, if work on these road projects coincides with demonstration of the proposed facilities, a noticeable cumulative impact resulting from traffic congestion on the local road network would continue. Southern Company and OUC are considering transporting the sulfur, ammonia, and/or gasification ash produced by the proposed facilities off the site by rail as an alternative to using the local roads.

Construction of the proposed facilities would not affect the existing CSX Transportation rail spur that provides access to the Stanton Energy Center. Some deliveries of large construction equipment could be made via rail, which would generate a minimal amount of additional rail traffic. Facility operations would require 2 to 3 additional train loads of coal per week delivered via the existing CSX Transportation rail

spur on the Stanton Energy Center site. This small increase in rail traffic would not likely impact the local rail network. If sulfur, ammonia, and/or gasification ash were transported off the site by rail, the impact on the local rail network from the associated increase in rail activity would likely be minimal.

***Noise related to transportation would not be expected to cause significant impacts. At the nearest residence, noise levels from truck traffic on Alafaya Trail would be about the same as the noise level of a quiet subdivision during daylight hours. This level is also given by the EPA as a guideline upper limit with an adequate margin of safety for protection from activity interference and annoyance during the daytime in outdoor locations "in which quiet is a basis for use" (EPA 1974). Noise levels from current rail traffic have not caused any public complaints. Increased rail traffic due to the proposed project (two to three additional coal deliveries per week compared to five deliveries currently) would result in more frequent noise from rail traffic, but the noise levels would be the same.***

## No-Action Alternative

Under the no-action alternative, DOE would not provide cost-shared funding for the design, construction, and demonstration of the proposed Orlando Gasification Project at OUC's Stanton Energy Center near Orlando, Florida. Without DOE participation, Southern Company and/or OUC could reasonably pursue at least one option. The combined-cycle facilities could be built at the Stanton Energy Center without the gasifier, synthesis gas cleanup systems, and supporting infrastructure. The combined-cycle facilities would operate using natural gas as fuel without the availability of synthesis gas. Approximately the same amount of electricity would be produced. However, the cost of electricity would be higher under the no-action alternative because the cost of natural gas would be much higher than the corresponding cost of coal. The 3,200-ft transmission line would still be constructed and installed to serve as an electrical interconnection to an existing onsite substation.

Under this no-action scenario, for most resources, environmental impacts would be slightly less or nearly identical to those predicted for the proposed Orlando Gasification Project. The minimal impacts to geology, soils, floodplains, and ecology predicted for the proposed facilities would be the same for this scenario. Construction-related impacts would be similar. Somewhat less land would be needed, because the gasifier, synthesis gas cleanup systems, and supporting infrastructure would not be built. Therefore, slightly less site preparation would be required. Also, the natural gas-fired unit would require no new coal storage pile.

The construction work force, both peak and average, would be reduced, and the period of construction would be cut from 28 months to 24 months. The associated construction-related traffic would also be reduced in terms of both duration and total volume. Positive economic benefits would be less, relative to the proposed Orlando Gasification Project. The smaller, shorter-duration construction work force would yield fewer wages, associated taxes, and spending for goods and services.

During operation of the natural gas-fired unit, emissions of air pollutants (e.g., $SO_2$ and $NO_x$) would be less than those predicted for the proposed Orlando Gasification Project. The flare required for the proposed facilities would not be required. Cooling water requirements would be about 20% less than for the proposed facilities, or about 2.1 million gal per day, on average. Current releases to wetlands

downstream from the Orange County Eastern Water Reclamation Facility (and from the wetlands to the Econlockhatchee River) would be reduced by 3.2 $ft^3$/sec, on average, compared to a reduction of 4 $ft^3$/sec, on average, for the proposed facilities. However, the withdrawal and use of Floridan aquifer groundwater would be the same as for the proposed facilities. Noise would essentially be similar, except that noise from trains would be less frequent.

The two to three additional trains per week associated with the proposed Orlando Gasification Project would not be needed to deliver coal to the Stanton Energy Center. Because no ash would be generated, no disposal sites would be needed to accommodate ash. No elemental sulfur or anhydrous ammonia would be produced. Because no new coal pile would be needed or ash disposal site required, localized contamination would be less likely to shallow groundwater from infiltration of runoff from the coal storage pile or from placement of ash in the onsite coal-combustion ash landfill. Also, somewhat less stormwater runoff would require treatment.

The natural gas-fired unit would require fewer employees to operate (approximately 21 rather than 72), which would reduce traffic, but would also reduce economic benefits. Other traffic associated with delivering supplies and removing byproducts would be less. However, unlike for the proposed Orlando Gasification Project, trucks would continue to deliver anhydrous ammonia to the site once per week for use by the selective catalytic reduction systems on existing generating units. Ammonia accidents could result from transportation of ammonia to the site and ammonia storage on the site.

The Stanton Energy Center's existing units would continue to operate without change. Levels of resources used and emissions, effluents, and wastes discharged would remain the same at the existing units.

Table S.1 presents a comparison of key potential impacts between the proposed facilities and the scenario under the no-action alternative.

**Table S.1. Comparison of key potential impacts between the proposed facilities and the no-action alternative**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Land use and aesthetics | The proposed facilities would be confined to the existing Stanton Energy Center site and thus would not directly affect offsite land use. The 1,100-acre developed portion of the power plant site is designated specifically for power generation through the site certification process under Florida's Power Plant Siting Act. Through this process, power production has previously been approved by state and local agencies as an activity compatible with offsite land use, and the power plant has been determined to satisfy zoning requirements. The tallest structures to be constructed as part of the proposed facilities would be the 205-ft heat recovery steam generator (HRSG) stack, the 174-ft structure to house the gasifier, and the 114-ft HRSG. These structures would be shorter than the existing two 550-ft stacks serving Units 1 and 2, the two 431-ft natural-draft cooling towers serving Units 1 and 2, and the 225-ft Unit 1 and 2 boiler buildings. Aesthetic impacts of the proposed facilities would be further reduced because the facilities would be located between existing facilities, appearing as a continuation of the existing industrial character of the site rather than as a change in character. | Offsite land use would be the same as for the proposed facilities. Because the 174-ft structure to house the gasifier would not be required, aesthetic impacts would be minimally less. |
| Air quality | Modeling results based on emissions from the proposed facilities predicted that maximum concentrations would be less than their corresponding significant impact levels and, combined with ambient background concentrations that monitor existing facilities, would be less than corresponding ambient air quality standards. Concentrations would be negligible at the nearest Prevention of Significant Deterioration (PSD) Class I area about 90 miles to the west-northwest. Annual $NO_x$ emissions from the Stanton Energy Center overall would not be expected to increase because, as part of the air permitting process, OUC has agreed to reduce $NO_x$ emissions from other units at the Stanton Energy Center so that there would be a net decrease in $NO_x$ emissions. Annual emissions of volatile organic compounds (VOCs), a precursor of the criteria pollutant ozone, would be 129 tons. The small percentage increase in VOC emissions (~0.3% of Orange County 2001 emission inventory) would not be likely to degrade air quality sufficiently to cause violations in the $O_3$ standard, but the magnitude of the degradation cannot be quantified. Measured ozone concentrations have closely approached the National Ambient Air Quality Standard in the past. The maximum ambient 24-hour concentration of mercury from the proposed HRSG stack is predicted to be 0.8% of its corresponding guideline value, and the maximum ambient 24-hour concentration of beryllium from the stack is predicted to be 0.4% of its guideline value. These results indicate that mercury and beryllium emissions from the proposed facilities alone or in combination with existing sources would pose no direct threat to human health in the area. Any potential odors should be limited to the immediate site area and should not affect offsite areas. Increases in $CO_2$ emissions from the proposed facilities would add 1.8 million tons per year to an estimated global emission of 26,000 million tons per year. | Emissions of air pollutants (e.g., $SO_2$ and $NO_x$) would be less than those predicted for the proposed facilities. Because the flare would not be required, no occasional emissions from a flare would occur. |

**Table S.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Geology | Construction and operation of the proposed facilities would not change geologic conditions. A very low potential would exist for adverse effects to the facilities from geologic hazards. Because the new facilities would be built on a site in which about 5 ft of sandy fill material was deposited during construction of the Stanton Energy Center in the 1980s, proposed construction would not cause additional alteration of soil resources. Transmission line construction would disturb small areas of soils along the transmission line corridor. | Impacts would be the same as for the proposed facilities. |
| Water resources | Because facility construction would occur in developed site areas where surface water runoff is directed to onsite stormwater retention ponds and is used in the facilities, no impacts to natural surface waters would be experienced, except in the unlikely event of a major storm that caused overflow of the site stormwater collection system. Transmission line construction outside of the main plant area could result in soil erosion and sediment deposition to streams, but best management practices would minimize erosion and sedimentation. Impacts from lowering the water table during dewatering would be inconsequential. Because operation of the proposed facilities would not withdraw surface water or discharge liquid effluent, surface waters would experience no direct impacts. The Stanton Energy Center's use of ***reclaimed water*** would increase by an average of 2.1 million gal per day (from 10.2 million to about 12.3 million gal per day), thus reducing by a similar amount the water volume discharged to the wetlands downstream from the Eastern Water Reclamation Facility and from those wetlands to the Econlockhatchee River. Because this surface water is not used, reduced flow would not affect water users. Water quality in the river could be affected if reduced streamflow also reduced the river's capacity to dilute contamination discharged from other parts of the watershed. Increased groundwater withdrawals would not produce discernible impacts. Facility operation could add localized contamination to shallow groundwater from the possible placement of additional waste in the onsite ash landfill. Because any contamination would be limited to the shallow aquifer and any contaminated groundwater would be designed to discharge to onsite stormwater collection systems, impacts to water users are unlikely. | Cooling water requirements would be about 20% less than for the proposed facilities. Current releases to wetlands downstream from the Orange County Eastern Water Reclamation Facility and from the wetlands to the Econlockhatchee River would be reduced by 20% less than the reduction for the proposed facilities. The withdrawal and use of groundwater would be the same as for the proposed facilities. |

**Table S.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Floodplains and wetlands | No floodplains would be affected because no construction would occur within a floodplain. During construction, wetland and other vegetation communities within the transmission corridor would be altered. Because tall-growing vegetation would be cut and kept at a height low enough to prevent interference with the conductors, forest cover habitats would be reduced and shrub or other low-growing vegetation would eventually dominate the corridor. Construction would require submittal of a joint (1) Corps of Engineers Section 404 dredge-and-fill wetlands application and (2) Florida Department of Environmental Protection environmental resource permit. This permitting/approval process would also require a mitigation plan for any unavoidable wetland impacts. The net effect of clearing and maintaining 3.95 acres of wetland habitat for the transmission line would be (1) loss of 1.04 acres of wetland due to fill and (2) modification of vegetation in wetlands in the remainder of the corridor due to right-of-way maintenance. This would shift, to a small extent, the balance of wildlife habitat in the area away from wetland and forest toward shrub and brushland. | No floodplains would be affected because no construction would occur within a floodplain. Because the new transmission line for the proposed facilities would also be required under this scenario, the same alteration of wetland and other vegetation communities within the transmission corridor would be experienced. |
| Ecological resources | The previously disturbed 1,100-acre tract of land where all proposed facilities except the transmission line interconnection would be constructed is not important habitat for wildlife, and no areas of ecological sensitivity would be affected directly. Wildlife species would be affected by construction activities and resultant loss of habitat in the transmission corridor. Smaller less mobile animals would be at greatest risk, whereas larger more mobile animals would likely move from the disturbed areas and increase utilization of surrounding habitats. No federally-listed threatened or endangered plant species are known to occur within the immediate vicinity of the main proposed facilities or the transmission corridor. Five plant species protected by the Florida Department of Agriculture and Consumer Services are known to occur along or in the vicinity of the transmission corridor. Clearing and maintenance activities on the right-of-way would be expected to destroy some individuals, but populations would persist in undisturbed areas. Other than transient or incidental use by some wildlife species, no federally-listed threatened or endangered animal species are found within the previously cleared 1,100 acres. Except for the five listed plants, no direct impacts are expected to listed species from proposed construction and operations. The site contains no appreciable natural aquatic resources. | Impacts would be the same as for the proposed facilities. |

**Table S.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Social and economic resources | Construction and operation of the proposed facilities would not result in major impacts to population, housing, local government revenues, or most public services in Orange County. However, because the county's public schools are already above capacity, even the small increase in the number of students as a consequence of the proposed facilities would contribute to the existing overcrowding problem. Because the proposed facilities would be located within the county's relatively large and diverse labor market, a minimal number of construction and operations workers would be expected to relocate to the project area. Overall, construction and operation of the proposed facilities would have positive effects on employment and income in the region. The relatively large minority populations in and around Census Tract 167.22 represent "environmental justice" populations to which any adverse impacts could be distributed disproportionately. ***However, impacts to land use and aesthetics would not be significant for the population as a whole and therefore there would be no disproportionate impacts. Likewise, with regard to health effects and noise, there would not be significant adverse impacts to the population as a whole and, therefore, no disproportionate adverse effects. With regard to air quality, there would be no significant increases in either criteria or hazardous air pollutants; any odors would be limited to the site area and should not affect the surrounding community. Regarding water resources, there would be no disproportionate effect on the quality or availability of water resources for the environmental justice population. Finally, construction and operation of the proposed facilities would not create adverse impacts to most social and economic resources in the census tracts evaluated; however, there is the potential for a major cumulative impact to traffic flow on the local road network. Without appropriate mitigation, this impact on local traffic flow and safety could represent a disproportionately high and adverse impact to the minority population in Census Tract 167.22. These impacts would be reduced if the Avalon Park Boulevard extension is completed in mid-2008, before the peak construction period. Also, Southern Company and OUC have committed to a number of measures that would mitigate these potential traffic impacts.*** None of the populations in and around Census Tract 167.22 represent "environmental justice" populations on the basis of poverty. The proposed facilities would not affect cultural resources because most of the facilities would be sited within a previously disturbed area and the four documented resources within the Stanton Energy Center boundaries are not located within any area to be disturbed. | Compared to the proposed facilities, the peak and average construction work force would be reduced, and the construction period would be cut from 28 months to 24 months. Fewer operational workers would be required (21 rather than 72). Positive economic benefits would also be less. |

**Table S.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Waste management | The Orange County Sanitary Landfill would have ample capacity to receive project construction wastes. The gasification ash generated by the proposed facilities has been evaluated for several possible beneficial uses that could avoid disposal in the onsite landfill. If no beneficial use were found, the 347-acre dedicated landfill would provide more than enough space to dispose of this ash, as well as other coal combustion wastes generated by the Stanton Energy Center. The existing generating units would use the anhydrous ammonia produced by the proposed facilities to satisfy their requirements, and any excess would be sold commercially. Because this chemical has many uses in agriculture and industry, markets should easily absorb any production in excess of onsite needs. If the elemental sulfur generated by the facilities proves to be as pure as it is projected to be, it would be sold commercially. Otherwise, it would be placed in the onsite landfill. Elemental sulfur would not be a hazardous waste, and the quantity produced would be small in comparison with the total capacity of the landfill. Disposal of this material could necessitate special handling procedures to assure appropriate containment in order to avoid adverse impacts on waste stability or leachate chemistry. | The quantities of construction wastes would be slightly less than for the proposed facilities. Because no ash would be generated, no disposal sites would be needed to accommodate ash. No anhydrous ammonia or elemental sulfur would be produced. |

**Table S.1. Continued**

| Resource | Impacts of the proposed facilities | Impacts of the no-action alternative |
|---|---|---|
| Human health and safety | Minimal adverse impacts to human health were predicted to result from operational $SO_2$, $NO_x$, and particulate matter emissions from the proposed facilities. EPA reported that the vast majority of coal-fired power plants were estimated to pose lifetime human cancer risks (i.e., increased probability of an exposed person getting cancer during their lifetime) of less than $1 \times 10^{-6}$ resulting from inhalation exposure to emissions of hazardous air pollutants. The cancer incidence in the United States due to inhalation exposure to hazardous air pollutants (including radionuclides) from all 426 coal-fired plants is estimated to be no greater than approximately 0.2 cancer cases per year, or 1 case every 5 years. The proposed facilities are expected to pose less risk than most existing plants, many of which were built decades ago. Regarding noncancer risks, estimated long-term ambient hazardous air pollutant concentrations were generally 100 to 10,000 times below the reference concentration or similar benchmark. The probability of a catastrophic accident associated with the facilities, including transportation of anhydrous ammonia off the site, would be unlikely. | Because emissions of air pollutants (e.g., $SO_2$ and $NO_x$) would be less than those for the proposed facilities, adverse impacts to human health would be less. Because there would be fewer trucks transporting, the probability of an ammonia truck accident would be lower. |
| Noise | During operation of the proposed facilities, the predicted noise level at the nearest residence (about 6,500 ft to the northeast) would be 46.5 dBA. No adverse community reaction would be expected as a result of noise levels below 50 dBA. Noise from steam blows would attenuate to a level of about 66 dBA at the nearest property boundary and 60 dBA at the nearest residence. A level of 60 dBA would be typical of normal conversation. | Noise would be essentially the same as for the proposed facilities. |
| ***Transportation*** | Much of the work on planned road projects could coincide with construction and operation of the proposed facilities, creating a major cumulative impact to traffic flow on the local road network. This impact would be reduced if the Avalon Park Boulevard extension is completed in mid-2008 before the peak construction period. ***Noise related to transportation would not be expected to cause significant impacts. At the nearest residence, noise levels from truck traffic on Alafaya Trail would be about the same as level of a quiet subdivision during daylight hours. Increased rail traffic due to the proposed project would result in more frequent noise from rail traffic, but the noise levels would be the same.*** | Traffic congestion would be less than for the proposed facilities. No additional trains would be needed to deliver coal, but trucks would continue to deliver anhydrous ammonia to the site once per week. ***Noise levels associated with transportation would be the same as for the proposed facilities but would be less frequent.*** |