DOE/EA-1616A

DRAFT ENVIRONMENTAL ASSESSMENT

FOR THE

NATIONAL CARBON CAPTURE CENTER PROJECT AT SOUTHERN COMPANY SERVICES' POWER SYSTEMS DEVELOPMENT FACILITY NEAR WILSONVILLE, ALABAMA

U.S. Department of Energy
Office of Fossil Energy
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Abstract:

The United States Department of Energy, National Energy Technology Laboratory (DOE NETL) has prepared this second amended Environmental Assessment (EA) to analyze potential environmental impacts associated with future funding, for a period of approximately five years, of both ongoing and future research and development (R&D) project work operations at the National Carbon Capture Center (NCCC) project located at the existing Power Systems Development Facility (PSDF) located near Wilsonville, Alabama. The PSDF is owned and operated by Southern Company Services, Inc., a subsidiary of Southern Company an electric generation and transmission holding company. The initial original PSDF EA and Finding of No Significant Impact(FONSI) was issued in 1993. The first amended PSDF EA and FONSI of ongoing and future operations was issued in 2008 specifically pertaining to the NCCC. Moreover, as new technologies advance and will be tested at the NCCC, NETL felt the need to again proactively and routinely update the PSDF NEPA documentation associated with R&D project work at the NCCC. Therefore, DOE NETL has prepared this second amended PSDF EA to support both current and developing technologies at the NCCC.

The NCCC is designed to test and evaluate carbon dioxide (CO_2) control technologies for power generation facilities, including CO_2 capture solvents, mass-transfer devices, lower cost water-gas

shift reactors, and scaled-up membrane technologies. Additionally, the NCCC evaluates methods to integrate CO_2 capture technologies with other coal-based power plant systems by testing both pre-combustion and post-combustion technologies. The NCCC provides the capability to test these systems under a wide range of fuels, including bituminous and sub-bituminous coals, lignite, and biomass/coal mixtures. The goal of the NCCC project is to accelerate the development, optimization, and commercialization of viable CO_2 control technologies.

The Proposed Action currently being evaluated is for DOE's continued R&D project funding and work operations with the NCCC at the PSDF plant. If approved, DOE would provide financial and technical R&D project assistance to test components and advanced power systems, including carbon (in the form of CO_2) capture technology, under realistic conditions using coal-derived gas streams. A small component of the NCCC project, the Post-Combustion Carbon Capture Center (PC4), is located adjacent to the E.C. Gaston Electric Generating Plant.

No major modifications to existing operational permits for the PSDF are anticipated to be required as a result of the implementation of the Proposed Action; however, some minor modifications may be needed. No previously undisturbed ground would be developed and no significant adverse impacts are anticipated to result from implementation of the action. The project would primarily involve the installation of new components on existing facilities in order to develop carbon capture technologies, and for the continued operation of the PSDF facility for an additional period of 5 years.

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LIST OF ABBREVIATIONS/ACRONYMS

AAC	Alabama Administrative Code
ADEM	Alabama Department of Environmental Management
AQCR	Air Quality Control Region
AQCR 004	Metropolitan Birmingham Intrastate AQCR
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
DBU	Declaration of Beneficial Use
DHS	Department of Homeland Security
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIA	Energy Information Administration
EO	Executive Order
EPRI	Electric Power Research Institute
FGD	Flue Gas Desulfurization
FONSI	Finding of No Significant Impact
GCR	General Conformity Rules
GHG	Greenhouse Gas
gpd	gallons per day
ha	Hectare
HAPS	Hazardous Air Pollutants
HAZMAT	Hazardous Material
IGCC	Integrated Gasification Combined Cycle
MACT	Maximum Achievable Control Technology
NAAQS	National Ambient Air Quality Standards
NCCC	National Carbon Capture Center
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NNSR	Nonattainment New Source Review
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NOA	Notice of Availability
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NSR	New Source Review
O_3	Ozone

OSHA	Occupational Safety and Health Administration
PC4	Post-Combustion Carbon Capture Center
PFCs	Perfluorocarbons
PM	Particulate Matter
PM_{10}	Particulate Matter < 10 microns in diameter
$PM_{2.5}$	Particulate Matter < 2.5 microns in diameter
PSD	Prevention of Significant Deterioration
PSDF	Power Systems Development Facility
RCRA	Resource Conservation Recovery Act
R&D	Research and Development
sf	square foot
SF_6	Sulfur Hexafluoride
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SPCC	Spill Prevention Control and Countermeasures Plan
TMDL	Total Maximum Daily Load
tpy	tons per year
µm	micrometer
$\mu g/m^3$	micrograms per meter cubed
UNFCC	United Nations Framework Convention on Climate Change
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The United States Department of Energy, National Energy Technology Laboratory (DOE NETL) prepared this amended Environmental Assessment (EA) to analyze and update potential environmental impacts associated with continued research and development (R&D) funding and project work operations at the National Carbon Capture Center (NCCC) located at the Power Systems Development Facility (PSDF) near Wilsonville, Alabama. The PSDF is operated by Southern Company Services, Inc., a wholly-owned subsidiary of Southern Company, an electric generation and transmission company.

The NCCC is designed to test and evaluate Carbon Dioxide (CO_2) control technologies for power generation facilities, including CO_2 capture solvents, mass-transfer devices, lower cost water-gas shift reactors, and scaled-up membrane technologies. Additionally, the NCCC would evaluate means to integrate CO_2 capture technologies with other coal-based power plant systems by testing both pre-combustion and post-combustion technologies. The NCCC would provide the capability to test these systems under a wide range of fuels, including bituminous, sub-bituminous coals, lignites and biomass/coal mixtures. The goal of the NCCC project is to accelerate the development, optimization, and commercialization of viable CO_2 control technologies.

1.1 BACKGROUND

The PSDF is located on 16.1 acres of land, located 1.5 miles northeast of the town of Wilsonville in Shelby County, Alabama. The PSDF property is located within a utility plant site, Alabama Power Company's E.C. Gaston Generating Plant (Plant Gaston).

The PSDF is a facility designed and built to evaluate advanced coal-based power technologies at a scale large enough to provide meaningful data for scale-up and under conditions that adequately represent temperature, pressure, and contaminant conditions of a commercial embodiment. The PSDF is operated by Southern Company as a unique R&D test facility under partial funding from DOE, on behalf of several industrial partners such as American Electric Power, Arch Coal, Inc., Cloud Peak Energy, Duke Energy, Electric Power Institute, Luminant, and NRG Energy, Inc. The PSDF project was initiated September 14, 1990. Upon completion of construction and commissioning, the first coal-fired operations began in August 1996. The current funded Cooperative Agreement is currently set to expire on September 30, 2014. However, research and development efforts at the PSDF, in the form of the NCCC, are being awarded to NCCC for another 5-year period.

The initial EA for the development, construction, and operation of the PSDF was issued with a Finding of No Significant Impact (FONSI) in 1993. The first amended EA pertaining specifically to the development, construction, and operation of the Carbon Research Center, now known as the National Carbon Capture Center, was issued with a FONSI in 2008. The Proposed Action currently being evaluated is for DOE to provide, through a 60-month cooperative agreement with Southern Company Services, Inc., 80 percent of the cost share (an estimated total of $150,000,000) for the proposed continuation of the NCCC Project at the PSDF plant. If approved, DOE would provide project assistance to test components and

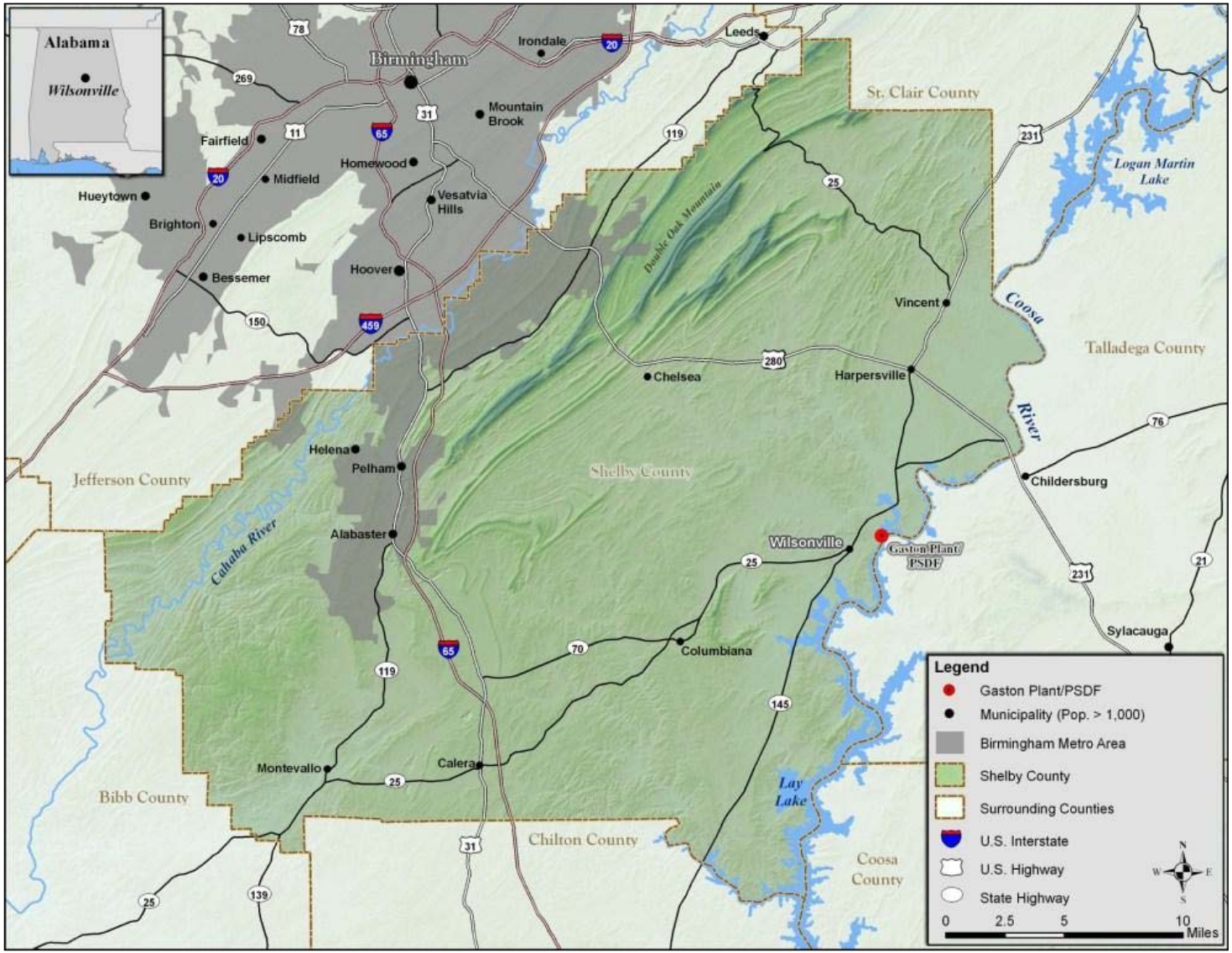

Figure 1-1. Project Vicinity Map

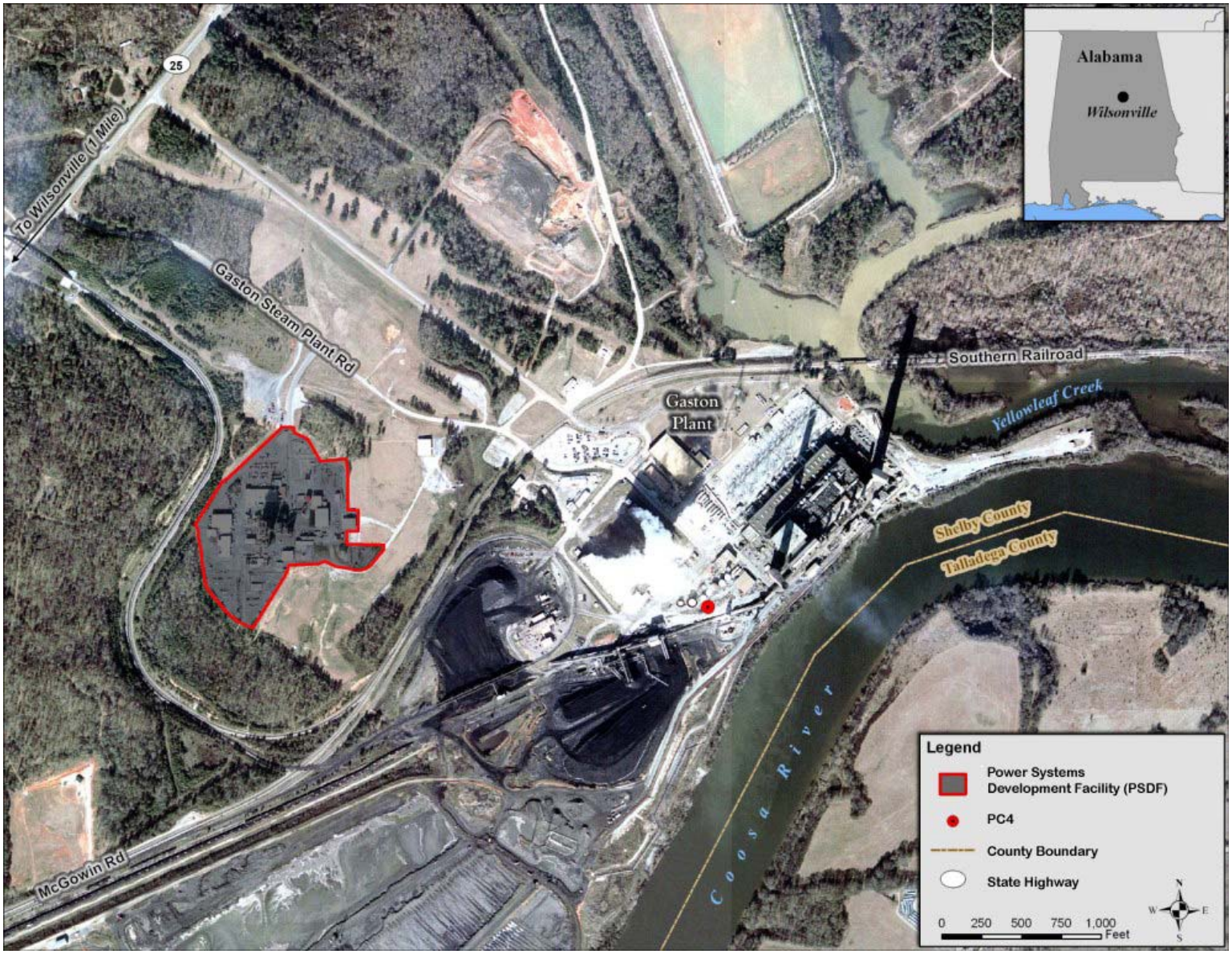

Figure 1-2. PSDF/Plant Gaston Site Map

advanced power systems, including carbon (in the form of CO_2) capture technology, under realistic conditions using coal-derived gas streams. A post combustion capture component (PC4) of the NCCC project is located at the adjacent E.C. Gaston Generating Plant (see Figures 1-1 and 1-2).

No major modifications to existing operational permits (air, and water) for the PSDF are anticipated to be required as a result of the implementation of the Proposed Action. No previously undisturbed ground would be developed. The project would primarily involve the continued operation of NCCC at the PSDF facility for a period of 5 years, while new components and carbon capture technologies are installed, tested, and further developed.

1.2 PURPOSE AND NEED

The proposed agency action, providing funding to continue operations of the NCCC at the PSDF near Wilsonville, Alabama, serves the purpose of accelerating the development, optimization, and commercialization of viable CO_2 control technologies for coal-based power generation facilities. The Proposed Action will support continued R&D activities at the PSDF for a period of 5 years.

The need for the project is for DOE NETL to continue to carry out research, development, and pilot programs to resolve the environmental, supply, and reliability constraints of producing and using fossil resources, and to develop efficient and effective CO_2 capture systems, which is one of the fundamental goals of NETL's Carbon Capture Technology Program (DOE, 2014; DOE, 2013).

NETL is a DOE national laboratory which devotes the majority of its funding to R&D partnerships with industry, university, and other government entities. NETL is committed to addressing the challenges put forth by the National Energy Policy, which include enhancing America's energy security; advancing clean fossil energy technologies and use; increasing the competitiveness and reliability of U.S. energy systems; and ensuring a robust U.S. energy future (DOE, 2014).

The demand for electric power in the U.S. and around the world shows continued, steady growth. According to DOE's Energy Information Administration (EIA) Annual Energy Outlook, coal remains the largest source of electricity generation, but its share of total electricity generation, which was 51 percent in 2003, is expected to decline from 42 percent in 2011 down to 35 percent in 2040 (EIA, 2013). Both the U.S. and world economies are linked to an abundant, reliable and cost-effective supply of electricity. While efforts are being expanded to manage the pace of electricity demand growth by energy efficiency and conservation programs, it is clear that new sources of electricity generation will be needed. While nuclear, natural gas and renewable sources of generation will be utilized going forward, the size of the U.S. demand for low-cost electricity will mandate continued and expanded use of domestic coal-based power generation.

Public concerns about the use of coal's environmental impact, including the amount of carbon dioxide, CO_2, emitted per unit of power generation warrants continued research to further carbon capture technologies. Many link CO_2 emissions to concerns over global climate change.

Because of the growing concentration of greenhouse gases in the atmosphere, there is a growing sense of urgency to legislate restrictions on the emissions of CO_2. Cost-effective technologies that will enable continued coal usage with reduced emissions of CO_2 are not commercially viable or available without further research. To keep coal as part of the U.S. generation mix, significant advancements in CO_2 capture technologies from coal-based power generation are needed. The Proposed Action aims to develop cost-effective CO_2 capture technologies that can be economically integrated into coal-based power generation and to demonstrate reliable operations of the integrated system.

The objective of the Proposed Action is to operate and maintain existing test facilities to offer third party technology evaluation to reduce the cost of advanced power plants with CO_2 capture. The NCCC offers the capability of providing multiple and simultaneous slipstream testing of bench scale and pilot scale third-party advanced CO_2 capture and gasification technologies, both domestically and internationally The NCCC has the ability to research diverse fuel sources at commercially relevant process conditions. Components will be tested using actual flue gas from existing coal-fired units for the post-combustion testing and actual syngas for the gasification and pre-combustion technology systems. Testing facilities are designed to promote and conduct the evaluation of advanced technologies to identify and resolve environmental, health and safety, operational, component, and system development issues in collaboration with the technology developer. Technology development will be supported at the NCCC through the design, procurement, construction, installation, operation, data analysis, and reporting required in meeting the objectives of the Project and technology developers. A review of DOE sponsored projects, projects from industry, universities, and other collaborative institutions will provide a full spectrum of technologies to be tested under the expertise of NCCC staff. Subsequently reports generated will be provided to DOE with information required to further CO_2 capture technologies to meet the objective of 90 percent capture with 95 percent CO_2 purity at a cost of $40/ton of CO_2 captured in advanced coal-fired power plants by 2020 and to commercialize by 2025 timeframe.

1.3 SCOPE OF THE EA

This DOE EA analyzes the environmental impacts that would result from the Proposed Action and the No Action alternative. This EA was prepared in compliance with the National Environmental Policy Act of 1969 (P.L. 91-190), the Council of Environmental Quality Regulations dated 28 November 1978 (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the DOE National Environmental Policy Act (NEPA) Implementing Procedures (10 CFR Part 1021).

Key goals of NEPA are to help Federal agency officials make well-informed decisions about agency actions and to provide a role for the general public in the decision-making process. The study and documentation mechanisms associated with NEPA seek to provide decision-makers with sound knowledge of the comparative environmental consequences of the several courses of action available to them. NEPA studies, and the documents recording their results, such as this EA, focus on providing input to the particular decisions faced by the relevant officials.

This EA identifies, describes, and evaluates the potential environmental impacts that would result from the implementation of the Proposed Action and the no action alternative, taking into consideration possible cumulative impacts from other actions. As appropriate, the affected environment and environmental consequences of the action will be described in both site-specific and regional contexts. In instances where mitigation measures may lessen any potentially adverse impacts, this EA identifies such measures that should be implemented to further minimize environmental impacts.

The following resource areas have been identified for study within this EA: water resources (including groundwater, wetlands, and floodplains), air quality, biological resources (including threatened and endangered species), waste and hazardous materials management, human health and safety, cultural resources, and socioeconomics. Resource areas considered but dismissed for further analysis are discussed below.

RESOURCE TOPICS DISMISSED FROM FURTHER ANALYSIS

Several resource topics and issues were raised during internal DOE scoping for this project that were not considered to warrant detailed analysis in this EA because they were: 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, or other higher level decisions; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The rationale for eliminating these issues is provided in the descriptions below.

Geology and Soils

The PSDF/Plant Gaston site is located in a geologically complex portion of the Coosa Valley in Alabama. The Floyd-Parkwood shale, a dark gray fissile shale that underlies the site, has been extensively folded due to ancient tectonic activity. The majority of joints and faults that formed as a result of this folding have been filled with calcite. Soils underlying the PSDF facility have been derived from the weathering of the Floyd shale; they are predominately of the Townley Silt Loam series, with a small portion of the site found on the Townley-Urban Land Complex series. However, at the PSDF and Plant Gaston site location, the majority of land area has been converted to industrial uses. Geology and soils will not be affected by the proposed project in any way as there are no foreseeable construction activities. It is not anticipated that future excavations or foundations will be required although without knowing all technology tests that will be performed over the next five years it could be possible that some minor work may be required. If this type of work were to occur it would be minimal in nature and only to the extent that is required for a specific piece of equipment. Locations where this could occur reside on previously disturbed land when the site was originally constructed. No previously undisturbed land would be affected. Therefore, this topic is dismissed from further analysis.

Wild and Scenic Rivers

The National Wild and Scenic Rivers Act is administered by four Federal agencies; the Bureau of Land Management, the National Park Service, the U.S. Fish and Wildlife Service, and the

U.S. Forest Service. The NCCC is approximately 50 miles from the Sipsey Fork of the Black Warrior River, the nearest designated Wild and Scenic River.

The Sipsey Fork of the Black Warrior River originates at the confluence of Thompson and Hubbard creeks in southwestern Lawrence County. The Sipsey Fork flows in a south southeasterly direction until impacted by the impounded waters of Lewis-Smith Reservoir. The section of the tributary which is a designated wild and scenic river lies completely within the boundaries of the William B. Bankhead National Forest. The Sipsey Fork of the Black Warrior River and its watershed will not be affected by the proposed project in any way. Therefore, this topic is dismissed from further analysis.

Land Use

The land surrounding the Plant Gaston utility site is primarily rural, with a few scattered residences within a half mile of the site line near Highway 25. The predominant land use in the vicinity of the property is forest and agricultural (timber, peach, and cotton production), although there are several industries located within the county. About 2.2 acres of the site are within the city limits of Wilsonville.

The NCCC occupies just under 17 acres with the main PSDF facility occupying 16.1 acres and the adjacent PC4 occupying 0.69 acres on the grounds of Plant E.C. Gaston. The sum of both encompass the full NCCC. The Proposed Action would not involve any new construction.

No onsite land use changes would result from implementation of the Proposed Action. Additionally, no changes to vicinity land use or land use designations would occur. Therefore, this topic is dismissed from further analysis.

If the PSDF is at any point slated for decommissioning, it is expected that a Decontamination, Demolition, and Disposal (DD&D) Plan with a detailed description of the proposed decontamination, demolition, and disposal of both the pre-combustion and post-combustion facility, and, determinations of future land uses of the property will be developed in concert with NETL participation and approval. However, facility decommissioning and possible future land use are not within the scope of this EA.

Traffic and Transportation

Alabama Highway 25 provides principle access to the NCCC at the PSDF and PC4 at Plant Gaston, and the PSDF shares an existing access road off of Highway 25 to Plant Gaston. Additionally, a railroad which services Plant Gaston bisects the property. Under the Proposed Action, the PSDF and Plant Gaston are anticipated to receive the same amount of traffic as they are currently experiencing. No additional impacts to either traffic or transportation are anticipated to result. Therefore, this impact topic is dismissed from further analysis.

Noise

Noise can influence humans or wildlife by interfering with normal activities or diminishing the quality of the environment. Certain land uses, facilities, and the people associated with these noise levels are more sensitive to a given level of noise than other uses. Such "sensitive receptors" include schools, churches, hospitals, retirement homes, campgrounds, wilderness areas, hiking trails, and some species of threatened or endangered wildlife. The closest sensitive receptor to the NCCC is the Wilsonville Elementary School, located approximately 2 miles southwest of the site.

Operational activities associated with the Proposed Action are not anticipated to be audible offsite of the Plant Gaston property. Noise associated with the proposed NCCC would contribute only an incremental amount to the cumulative noise generated from Plant Gaston. Hearing protection equipment is required for workers when sound levels exceed Federal workplace standards. No impacts from noise are anticipated from the proposed project, and this topic is therefore dismissed from further analysis.

Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations,* requires all Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Although the nearest residential areas to the PSDF include some levels of both low-income and high-minority populations, these levels are not disproportionately high and the Proposed Action is not anticipated to impact these areas in any event due to the distance of the proposed facilities, the high dispersion rate of air emissions in the area, and the low level of changes to the socioeconomic environment of the area anticipated from this project. Therefore, this topic is dismissed from further analysis.

Recreation

The project area is contained entirely within a secured utility plant site; there is no public access to, or use of, the natural resources located on site. The closest designated outdoor recreation area, the Talladega National Forest, is located over 30 miles east of the site.

The Proposed Action would not result in any impacts to public or recreational uses of the land. Furthermore, the offsite impacts of the Proposed Action (e.g. surface water withdrawals and discharges, and air emissions from facilities operations) are not anticipated to have any impact on recreation activities offsite of the proposed project area. Because the proposed project would not appreciably diminish recreation opportunities or the quality of recreation activities in the vicinity of the project area, this topic is dismissed from further analysis.

1.3.2 COMPLIANCE WITH LAWS AND EXECUTIVE ORDERS

This project complies with the NEPA, Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and DOE regulations for compliance with NEPA (10 CFR Part 1021).

The EA also addresses all applicable laws and regulations, including but not limited to the following:

- National Historic Preservation Act,
- Archeological Resources Protection Act (ARPA),
- The Noise Control Act of 1972, as amended,
- Addressing Environmental Justice (Executive Order [EO] 12898)
- Clean Air Act (CAA),
- Clean Water Act (CWA),
- Coastal Zone Management Act,
- Protection of Wetlands (EO 11990),
- Floodplain Management (EO 11988),
- Endangered Species Act,
- Pollution Prevention Act,
- Resource Conservation and Recovery Act (RCRA), and
- Comprehensive Environmental Response, Compensation and Liability Act.

Implementation of the Proposed Action will help the DOE meet the goals and challenges put forth by the National Energy Policy, enacted by the Energy Policy Act, as amended.

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2.0 PROPOSED ACTION AND ALTERNATIVE ACTIONS

2.1 ALTERNATIVE 1: PROPOSED ACTION – IMPLEMENTATION OF THE NATIONAL CARBON CAPTURE CENTER AT THE PSDF

The Proposed Action, providing funding for the continued operation of the NCCC at the PSDF, is consistent with DOE's goal to reduce CO_2 emissions from coal-fueled power plants. The NCCC is designed to test and evaluate CO_2 control technologies, including CO_2 capture solvents and sorbents, mass-transfer devices, lower cost water-gas shift reactors, and scaled-up membrane technologies. The NCCC would also evaluate means to integrate CO_2 capture technologies with other coal-based power plant systems by testing both pre-combustion and post-combustion technologies. The NCCC would provide the capability to test these systems under a wide range of fuels, including bituminous and sub-bituminous coals, lignites and biomass/coal mixtures. The goal of the NCCC project is to accelerate the development, optimization, and commercialization of CO_2 control technologies.

The DOE funding provided would be 80 percent of total project cost, or $150,000,000 of the projected total 5 year project cost of $187,500,000. Southern Company and its industry partners, American Electric Power; Arch Coal, Inc.; Cloud Peak Energy; Duke Energy; Electric Power Research Institute (EPRI); Luminant; and NRG Energy, Inc, would provide the remaining 20 percent project cost.

2.1.1 BACKGROUND

The proposed work entails the continued operation and maintenance of existing, flexible R&D test facilities at the NCCC at the PSDF and PC4 suitable for evaluating third-party advanced domestic and international carbon capture and gasification technology R&D projects under development at bench-scale and pilot-scale. The NCCC facilities utilize actual flue gas from existing coal-fired unit for the post-combustion technology system and an actual syngas for the gasification and pre-combustion technology systems. The NCCC offers the only publicly available test center for coal-based energy technologies to be evaluated at pre-commercial scale.

The NCCC facilities provide for multiple and simultaneous slipstream testing of bench- and pilot- scale third party advanced CO_2 capture and gasification technologies from diverse fuel sources at commercially relevant process conditions. These facilities also promote and conduct the evaluation of advanced technologies to identify and resolve environmental, health and safety, operational, component, and system development issues in collaboration with technology developers. The identification of cost effective and efficient advanced CO_2 capture and gasification technologies will address the Energy Information Administration's forecast that domestic and international coal based power generation will remain a critical and primary source of electricity generation through 2035, thereby creating a near term market based opportunity with a global opportunity for the export of U.S. developed technology.

The NCCC provides a broad array of technology development activities, including pre-combustion CO_2 capture for Integrated Gasification Combined Cycle (IGCC) plants, post-combustion CO_2 capture for Pulverized Coal (PC) plants; and, gasification. These R&D activities

would support a pathway to a cost-effective advanced coal-generating plant with CO_2 capture. The flexibility and scale of the NCCC is well suited to test gas cleanup and CO_2 capture technologies. The NCCC can test multiple projects in parallel with a wide range of test equipment sizes leading up to pre-commercial equipment sufficient to guide the design of full commercial scale power plants. The NCCC would support the development of cost-effective CO_2 capture technologies for advanced coal-fueled power plants as well as existing and new pulverized coal power plants.

PSDF

The PSDF is located on 16.6 acres of land, northeast of the town of Wilsonville in Shelby County, Alabama. The PSDF property is located within the Plant Gaston utility plant site. The PSDF can be used to screen research projects, perform pilot testing, and conduct testing at pre-commercial scale in an industrial setting. The PSDF is operated by Southern Company Services on behalf of industrial partners under funding from DOE, as a unique R&D test facility. The facility is large enough to produce commercially representative data while remaining sufficiently small for economic operation as a test facility. The effectiveness of the PSDF has been established. It has already fulfilled a major DOE objective by accelerating development of the Transport Gasifier to the demonstration phase.

The PSDF provides an engineering-scale testing facility for key components of an IGCC power plant. IGCC plants are so called because they use synthetic gas which is produced in a gasification unit in the plant. The gasification process produces heat, and this heat is reclaimed by steam boilers. The PSDF is adaptable to a variety of technology research needs. The components being tested are integrated into the plant, which exposes them to the requirements and rigors of real plant operating conditions and allows them to be scaled-up with confidence for commercial demonstration. Integrated operations allow the effects of system interactions to be understood. These interactions can typically be missed in unintegrated testing. In addition to engineering-scale testing, the PSDF has slipstream testing capability over a wide range of flowrates for cost-effective technology screening. The PSDF operates approximately 2,200 hours per year in 3 or 4 distinct cycles of research (each cycle lasts an average of 550 hours, equivalent to 23 days). Each operation cycle burns approximately 1,000 tons of various types of coal.

The PSDF project was initiated September 14, 1990. Upon completion of construction and commissioning, the first coal-fired operations began in August 1996. The current funded Cooperative Agreement is currently set to expire on September 30, 2014. However, research and development efforts at the PSDF, in the form of the NCCC, are proposed for another 5-year period. The initial EA for the development, construction, and operation of the PSDF was issued with a Finding of No Significant Impact (FONSI) in 1993. The Proposed Action currently being evaluated is for DOE to provide, through a 60-month cooperative agreement with Southern Company Services, Inc., financial assistance for the proposed continuation of the NCCC Project at the PSDF plant. If approved, DOE would provide project assistance to test components and advanced power systems, including carbon (in the form of CO_2) capture technology, under realistic conditions using coal-derived gas streams. A small component of the NCCC project, the post-combustion CO_2 capture component, would be located at Plant Gaston.

No major modifications to existing operational permits for either the PSDF or Plant Gaston are anticipated to be required as a result of the implementation of the Proposed Action. However, some minor permit modifications may be required. No previously undisturbed ground would be developed. The project would primarily involve the continued operation of the PSDF facility for a period of 5 years, with the installation of new components on existing facilities in order to research and develop carbon capture technologies.

The R&D conducted at the NCCC as the Proposed Action would consist of the following three components:

- Pre-combustion CO_2 capture for IGCC plants;
- Post-combustion CO_2 capture for PC plants; and,
- Gasification

Pre-combustion CO_2 Capture

Pre-combustion CO_2 capture provides low carbon emissions for IGCC power systems, which are expected to be a primary technology employed in the future coal fleet. Testing at the NCCC related to pre-combustion CO_2 capture involves the most promising technologies for high-efficiency, low cost separation of CO_2 from coal-derived fuel gas, or syngas. These technologies include gas separation membranes, catalysts, solvents, and sorbents.

Pre-combustion CO_2 capture can be integrated into IGCC technology by adapting the process so that the syngas produced is comprised mainly of hydrogen and CO_2. The hydrogen is then combusted in a gas turbine, and the CO_2 is captured for storage or use. The hydrogen could also be used in fuel cells when fuel cell technology matures.

The NCCC will investigate key processes to advance pre-combustion CO_2 capture. These key processes include:

- Gas/liquid contacting systems
- Solvents for CO_2 capture/separation
- Water-gas shift catalysts, reactors, and processes
- CO_2 compression
- Emerging syngas processes (sorbents and membranes)

The NCCC pre-combustion CO_2 test facility includes slipstreams with a range of gas flow rates and process conditions using coal-derived syngas for verification and scale-up of fundamental research and development CO_2 capture projects. The NCCC has the capability to test these systems using a wide range of fuels, including biomass and bituminous, subbituminous, and lignite coals. NCCC staff will work closely with DOE and with technology vendors to design individual test systems. As concepts proceed past the bench scale, testing under industrial conditions with real syngas will provide meaningful pathways to commercialization. Figure 2-1 shows the research pathways being pursued for pre-combustion CO_2 capture.

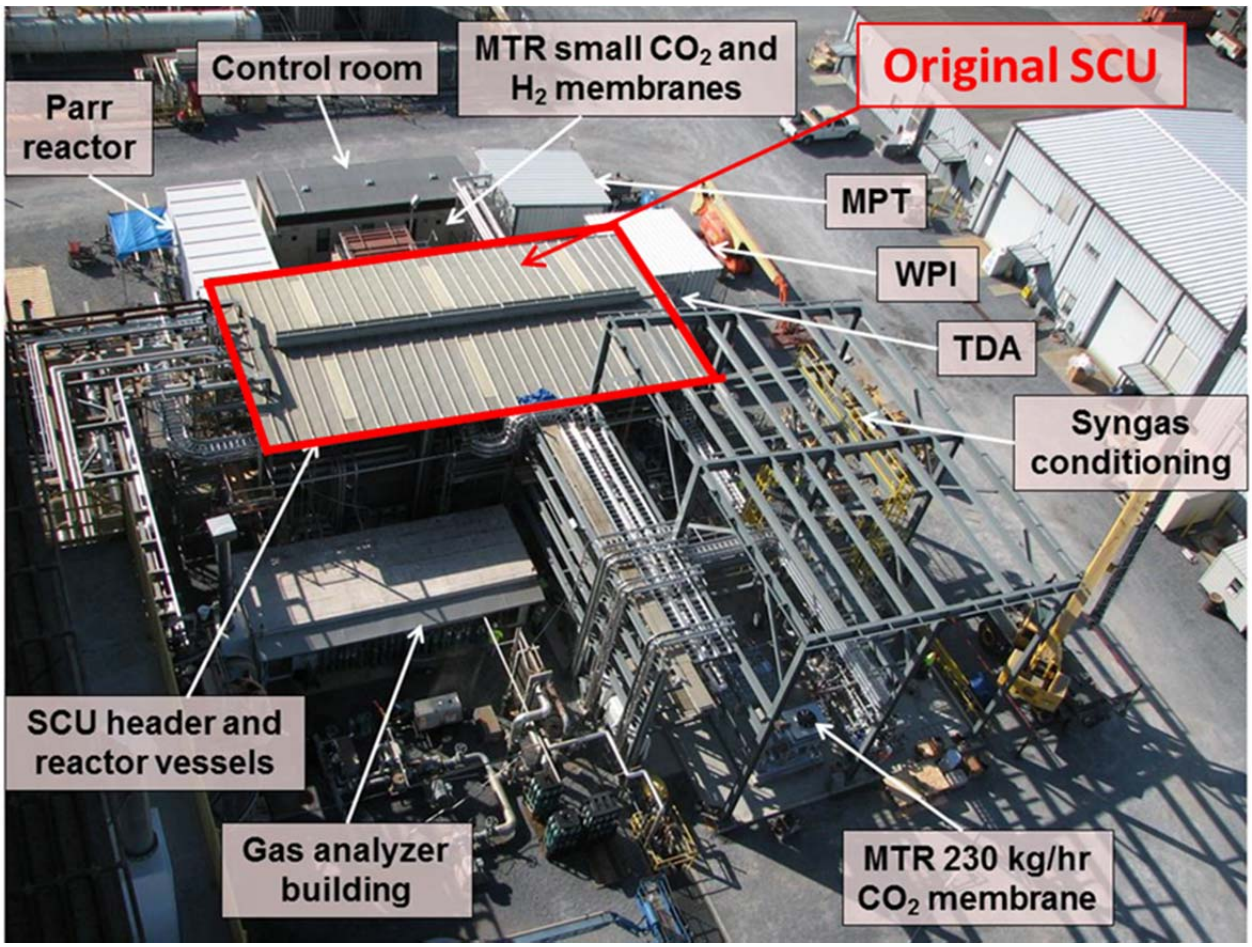

Figure 2-1. Pre-Combustion CO_2 Research Area

(Source: Southern Company, 2014)

Post-Combustion CO_2 Capture

Post-combustion CO_2 capture research aims to equip existing and future coal-fired units (pulverized coal and circulating fluidized-bed units) with effective CO_2 capture that significantly lowers the increase in cost of electricity compared with the increase expected from currently available technologies. The NCCC's Post-Combustion Carbon Capture Center (PC4) is the focal point for testing CO_2 capture solvents, process trains, gas separation membranes, and enzymes from a variety of technology developers (see Figure 2-2).

Although electricity generation through conventional coal combustion processes is well-advanced, many barriers exist when coupling this conventional technology with CO2 capture. Some of these barriers include:

- Lack of commercially available CO_2 capture technologies
- High capital cost, with estimated 75 percent increase from adding CO2 capture
- Large footprint required for CO_2 capture equipment
- Numerous operational concerns

- High energy penalty for CO_2 stripping and regeneration of solvent

Clearly, major technology advancements are needed for commercial application of CO2 capture with conventional pulverized coal units. Much of the NCCCs research will focus on post-combustion CO_2 capture to evaluate new technologies for integration with the existing fleet of pulverized coal power plants.

Figure 2-2. Post-Combustion CO_2 Capture Center

(Source: Southern Company, 2014)

As part of the NCCC, the PC4 was installed at the Alabama Power Gaston power plant Unit 5, a 880 megawatt supercritical pulverized coal unit. The primary purpose of this slipstream test facility is to support development of multiple post-combustion CO_2 capture technologies at several scales. The PC4 will:

- Test new solvents and gas/liquid contacting systems
- Regenerate solvents at high pressure
- Evaluate emerging technologies such as sorbents and membranes
- Reduce capex and opex penalties associated with the addition of CO_2 capture

PC4 will provide several parallel paths in order to test candidate processes at appropriate scales. It will support integration of test skids developed by others and will include a solvent test unit, an advanced contactor slipstream, and a slipstream for multiple, small-scale tests.

Gasification

While the previous testing of the PSDF gasification process led to commercialization of several key processes, important work remains to make IGCC processes more reliable, efficient, and commercially competitive. In addition to providing syngas for pre-combustion CO_2 capture testing, the gasification process operates to support the development of technologies including automatic gasifier controls, coal feeders, advanced sensors and instrumentation, and high efficiency particulate filtration components. Gasification operation also supports significant related technologies including biomass gasification, warm gas cleanup (such as mercury capture), and fuel cells.

The gasification process at the NCCC is based on the Transport Gasifier, a circulating fluidized bed reactor which was designed based on successful operations of fluid bed catalytic cracking (see Figure 2-3). Some features of the Transport Gasifier include:

- Simple, well established design based on technology in use for 70 years which does not require expansion joints
- Equally effective gasification in either air- or oxygen-blown modes of operation, making it suitable for power generation or production of liquid fuels and chemicals
- High reliability non-slagging design, which allows a 10- to 20-year refractory life
- Operation without burners enhances reliability and minimizes maintenance requirements
- Use of coarse, dry coal feed, which requires fewer, lower power pulverizers, and less drying than other dry-feed gasifiers
- Cost-effective operation and high carbon conversion with high moisture, high ash, and low rank fuels, including subbituminous and lignite coals
- Excellent heat and mass transfer due to a high solids mass flux, with a solids circulation rate 80 to 100 times greater than the coal feed rate

Figure 2-3. PSDF Gasification Research Area

(Source: Southern Company, 2014)

Syngas produced in the gasifier is cooled, filtered in a hot gas particulate control device, and is available for testing a variety of gas cleanup technologies. Operation of the gasification process also allows testing and development of numerous gasification related technologies, such as high pressure solids handling equipment, advanced instrumentation, hot gas filter components, and gas analysis equipment.

2.2 ALTERNATIVE 2: NO ACTION ALTERNATIVE

Under the No Action alternative, the DOE would not provide funding for the NCCC projects at the PSDF facility. If DOE funding were eliminated to the NCCC, the possible outcomes could include reduction in scope of work of the NCCC, procuring other funding sources, or discontinuing the project. The most likely scenario, and the only scenario considered reasonable for the purposes of this analysis, is that the NCCC projects would be cancelled.

There is no other facility available that could provide the flexibility and system integrated demonstration information at its size range that the proposed PSDF NCCC would produce. Project cancellation would mean this facility is not available to provide accelerated development for lower cost and more efficient CO_2 capture solutions for coal-based power generation.

2.3 ALTERNATIVES CONSIDERED BUT DISMISSED

CEQ regulations for implementing NEPA require that Federal agencies explore and objectively evaluate all reasonable alternatives to a Proposed Action and to briefly discuss the rationale for eliminating any alternatives that are not considered in detail. For this project, research into solvent, sorbent, membrane, and oxy-combustion systems as a means to capture CO_2 generated from coal-burning generating plants is proposed. The infrastructure in place at the PSDF is not currently developed at other R&D facilities and laboratories, and other locations would require the addition of substantial capital costs in order to perform the proposed R&D activities. The PSDF represents a full scale research facility with nearly all required infrastructure for the proposed activities already established.

The systems identified under the Proposed Action represent the initial range of alternative CO_2 capture systems currently under consideration for research at the PSDF. The proposed CO_2 capture systems selected for initial evaluation as part of the Proposed Action were selected after 1) creating an inventory of potential candidate technologies by evaluating a variety of sources (including the Clean Coal Technology Roadmaps from DOE and from EPRI, and the R&D Plan from CoalFleet), 2) discussions with organizations such as DOE and EPRI, 3) evaluating highest cost capture equipment areas, and 4) screening based on such factors as cost/benefit, likelihood of technical success, schedule, availability of data to support performance targets, timely development to commercial scale, and ability to integrate into the PSDF.

However, the five year plan of the proposed project is dynamic, and technologies will continue to be screened and identified over the five year plan, at least annually in order to accommodate new projects developed by DOE, industry, and others. The ongoing technology screening is expected to evolve. Prioritization of testing will be done in association with established budgets and goals and in conjunction with a project advisory team consisting of DOE and other major co-funders of the proposed project.

3.0 AFFECTED ENVIRONMENT

3.1 WATER RESOURCES

3.1.1 SURFACE WATER

Three surface water bodies are located within one-half mile of the PSDF (see Figure 3-1). These include the Coosa River, Yellowleaf Creek, and an railroad ditch to Yellowleaf Creek.

Coosa River

The Coosa River flows through a large section of Alabama; from the northeastern border with Georgia it travels south and converges with the Tallapoosa River in the middle of the state. Coosa River stream flow past Plant Gaston is completely regulated by the operation of the Logan Martin and Lay Dams at Coosa River Miles 99.5 and 51.3, respectively. The Plant Gaston/PSDF site is located approximately 20 miles north of the Lay Dam Reservoir. The United States Geological Survey (USGS) water level gauge at Plant Gaston averages the water level in the Coosa River adjacent to the plant to be between 13 and 14 feet above stream gage level. Due to the damming both up and downstream of Plant Gaston, water levels within the Coosa River do not fluctuate greatly throughout the year. Water levels are typically highest in March (averaging 13.91 feet above stream gage level), and lowest in October (averaging 13.40 feet above stream gage level) (USGS, 2014). Primary water uses for the Coosa River between the Logan Martin and Lay Dams are for industrial process cooling water, potable water supplies, recreation, and hydropower generation. The designated uses established by the Alabama Department of Environmental Management (ADEM) for the Coosa River within this reach are for Public Water Supply, Swimming, and Fish and Wildlife (ADEM, 2014).

Section 303 of the Clean Water Act (CWA) established Total Maximum Daily Loads (TMDL) as a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards for its designated use. Many pollutants have been assessed and given TMDLs, including heavy metals, nutrients, turbidity, and organic compounds. These water quality standards and designated uses are promulgated under the CWA and enforced by each State. When a State deems a water body impaired, it is placed on the 303(d) List of Impaired Waters. It will then remain on this list until TMDL water quality standards are met. Currently, over 325 miles of rivers and streams in the Coosa River Basin, including the reach of the Coosa River adjacent to the PC4, are included on the 303(d) List (ADEM, 2014). The Coosa River is listed as impaired due to elevated levels of nutrients, organic enrichment/dissolved oxygen (DO), and priority organics (polychlorinated biphenyls). The most likely causes of these impairments are flow regulation and modification, contaminated sediments, and upstream industrial and agricultural sources (ADEM, 2014). A TMDL to address the elevated DO levels in the Coosa River was established in 2004, and a TMDL and commercial fish ban to address the elevated PCB levels was established in 2005.

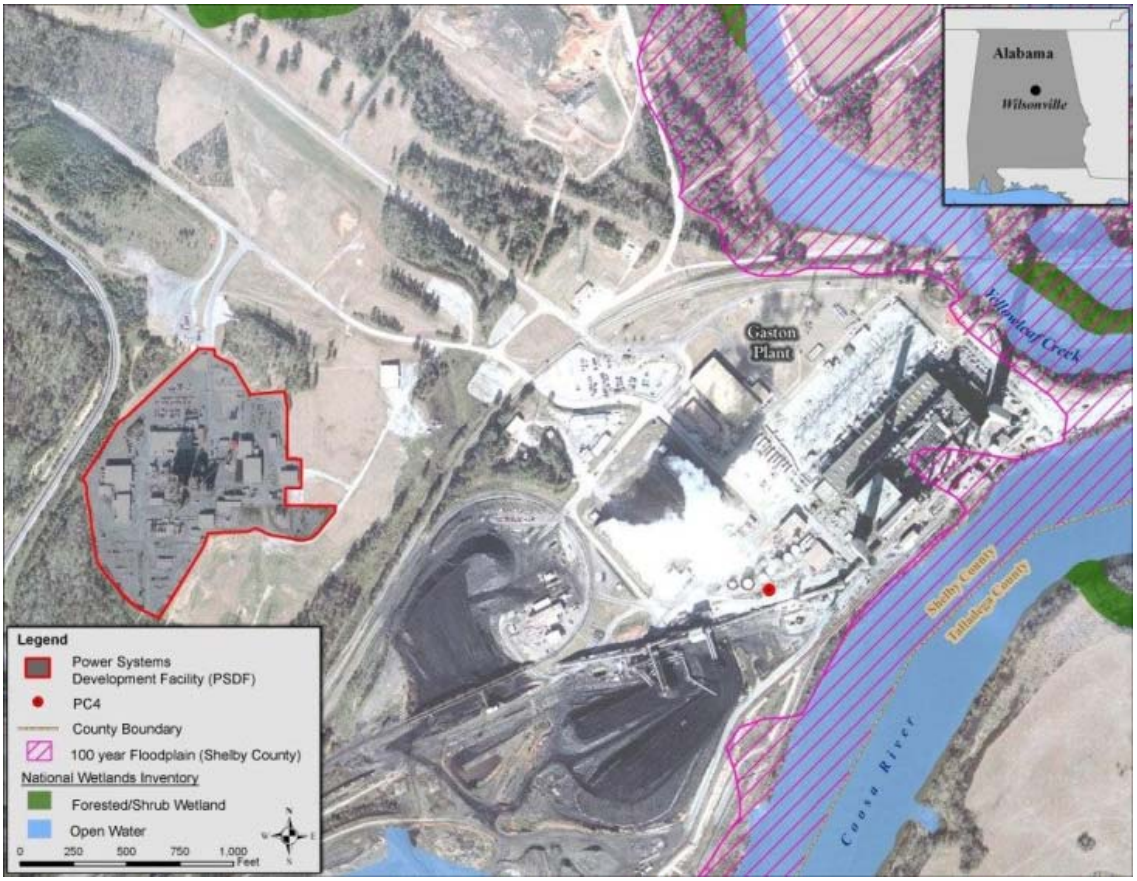

Figure 3-1. Aquatic Features of Project Area

Yellowleaf Creek and Railroad Ditch

Figure 3-2. Railroad Ditch

The Yellowleaf Creek is a generally southern flowing tributary to the Coosa River, and it meets the river immediately north of the Plant Gaston site. Flow direction of the Yellowleaf Creek in the immediate vicinity of the NCCC at the PC4 location is affected by water levels in the Coosa River and the water withdrawals in the area, including those of Plant Gaston. At normal full pool, the water in Yellowleaf Creek is about 20 feet deep at the unnamed tributary discharge point (Westervelt Company, 2014). The reach of Yellowleaf Creek in the vicinity of the project area is included on the 303(d) List of Impaired Waters for the same reasons as described above for the Coosa River.

The railroad ditch line conveys NPDES discharge waters from the NCCC to the Yellow Leaf Creek by natural elevation difference. Just south of the NCCC fence line is a wooded area that contains a small branch that drains the area. The drainage conveys to the railroad and eventually follows it to the Yellow Leaf Creek (Figure 3-2). The natural drainage is then joined and combined with the NCCC man-made water discharges. The majority of the water it conveys is storm water. This storm water has pollutant limits established by the ADEM the National Pollutant Discharge Elimination System (NPDES) permit. The storm water originates from the runoff in the plant area and the area surrounding the plant. The NCCC does not have a process water discharge wherein the water comes in contact with the process such as an acid or caustic wash stream, or some type of pollution scrubbing stream discharge. Stream flow is variable and seasonal. In the summer months, it can exist as a dry bed as the water discharges evaporate before they reach Yellow Leaf Creek. In the permitting process, the ADEM sent a representative to the site to observe the point discharges and record their GPS coordinates. Figure 1-2 PSDF/Gaston Site Map shows the railroad spur into Plant Gaston is a barrier to the storm water runoff from the NCCC and it is bound to follow the tracks to Yellow Leaf Creek. There is residual runoff and most of this is storm water, the combined discharges from NCCC sanitary and storm water have been about 7 gallons per minute in the past.

Water Use & Discharge

The PSDF service water system consists of separate systems to provide process water and potable water. Process water used in the cooling towers, firewater system and utility washdown is supplied from the Yellowleaf Creek via the intake structure at Plant Gaston. Process water used for steam and closed-loop cooling water systems is supplied by Plant Gaston from their demineralized water system. Potable water for domestic and sanitary use is obtained from the City of Wilsonville public water supply and metered to determine consumption. In lieu of a permitting system, Alabama requires water users to declare the quantity of water withdrawn for use or consumption by submitting a Declaration of Beneficial Use (DBU) to the Alabama Department of Economic and Community Affairs (ADECA), Office of Water Resources (OWR). A DBU requires the source and location of water withdrawal, the estimated amount as well as maximum quantity of the withdrawal and the primary use of the water to be diverted (ADEM, 2004). The Plant Gaston and PSDF property currently holds a joint approved DBU; water withdrawal from the Plant Gaston intake structure

Figure 3-3. Discharge to Railroad Ditch

on the Yellowleaf Creek is estimated to be approximately 830 million gallons per day (gpd) for use at Plant Gaston, and 0.031 million gpd for use at PSDF. The maximum quantities allowed under the DBU are 900 million gpd, and 0.5 million gpd, respectively (Anthony, 2014).

Water that is used throughout the plant processes is treated and discharged into area surface waters. Water discharges from PSDF flow into a railroad ditch which drains into Yellowleaf Creek. The ditch meets Yellowleaf Creek approximately 4,000 feet upstream from the confluence of Yellowleaf Creek and the Coosa River. The ditch receives NPDES regulated and treated plant process water from the PSDF (see Figure 3-3), and both the Yellowleaf Creek and Coosa River receive direct discharged process water from Plant Gaston. The existing plant site facilities generate a total of approximately 825 million gpd of discharged process water from site water cooling facilities and induced draft fan cooling systems.

Current wastewater treatment operations at PSDF include water collection by drainage from bermed areas, where chemicals are stored and process activities take place. The wastewater is drained to a 60,000 gallon collection basin where the water can be adjusted for pH, solids settling, and retention of oil. This discharge occurs in compliance with the facility's existing NPDES permit. Stormwater is conveyed to two drainage areas: one north and one south of the facility. The stormwater is tested for pH and suspended solids. Stormwater is not retained and its treatment relies on Best Management Practices (BMPs) such as vegetative cover, and rock barrier retainers and filters. Sanitary wastewater is collected by drainage to lift stations on site. The lift stations pump the sanitary wastewater to an activated sludge treatment unit. This unit has discharge limits for biological oxygen demand (BOD), total suspended solids, ammonia, and fecal coliform bacteria and dissolved oxygen; the wastewater is sampled on a routine basis by PSDF staff (Southern Company, 2011).

With the exception of the stormwater runoff, the discharge primarily consists of process water. Effluent from the process water could include runoff from the coal and limestone piles, wash down wastewater, sanitary wastewater, plant process wastewater, and general surface runoff. Major contamination concerns from these types of runoff could include changes in pH, elevated levels of suspended solids, metals, oils, grease, and changes in biological oxygen demand (DOE, 1999). As such, monitored effluent characteristics of process water include flow levels, pH, chlorine, temperature, phosphorus, magnesium, oil and grease, total suspended solids, benzene, ethylbenzene, toluene, xylene, aluminum, naphthalene, sulfate, biochemical oxygen demand, fecal coliform, ammonia, dissolved oxygen, total nitrogen, nitrates, and nitrites (ADEM, 2006). At the Plant Gaston, monitored effluent characteristics are similar: flow levels, pH, chlorine, oil and grease, total suspended solids, arsenic, copper, iron, manganese, phosphorus, ammonia, nitrate and nitrite, toxicity to *Ceriodaphnia*, and toxicity to pimephales (ADEM, 2007b).

3.1.2 GROUNDWATER

The PSDF is located on the Floyd-Parkwood Shale Formation. Data collected from the site investigation indicated that groundwater occurring in this formation is non-continuous and that it is found either perched in the residual clay and decomposed shale or concentrated along joint and fault planes.

Regional groundwater supplies are provided from two major aquifers: the Knox-Shady and the Fort Payne-Tuscumbia aquifers. Aquifers in the region are typically associated with valleys that are separated by less permeable rocks outcropping on ridges. The major source of recharge to the aquifers is rainfall, with an estimated surface recharge of 5 inches per year. Most of the aquifers in the area are unconfined and may be susceptible to surface contamination. The formations which underlie the NCCC at either the PSDF or PC4 locations have little groundwater and groundwater that is present flows away from the site (DOE, 1999).

3.2.3 WETLANDS & FLOODPLAINS

There are no wetlands within the boundaries of the NCCC at either the PSDF or PC4 locations. However, there are stretches of forested/shrub wetlands in the immediate vicinity of the sites, along both the Coosa River and Yellowleaf Creek. These types of wetlands are typically found adjacent to rivers and are areas that are waterlogged for much of the year. Forested/shrub wetlands are typically dominated by broadleaf, deciduous trees such as cottonwoods, walnuts and sycamores (USEPA, 2013a). In early 2007, approximately 550 acres of wetland and stream habitat was permanently protected along Yellowleaf Creek. The Freshwater Land Trust of Birmingham established this Yellowleaf Mitigation Bank approximately 10-20 miles northwest of the NCCC. Since nineteen counties in Alabama purchase wetland and stream credits at this location to offset the use of these types of environments during development projects these wetlands are protected for perpetuity (Westervelt Company, 2014).

The NCCC at either the PSDF or PC4 locations are not located within the 100-year floodplain (Southern Company, 2011). However, there are floodplains associated with each of the water bodies discussed above, in the immediate vicinity of the sites (as illustrated in Figure 3-1).

3.2 AIR QUALITY

Air quality is described by the concentration of various pollutants in the atmosphere. The significance of a pollutant concentration is determined by comparing the concentration in the atmosphere to applicable national and/or state ambient air quality standards. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety.

This section is a description of ambient air quality in Shelby County with respect to attainment of National Ambient Air Quality Standards (NAAQS), and identification of applicable air quality regulations to the PSDF.

3.2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS

USEPA Region 4 and ADEM regulate air quality in Alabama. The Clean Air Act (CAA) (42 USC 7401-7671q), as amended, gives USEPA the responsibility to establish the primary and secondary NAAQS (40 CFR Part 50) that set acceptable concentration levels for seven criteria pollutants: fine particulate matter (PM_{10}), very fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), and lead. Short-term standards (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute

health effects, while long-term standards (annual averages) have been established for pollutants contributing to chronic health effects. Based on the severity of the pollution problem, nonattainment areas are categorized as marginal, moderate, serious, severe, or extreme. Each state has the authority to adopt standards stricter than those established under the Federal program; however, the State of Alabama accepts the Federal standards.

Federal regulations designate Air-Quality Control Regions (AQCRs) in violation of the NAAQS as "nonattainment" areas. Federal regulations designate AQCRs with levels below the NAAQS as "attainment" areas. "Maintenance" AQCRs are areas that have previously been designated "nonattainment," and have been redesignated to "attainment" for a probationary period through implementation of maintenance plans. The PSDF, and therefore the NCCC, is completely within the Metropolitan Birmingham Intrastate AQCR (AQCR 004) (40 CFR 81.144). The USEPA has designated Shelby County as attainment area for all criteria pollutants (40 CFR 81.301).

3.2.2 CLASS I AND II AREAS

Class I Areas, as defined in the CAA, are national parks over 6,000 acres (2,428 hectare [ha]), national wilderness areas and national memorial parks over 5,000 acres (2,023 ha), and international parks that were in existence as of August 7, 1977. The nearest Class I area, the Sipsey Wilderness Area, is located approximately 95 miles northwest of the site. Class II Areas are areas of the country protected under the CAA, but identified for somewhat less stringent protection from air pollution damage than a Class I area. Shelby County is considered a Class II Area.

3.2.3 LOCAL AMBIENT AIR QUALITY

ADEM and Jefferson County Department of Health Air Pollution Control Program monitor the concentrations of criteria pollutants in AQCR 004. Monitoring stations are located in Jefferson, Shelby, Sumter, Tuscaloosa, and Walker Counties. Worst case ambient air quality conditions can be estimated from maximum concentrations measured at these stations (Table 3-1).

Table 3-1. NAAQS and Area Air Quality

Pollutant and Averaging Time	Primary NAAQS[1]	Secondary NAAQS[1]	Monitored Data[2]
CO			
8-Hour Maximum[3] (ppm)	9	(None)	1.7
1-Hour Maximum[3] (ppm)	35	(None)	5.6
NO_2			
1-Hour Maximum (ppm)	0.1	0.1	.046
Ozone			
8-Hour Maximum[4] (ppm)	0.075	0.12	0.067
$PM_{2.5}$			
Annual Arithmetic Mean[5] (µg/m^3)	12	15	11.8
24-Hour Maximum[6] (µg/m^3)	35	35	24
PM_{10}			
24-Hour Maximum[3] (µg/m^3)	150	150	58
SO_2			
Annual Arithmetic Mean (ppm)	0.03	(None)	0.029
24-Hour Maximum[3] (ppm)	0.14	(None)	0.005
1-Hour Maximum (ppm)	.075		-

1 - Source: 40 CFR 50.1-50.12.
2 - Source: USEPA, 2013b.
3 - Not to be exceeded more than once per year
4 - The 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations over each year must not exceed 0.075 ppm.
5 - The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from must not exceed 12.0 ug/m^3.
6 - The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 65 ug/m^3.
7 - The 3-year average of the weighted annual mean PM_{10} concentration at each monitor within an area must not exceed 50 ug/m^3.

The USEPA has designated Shelby County as attainment area for all criteria pollutants (USEPA, 2013b).

3.2.4 REGIONAL EMISSIONS

As part of its State Implementation Plan (SIP) of the CAA, ADEM compiles a region wide emissions inventory of the Metropolitan Birmingham Intrastate AQCR, and sets regional emissions budgets.

3.2.5 GREENHOUSE GASSES AND GLOBAL WARMING

Greenhouse gases (GHG) are components of the atmosphere that are generally considered as contributing to the greenhouse effect and global warming. Some greenhouse gases occur naturally in the atmosphere, while others result from human activities such as the burning of fossil fuels. Federal agencies, states, and local communities have prepared GHG inventories and adopted policies that would result in a decrease of greenhouse gas emissions. GHG's include water vapor, CO_2, methane (CH_4), nitrous oxide (N_2O), ozone (O_3) and several

chlorofluorocarbons. Although the direct GHG (CO_2, CH_4, and N_2O) occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. From the pre-industrial era (i.e., ending about 1750) to 2004, concentrations of CO_2 have increased globally by 40 percent. Within the United States, fuel combustion accounted for 94 percent of all CO_2 emissions released in 2012. On a global scale, fossil fuel combustion added approximately 35 $x10^9$ tons (32 $x10^9$ metric tons) of CO_2 to the atmosphere in 2011, of which the United States accounted for about 16 percent (USEPA, 2014a). DOE's EIA report indicates that U.S. CO_2 emissions have grown by an average of 1.2 percent annually since 1990 and energy-related CO_2 emissions constitute as much as 86 percent of the total annual CO_2 emissions.

Since 1900, the Earth's average surface air temperature has increased by about 1.4ºF. The warmest global average temperatures on record have all occurred within the past 15 years, with the warmest years being 1998, 2005, and 2010 (USEPA, 2014b; NOAA, 2011). With this in mind, the DOE while preserving their core operations is poised to support climate-change initiatives to reduce GHG emissions.

The human and natural causes of climate change and the impacts of climate change are global in scope. GHG emissions which are believed to contribute to climate change, do not remain localized but become dispersed throughout the earth's atmosphere. Therefore, this analysis cannot separate the particular contribution by the PSDF GHG emissions to regional or global climate change from the many other past, present, and reasonably foreseeable projects that have produced or would produce or mitigate GHG emissions. Rather, this review focused on the cumulative effects of GHG emissions and climate change from a global perspective.

3.3 BIOLOGICAL RESOURCES

3.3.1 VEGETATION

The PSDF is located in a region dominated by Oak-Pine forests. These ecosystems are characterized by numerous oaks (white, northern, and southern red), and pines (loblolly pine being the most characteristic) in a rolling topography. The forest canopy also includes sourwood, sweetgum, and various hickory species. The non-forested areas nearby contain numerous species of grasses and herbs including fescue, orchard grass, verbena, wild petunia, and honeysuckle (DOE, 1999). As discussed above, the immediate project area is small and limited to previously developed land (Southern Company, 2011).

3.3.2 WILDLIFE

Species diversity for wildlife populations occurring on within the boundaries of the NCCC at either the PSDF or PC4 locations is limited due to previous development, existing use, and small general area of the site. Nearby resident upland species include white-tailed deer, gray squirrel, red-bellied woodpecker, blue jay, Carolina chickadee, tufted titmouse, Carolina wren, brown thrasher, pine warbler, northern cardinal, rufous-sided towhee, and the eastern box turtle (DOE, 1999).

Aquatic species living in Yellowleaf Creek include a diverse fish community with 47 species representing 10 families. Yellowleaf Creek is also home to numerous snail and mussel species. The Coosa River is also home to a diversity of aquatic species; no other river basin in North America has a higher percentage of endemic species than the Upper Coosa River. In the Lower Coosa River and Lay Lake, dominant fish species include sport fish such as bass, catfish, bluegill, and other sunfish (DOE, 1999; CRBI, 2010).

3.3.3 THREATENED & ENDANGERED SPECIES

Both the Coosa River and the Yellowleaf Creek are home to several state- or Federally- listed threatened or endangered species. The Coosa River is home to several listed fish, mussel, and snail species. Listed fish species include the Blue shiner, Cherokee darter, Goldline darter, Etowah darter, Amber darter and others. Mussel species include the Finelined pocketbook, the Alabama and Coosa moccasinshells, the Southern clubshell and the Rayed kidneyshell. Additionally, the cylindrical lioplax and the Interrupted rocksnail are both Federally endangered snail species found in the Coosa River (CRBI, 2010).

Similar to the Coosa River, the Yellowleaf Creek has several state- or Federally-listed threatened or endangered fish, mussel, and snail species. A 25-mile portion of Yellowleaf Creek is Federally designated critical habitat for four threatened or endangered mussels; the Coosa moccasinshell, finelined pocketbook, southern pigtoe, and triangular kidneyshell. The designated critical habitat ends 1.4 miles upstream of the Plant Gaston intake structure. The tulotoma snail (*Tulotoma magnifica*) is a Federally listed endangered snail which is known to occur on the rip rap of the Plant Gaston intake structure on the bank of Yellowleaf Creek, where it is attracted to the conditions caused by the turbulent intake water.

The Yellowleaf Mitigation Bank being established northwest of the PSDF plans to provide permanent protection for four Federally threatened or endangered mussel species, one state-listed mussel species, one endangered snail species, and one special concern plant species as determined by Federal and state natural resource agencies (Westervelt Company, 2014). Though there are several state and Federally listed aquatic species found in the vicinity of the NCCC, there are no known terrestrial plant or animal species found on or within the immediate vicinity of the PSDF property or PC4 (Southern Company, 2011).

No work relating to this Project will involve disturbances along Yellowleaf Creek, or alterations to the Plant Gaston intake structure.

3.4 WASTE AND HAZARDOUS MATERIALS MANAGEMENT

3.4.1 WASTE MANAGEMENT

The PSDF generates approximately 25 tons of municipal solid waste per year. Municipal waste generated at the PSDF is transferred to the Pineview Regional Landfill in Dora, Alabama, which is owned and managed by Allied Waste. Materials such as office paper, cardboard, plastics, and metals are collected at the PSDF and transported for recycling whenever possible. Between 2-3 tons of paper are collected for recycling from the PSDF per year.

In addition to municipal waste, the PSDF generates approximately 700 tons per year of coal ash and coal byproducts. This material is stored in two silos capable of holding 100 cubic yards each. Unused coal slated for site removal, and coal ash generated by the PSDF, are either transferred to the adjacent Plant Gaston coal pile for combustion with their coal, or sent to the Pineview Regional Landfill for disposal via a contracted vendor. Coal ash generated by Plant Gaston is disposed of onsite at a permitted ash landfill. Prior to use, coal and limestone are stored in a covered concrete bunker at the PSDF.

3.4.2 HAZARDOUS MATERIALS MANAGEMENT

The PSDF currently uses and manages a variety of hazardous and toxic substances, including propane, nitrogen, acids, bases, Heat Transfer Fluid, oxygen, and hydrogen. In compliance with Department of Homeland Security (DHS) regulations designed to address a possible terrorist attack, Southern Company has inventoried and disclosed the chemicals stored at the site which exceed DHS threshold amounts. The DHS regulations apply to the PSDF because the facility exceeds the threshold for propane.

The PSDF is also permitted under the Federal RCRA and classified by the USEPA as a Small Quantity Generator of Hazardous Waste (USEPA ID # ALR000000216). The hazardous wastes currently generated at the PSDF include laboratory spent solvents and spent paint thinner/cleaning solvents, and a combined total of about 4 tons/year of wastes are produced. Liquid hazardous and toxic waste generated at the PSDF is collected in two satellite accumulation sites in metal drums and then moved to a covered shed, where it is held for less than 180 days. The waste is then transported offsite for disposal at Waste Management, Inc. located in Emelle, Alabama, which is a certified hazardous waste treatment, storage, and disposal facility.

BMPs for managing all onsite hazardous and toxic materials and waste are in place at the PSDF. These BMPs include proper storage facilities and locations for the chemicals, immediate response to spill and leaks, and proper disposal of the waste from spills and leaks. The PSDF has a Spill Prevention Control and Countermeasures Plan (SPCC) in place, which was prepared in accordance with good engineering practices to comply with USEPA's Oil Pollution Prevention Regulations, CFR Title 40 Part 112. The plan was implemented at the PSDF due to single above ground oil storage tank with an approximately 6,000 gallon capacity. The SPCC outlines how the PSDF would respond to significant oil spills, the strategies and methods used to minimize oil spills on nearby streams, and who is responsible for the plan. Spill prevention strategies used at PSDF include bermed tank and storage pads, oil spill supplies, and employees trained to respond to oil spills.

The PSDF is licensed to possess radioactive sources through the Alabama Department of Public Health, Office of Radiation Control. The PSDF license number is 1230. For handling and using radioactive materials, the PSDF adheres to the principle of As Low As Reasonably Achievable (ALARA) for employees at the site. As part of the program, only trained and authorized users are allowed to work with the sources and a physical inventory of all sources must be taken at periodic intervals. The site has a designated Radiation Safety Officer who serves as the overseer

for the program. The program is subject to a state inspection and has had three inspections over the life of the program.

3.5 HUMAN HEALTH AND SAFETY

Primary concerns to human health and safety at the PSDF include the exposure of workers to air emissions from the existing facilities, chemicals stored onsite, and process gases. Section 3.3.1 discusses monitored air emissions and their potential impacts on human health. National and state ambient air quality standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety; these are also presented in Section 3.1. PSDF employees living in and around this area are regularly exposed to the existing ambient air quality which is heavily influenced by combustion activities at Plant Gaston.

The existing PSDF facility stores a limited number of materials or chemicals which could potentially pose a risk to employees or others with respect to safety and health. See Section 3.5 for detailed description of current chemical storage and employee handling and safety requirements. Storage facilities for the materials required to operate the facility, including nitrogen, oxygen, acids, bases, and propane, are designed to minimize this risk in addition to being designed for spill containment and the control of releases. Current operational risks due to the accidental release of process gases are minimal. The flare, which is an integral part of the PSDF, is used as a relief device for venting and destroying gases from the gasifier during emergency conditions and power system shutdowns. To prepare for emergencies, routine safety, emergency response, and emergency evacuation drills have been, and will continue to be, conducted among the existing facility employees.

Existing operational noise levels are considered to be within the range of light industrial activities; typically not rising above 63 dB. This is well below the Occupational Safety and Health Administration's (OSHAs) limit of workers being exposed to not more than 90 dB over an 8-hour workday (Occupational Safety and Health Administration [OSHA], 2014). In areas of the PSDF where noise levels reach above 85 dB, employees are required to wear hearing protection. In addition, OSHA regulations which specify appropriate protective measures for all employees, including hardhats, eye covering, and other appropriate attire, are adhered to at the industrial areas of the PSDF and Plant Gaston.

3.6 CULTURAL RESOURCES

Cultural and historic resources are protected by a variety of laws and regulations, including the National Historic Preservation Act, as amended, and the Archaeological Resources Protection Act. Section 106 of the National Historic Preservation Act and implementing regulations (36 CFR 800) outline the procedures to be followed in the documentation, evaluation, and mitigation of impacts to cultural resources. The Section 106 process applies to any Federal undertaking that has the potential to affect cultural resources.

The Alabama Historical Commission is the state agency charged with safeguarding Alabama's historic buildings and sites. The Commission administers 12 historic sites. There are no historic

sites located within Shelby County; the historic site closest to the PSDF is the Confederate Memorial Park in Chilton County, located due south of Shelby County approximately 35 miles from the PSDF (AHC, 2014). The Confederate Memorial Park is the site of Alabama's only Old Soldiers Home for Confederate Veterans.

Though not regulated by the State as a historic site, the remains of three Confederate forts which were constructed in 1863 by Confederate troops under the command of Major W.T. Walthall, Commander of the military post at Talladega, exist approximately one mile from the PSDF on the Plant Gaston property.

No recorded archaeological sites are located within the project boundaries. There are no State-designated scenic highways in the Wilsonville area, and no local programs exist for designating scenic areas or vistas in the area.

The initial EA for the development, construction, and operation of the PSDF was issued with a FONSI in 1993. As part of this initial EA, consultation with the Alabama SHPO took place in 1992. On October 26, 1992, SHPO determined the project would not have an adverse effect on identified historic properties.

3.7 SOCIOECONOMICS

The socioeconomic region of influence for the Proposed Action is a three county area around PSDF where the majority of construction and site workers would reside and where socioeconomic impacts are most likely to occur. The three counties are Shelby, Coosa, and Talladega Counties in Alabama. The closest municipality is Wilsonville, Alabama, located just west of the NCCC.

In 2010 (based on Census Bureau data), the population within this three-county area was approximately 289,000. Approximately 60 percent of the population is found within Shelby County, 4 percent in Coosa County, and 28 percent in Talladega County. Wilsonville, Alabama had a population of 1,827 in 2010. Within Shelby County, approximately 80 percent of the population is white, 12 percent black, and 6 percent Hispanic or Latino. In Coosa County, 67 percent are white, 31 percent black, and 2.1 percent Hispanic or Latino, and in Talladega County, approximately 66 percent of the population is white, 32 percent black, and 2 percent Hispanic or Latino. The average demographics in the U.S. at this time were 78 percent white, 13.1 percent black, and 16.9 percent Hispanic or Latino. Within Alabama, 70 percent of the population was white, 27 percent black, and 4.1 percent Hispanic or Latino (USCB, 2014a, 2014b, 2014c, 2014d, 2014e, 2014f).

The total civilian labor force for the region of influence was approximately 146,423 in 2008-2012. Unemployment rate in Shelby County was approximately 4.4 percent while Coosa and Talladega Counties had an unemployment rate of 7.5 and 8.2 percent respectively. Comparatively, the unemployment rate was 6.0 percent in the United States and 6.1 percent in Alabama. The top three job types in Shelby County include the education, health care, and social services sector; manufacturing sector, and the retail sector. In Coosa County the top employment type is manufacturing, followed by education, health care, and social services, and construction. In Talladega, workers are also predominantly employed in manufacturing,

education, health care, and social services, and retail. In Wilsonville, the top employment type is retail, construction and education, health care, and social services. The average per capita personal income in 2008-2012 was $20,681 for the region of influence. For the time period, the per capita personal income was $28,051 for the United States, and $23,587 for Alabama (USCB, 2014a, 2014b, 2014c, 2014d, 2014e, 2014f).

The PSDF usually has between 80-100 permanent construction employees and approximately 121 permanent Southern Company Services and Alabama Power Company employees. Fluctuations in employment levels at the PSDF change based on workload and construction status. During past construction phases, the number of construction employees has increased to approximately 180 during peak times (Anthony, 2014).

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4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

4.1 WATER QUALITY IMPACTS

4.1.1 ALTERNATIVE 1: PROPOSED ACTION

Surface Water

The Coosa River and Yellowleaf Creek are the two nearby surface water bodies that have the potential to be impacted under the Proposed Action. Both the PSDF and Plant Gaston have existing NPDES permits that allow discharge of pollutants to these water bodies that meet limits established by the permit. Any new chemicals brought on site have the potential to be discharged through spills and accidents. New solvents will be required for the implementation of the NCCC. Operational changes in runoff are also likely to occur. Runoff from the coal and limestone storage areas will be collected and pumped to the 60,000 gallon collection basin. Runoff from the storage piles is expected to be minor and is estimated to be approximately 5,000 gallons per year. Sheds cover the storage areas and runoff from that area is limited to the area immediately in front of the shed. ADEM will be informed of the presence of the new solvents; their use will be managed by BMP plans that are already in place, with the plans being modified as necessary to accommodate the presence of the new solvents. Therefore, the potential harm to a receiving body should be mitigated by the small size of the proposed disturbance, by the BMP plans that are already in place, and by the existing treatment capabilities for some of the discharges such as solids settling, oil separation, pH adjustment, storage containers, and storage locations. It is not anticipated that a modification of the NPDES permit would be required for the addition of NCCC-related operations.

Neither the water quality of Coosa River, nor the railroad ditch to Yellowleaf Creek, are expected to be impacted as a result of the Proposed Action.

Water Use & Discharge

Potable and process water will continue to come from the City of Wilsonville and the Yellowleaf Creek via the Plant Gaston intake structure, respectively. No modification of the existing DBU would be required for the addition of NCCC equipment. Water use at the PSDF is expected to remain similar to, or increase slightly from, current amounts. These levels are estimated to be approximately 37,000 gpd; with a maximum quantity of 76,000 gpd. The majority of the water required for the pre-combustion facilities is already necessary for daily operations at PSDF; therefore this increase is negligible. Post-combustion CO_2 capture research water requirements will add an additional 35,000 gpd estimated usage, with a maximum usage quantity of 49,000 gpd (Southern Company, 2011). The 35,000 gpd of water needed for the post-combustion CO_2 capture facilities at Plant Gaston Unit 5 will be in addition to the nearly 830 million gpd required for operation of the PSDF/Plant Gaston facilities. It is anticipated that this will not result in any impact to either the Yellowleaf Creek or the Coosa River.

The NCCC has been developed within a curbed basin that collects any spills associated with process discharges, as well as stormwater runoff from the site. This curbed area collects to a sump, which will be pumped either into existing yard drains (normal operation) or to storage containers in the event of a process spill or modification. The existing site drainage system carries runoff to the south into the existing coal pile runoff pond, where it is then pumped to the existing ash storage lake. The discharge of the ash storage lake is monitored according to the existing Plant Gaston NPDES permit (Southern Company, 2011).

Current wastewater quantities are described in Section 3.2.1; the non-contact cooling water system, and process water systems will both result in additional wastewater during operation of the NCCC. Non-contact cooling water will increase to 827,000 gallons and process water will increase to 1,250,000 gallons. Section 3.2.1 also describes the components of wastewater that are monitored; this monitoring will continue as no changes to the NPDES permit are expected (Southern Company, 2011). The implementation of the Proposed Action is likely to have no more than minor, adverse impacts on surface waters due to operational changes in runoff; no impacts to surface water quantity or water levels within any water bodies are expected.

Groundwater

As described above, the Proposed Action will require the use of additional water resources, however, are below maximum allowable quanties as specified in the water withdrawal permit. However, none of the additionally required water is expected to come from groundwater or be discharged underground. No impacts to groundwater resources within the vicinity of the NCCC are expected.

Wetlands & Floodplains

Under the Proposed Action, no impacts to wetlands or floodplains are expected. No construction or operational activities or changes will occur in or adjacent to wetland or floodplain areas.

4.1.2 ALTERNATIVE 2: NO ACTION

If the No Action Alternative were to be implemented, negligible impacts would be anticipated to occur to surface water resources. Water withdrawal from the Plant Gaston intake structure would continue to supply daily operations at Plant Gaston, which are estimated to require approximately 830 million gpd (maximum quantities allowed under current permitting are 900 million gpd). Water withdrawal for the proposed operations at the PSDF and the projected post-combustion CO_2 capture research activities at Plant Gaston are estimated at a combined average of 72,000 gpd (0.072 million gpd), or less than 0.009 percent of total withdrawal. The decrease in water withdrawal and use if the NCCC was not implemented and the PSDF were not in operation is considered negligible relative to the quantities withdrawn and used by Plant Gaston.

The existing NPDES permit would not require modification or replacement. The No Action Alternative is not expected to result in impacts to the intermittently flowing railroad ditch, Yellowleaf Creek, or the Coosa River. Additionally, no impacts to groundwater or wetlands and floodplains can be expected from implementation of this alternative.

4.2 AIR QUALITY IMPACTS

4.2.1 ALTERNATIVE 1: PROPOSED ACTION

Short-term and long term minor impacts to air quality would be expected as a result of implementation of the Proposed Action. Direct and indirect air emissions would not exceed applicability thresholds, be "regionally significant," or contribute to a violation of any Federal, state, or local air regulation.

Estimated Emissions and General Conformity

The facility's operational emissions estimates included:

- Heating emissions from hot water heater and natural gas boilers, and
- Additional processing emission.

The general conformity rules (GCR) require Federal agencies to determine whether their action(s) would increase emissions of criteria pollutants above preset threshold levels (40 CFR 93.153(b) and Alabama Administrative Code [(AAC) 335-3-17-.02]. These *de minimis* (of minimal importance) rates vary depending on the severity of the nonattainment and geographic location. To determine the applicability of the GCR to the Proposed Action, estimated air emissions from operational activities were estimated and compared to the applicability thresholds under the GCR and the regional emission budgets. Emissions are expected to be below the applicability threshold for all criteria pollutants (Table 4-1), and would not be regionally significant for VOCs and NO_x (Table 4-2). Due to the limited size and scope of the Proposed Action when compared to the overall regional activity, it is not anticipated that emissions of $PM_{2.5}$ or SO_2 would be regionally significant. Detailed emissions calculations are located in Appendix A.

Table 4-1. Project Emissions Compared to Applicability Thresholds

	Annual Emissions (Tons per Year)					
Activity	**VOCs**	**NO_x**	**SO_2**	**$PM_{2.5}$**	**Applicability threshold**	**Would emissions exceed applicability levels? [Yes/No]**
Operations	1.0	21.0	17.0	3.4	100	No

Table 4-2. Annual Emissions Compared to Regional Emissions

	Criteria Pollutant or Precursor	
	VOCs	**NO_x**
Project Emissions (tpd)	0.003	0.057
Regional Emissions (tpd)	112	177
Percent Regional Emissions	<0.01%	<0.01%
Regionally Significant?	No	No

Source: ADEM, 2005. tpd = tons per day

Regulatory Review

Stationary sources of air emissions associated with the Proposed Action would be subject to Federal and state air permitting regulations. ADEM oversees programs for permitting the construction and operation of new or modified stationary source air emissions for industries and facilities that emit regulated pollutants in Alabama.

The permit rules and standards are found in Division 3 of the ADEM Administrative Code. These requirements include,, minor new source review (NSR), nonattainment new source review (NNSR), prevention of significant deterioration (PSD), and new source performance standards (NSPS). In addition, under the National Emission Standards for Hazardous Air Pollutants (NESHAP), new and modified stationary sources of air emissions may be subject to Maximum Achievable Control Technology (MACT) requirements.

Based on the facility's potential to emit, PSDF is a major emissions source. A facility wide Title V permit was issued in January 2011 (ADEM, 2003). The Title V PSDF air permit is not expected to be affected by future PSDF R&D technology development project work operations. However, modifications to the existing Title V air permit may be made in the future as appropriate to accommodate changing R&D project work requirements. The steam boiler would carry its own individual permit requirements separate from the main gasifier permit.

Based on the facility's potential to emit, Plant Gaston Unit 5 is also a major source. The proposed post-combustion facility would not require modification to the Plant Gaston Unit 5 existing Title V air permit. Flue gas that is processed through the facility would be returned to the existing plant flue gas desulfurization (FGD) inlet duct, where it would be contacted again through the FGD as a final filter for the gas stream. Due to the chemistry and processes in which flue gas CO_2 is captured, it is expected that the traditional emissions of particulate matter (PM) and acid gases (SO_2 and NO_x) would be reduced through the addition of this facility. The only expected incremental emissions can be attributed to possible VOC slip (from solvent based processes) or sorbent attrition and slip (from solid adsorbent based processes). Because the organic solvents used in these processes are aqueous based, any VOC should be captured at a high efficiency in the existing Unit 5 FGD. Furthermore, the FGD design is highly efficient in capturing PM. For these reasons, very little air emission is expected from the Post-Combustion facility. Unit 5 would continue to be monitored to assure compliance with its existing Title V air permit.

Table 4-3. Air Quality Regulatory Review for Proposed Stationary Sources

Regulation	Project Status
New Source Review (NSR)	The project would not be classified as a new source or a major modification to an existing source.
Prevention of Significant Deterioration (PSD)	The proposed project would not result in a significant net emissions increase of any regulated pollutant, as defined by AAC 335-3-14-.04 (2)(c) and (w). Accordingly, the project would not be subject to PSD review.
Title V Permitting Requirements	Major modification threshold would not be exceeded. The PSDF and the Plant Gaston Unit 5 Title V Air Permits would not need updating.
National Emission Standards for Hazardous Air Pollutants (NESHAP)	Potential HAP emissions are not anticipated to exceed NESHAP thresholds. Therefore, the use of MACT would not be required.
New Source Performance Standards (NSPS)	Any new boilers rated greater than one million BTU installed would have to comply with NSPS.
tpy = tons per year	

Greenhouse Gasses and Global Warming

Because operation of the PSDF is an integral part of research and development activities for the Proposed Action, release of CO_2 air emissions would occur during routine operations at the PSDF, as described in Section 3.3. Additional sources of emissions during research operations at the post-combustion area adjacent to Plant Gaston could occur. It is expected that emissions due to these additional sources would be very small. The majority of the CO_2 stream that would feed the system would otherwise be vented to the atmosphere without the Proposed Action. Therefore, CO_2 that is vented from the post-combustion unit during this project are emissions that would otherwise have occurred if the compression unit, pipeline, and NCCC were not in place. Therefore, these sources of fugitive emission would not increase overall CO_2 emissions.

4.2.2 ALTERNATIVE 2: NO ACTION

Selecting the No Action Alternative would result in negligible impacts to ambient air-quality conditions. Facility operations would be suspended. The relatively minute release of CO_2 from PSDF operations would not occur. Ambient air-quality conditions would remain as described in Sections 3.3.1. By selecting the No Action Alternative, the proposed NCCC would not be established and this project would not be carried out in any setting, and would delay planned larger-scale CO_2 reduction projects indefinitely. The increased understanding of CO_2 reduction technologies would not be gained.

4.3 BIOLOGICAL RESOURCES

4.3.1 ALTERNATIVE 1: PROPOSED ACTION

Vegetation and Wildlife

As discussed above, there will be no construction activities and all operations of the Proposed Action will be occurring on previously developed land that is lacking vegetative cover and likely not habitat for wildlife. No impacts to terrestrial wildlife and vegetation are expected to result from the implementation of the Proposed Action. Aquatic species living in the railroad ditch, Yellowleaf Creek, and the Coosa River are not likely to be impacted by the change in discharge coming from the activities associated with the Proposed Action, as discussed in Section 4.2.1.2. Although minor changes in water discharge will occur, these changes are not enough to warrant a modified or new NPDES permit. Changes in water discharge are not expected to result in more than negligible impacts to the nearby aquatic environments.

Threatened and Endangered Species

Under the Proposed Action, no impacts to State or Federally listed threatened or endangered species are anticipated to occur. Negligible impacts to water quality, water quantity, and the water velocity in the intake structure on Yellowleaf Creek, would occur as a result of continued operation of the NCCC. As a result, no impacts are anticipated to occur to the Tulotoma Snail which is found on the riprap of the intake structure.

Consultation regarding the initial Proposed Action in 2008 was initiated with the USFWS on June 2, 2008, to ensure that the proposed project would result in no impacts to listed species. On June 24, 2008, the USFWS responded with concurrence that the project as described will have "no significant impact on fish and wildlife resources". A copy of the consultation letter with USFWS' stamped concurrence can be found in Appendix B.

4.3.2 ALTERNATIVE 2: NO ACTION

The No Action Alternative will not result in any impacts to wildlife or vegetation, as no facility development is expected to occur. Additionally, the No Action Alternative is not anticipated to result in any impacts to threatened or endangered species found in the vicinity of the area.

4.4 WASTE AND HAZARDOUS MATERIALS MANAGEMENT

4.4.1 ALTERNATIVE 1: PROPOSED ACTION

The municipal solid waste would continue to be disposed of at the Pineview Regional Landfill, while the addition of a solids wetting system to the solids discharge silo in the latter part of 2007 to eliminate dusting allows all of the coal and coal-derived ash from the PSDF to be placed on the coal pile at the adjacent Alabama Power Company power plant. The quantity of coal

byproducts and ash sent to the Pineview Regional Landfill is expected to be near zero under the Proposed Action.

The amount of hazardous waste currently generated by the PSDF (4 tons/yr) from laboratory spent solvents and spent paint thinner/cleaning solvents, is expected to either remain the same under the Proposed Action, or to increase as a result of an increase in spent solvents from NCCC R&D efforts.

New substances that are anticipated to be stored and used at the PSDF as part of the NCCC include several hazardous or toxic substances, such as solvents (amine derivatives and amine compounds), anhydrous ammonia, catalysts containing metals such as nickel and cobalt, hydrogen sulfide, and sulfur dioxide. The solvents will be used for CO_2 absorption in liquid-gas contacting devices being tested.

Amines, salts of strong organic bases, are organic compounds and a type of functional group that contains nitrogen as the key atom. Some amines that may be used at PSDF-NCCC for CO_2 capture testing include Mono ethanol amine (MEA), Methyl diethanol amine (MDEA), and proprietary hindered amines (chemical compounds containing an amine functional group surrounded by a crowded steric environment). However, most solvents have not yet been identified, but will be selected as research progresses and suppliers develop suitable solvents.

Upon completion of testing of amine-based and other test solvents, the NCCC management and the vendor will decide what to do with the solvent. If they are no longer needed for future testing, the solvents (and the cartridge filters utilized with the solvents, to remove impurities from the solvents system and improve the life of the solvent) will be collected and stored. The solvents will then be tested and then characterized as non-hazardous or hazardous. The NCCC, in conjunction with Alabama Power Environmental Affairs, will arrange for disposal at a licensed waste management facility as either a non-hazardous or hazardous waste. No waste from PC4 is buried in a landfill at E.C. Gaston nor burned in the boiler as a fuel

It is assumed that this quantity of solvents will increase each year as processes are added for testing and the number of hours operation for each process is established. An initial quantity of approximately 12,000 lb/yr is projected for year 1, increasing to a maximum of approximately 68,000 lb/yr after 5 years. If all spent solvents tested are found to be hazardous wastes that cannot be combusted nor recycled, they will add an additional 6 tons/year of hazardous waste to be safely disposed of in a licensed waste management facility, bringing the total facility wide amount of hazardous waste generated by the PSDF to approximately 10 tons/yr.

Each new chemical brought onsite to the PSDF or Plant Gaston as part of the NCCC would be thoroughly investigated and classified before storage and use. All applicable safe handling, storage, use, and disposal precautions would be observed and adhered to. Though the quantity of hazardous and toxic materials would likely increase as a result of this alternative, it is not anticipated that this increase would result in more than negligible impacts to proper management of the materials.

4.4.2 ALTERNATIVE 2: NO ACTION

Under the No Action alternative, there would be no additional waste generated, and no new hazardous or toxic substances would be stored or used on site. While ultimate use of the PSDF, if the NCCC project is cancelled, cannot be determined at this time, it is anticipated that the amount of waste generated from the site would decrease and that the resultant impacts associated with the No Action alternative on waste and hazardous materials management would be negligible.

4.5 HUMAN HEALTH AND SAFETY

4.5.1 ALTERNATIVE 1: PROPOSED ACTION

The worker safety program requirements applicable at the NCCC include the "construction" and "general industry" standards of the Federal OSHA 29 CFR 1910 and 1926. These standards include walking-working surfaces, means of ingress and egress, operation of power equipment, adequate ventilation, noise exposure controls, fire protection, and electrical equipment safeguards. Following the mitigation measures and BMPs will reduce the adverse impacts to human health from air quality. Workers would follow OSHA procedures, which would further reduce the impact to human health.

During the NCCC facilities operations, OSHA procedures would continue to be followed to minimize worker exposure. These may include warning systems and alarms to detect exposures and spills, as well as informing the proper authorities of any incidents. The PSDF Safety Program has numerous worker safety and health programs to mitigate potential harm or exposure of employees such as: Respiratory Protection, Hearing Conservation, Blood borne Pathogens, Scaffold Program, Fall Protection Program, Personal Protective Equipment, a Hazmat Response Team, Confined Space Rescue Team, a First Responder Group, and employees trained in First Aid and CPR.

There is always some potential for a worker to be exposed to chemicals. Section 4.5 discusses the changes in hazardous materials use and subsequent risk to employees as a result of the Proposed Action. Changes to existing processes and equipment, addition of new processes or equipment, or introduction of new chemicals (solvents, sorbents, etc.) would require appropriate training of workers to allow operation and testing of the equipment and otherwise ensure affected personnel are informed of the changes or additions (Southern Company, 2011). In addition, the existing Material Safety Data Sheets and Personal Protective Equipment requirements would remain in place to ensure that employees are prepared to handle any required chemicals. As discussed in Section 4.3, operational PSDF air emissions are not expected to change as a result of the NCCC. It can be expected that workers will continue to be exposed to the same ambient air quality as they currently are. Additionally, operational noise levels are not expected to change; hearing protection will continue to be required in all high noise areas (Southern Company, 2011).

The existing PSDF has not had a lost-time injury since the safety record began on August 1, 1995. Job Safety Briefings are held before any non-routine job begins on a daily basis or as needed. It can be assumed that these procedures will remain intact and that all personnel will be

properly trained or briefed to ensure their safety while operating the new facility components. Given the small size of risks and additional exposures, overall impact to human health from the Proposed Action can be expected to be adverse, long-term and negligible to minor.

4.5.1 ALTERNATIVE 2: NO ACTION

Under the No Action Alternative, any emissions released from the PSDF from alternative research projects can be expected to be at the level they're at now, or less, with the addition of efficiency upgrades. The overall impacts to human health from the No Action Alternative can be expected to be negligible.

4.6 CULTURAL RESOURCES

4.6.1 ALTERNATIVE 1: PROPOSED ACTION

Consultation regarding the initial 2008 Proposed Action was initiated with the Alabama State Historic Preservation Officer (SHPO) on June 2, 2008. On June 27, 2008, the Alabama Deputy SHPO sent a reply letter stating that "the project activities will have no effect on any known cultural resources listed on or eligible for the National Register of Historic Places". A full copy of this response letter can be found in Appendix B. It is anticipated that the proposed project would not result in any impacts to cultural or historic resources, as no previously undisturbed land would be developed.

4.6.2 ALTERNATIVE 2: NO ACTION

Under the No Action Alternative, no new areas of the PSDF or Plant Gaston Unit 5 would be developed as part of the NCCC, and as a result, no impacts are anticipated to occur to cultural or historic resources.

4.7 SOCIOECONOMICS

The threshold level of significance for socioeconomic resources is the potential of the project to result in a substantial population or employment increase or decrease in the region of influence.

ALTERNATIVE 1: PROPOSED ACTION

The implementation of the Proposed Action would not result in the hiring additional employees. Overall impacts to socioeconomics from the implementation of the Proposed Action are expected to be minimal. Employment levels are anticipated to be within the typical fluctuation of workforce numbers seen at this site.

ALTERNATIVE 2: NO ACTION

It is not known at this time whether or not cancellation of the NCCC project would translate into potential site layoffs. If any layoffs were to occur, the impacts from the No Action alternative would be adverse and in proportion to the scale down of the site's workforce. Additionally, the No Action alternative would not have the benefits of potentially developing more cost-effective and affordable CO_2 capture technology, which could ultimately result in widespread beneficial economic impacts to coal based power generation facilities which seek to reduce their CO_2 emissions.

4.8 CUMULATIVE IMPACTS

CEQ regulations (40 CFR 1508.7) require an analysis of the cumulative impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these other actions. Cumulative impacts can result from individually minor, but collectively significant, actions. This cumulative impacts section of the EA addresses only the cumulative effects arising from considering the Proposed Action in combination with other ongoing actions at, or in the vicinity of, the PSDF and Plant Gaston.

No development, with the exception of what has been disclosed within this EA as part of the NCCC, is proposed to take place at the PSDF within the foreseeable future. Cumulatively, the impacts of implementing the Proposed Action at PC4, in conjunction with the other developments proposed there, are considered negligible.

In a regional context, the greater Wilsonville area is experiencing a slight increase in population and growth, and it can be expected that there will be some amount of new development taking place in the region in the foreseeable future. However, the development impacts of the continued operation of the NCCC are minimal, as no additional land is proposed to be developed. As a result, no cumulative impacts to land use, or to soils and geology, are anticipated to result within a regional context.

Water quality in both major surface water bodies adjacent to the PSDF and Plant Gaston sites, the Yellowleaf Creek and the Coosa River, are currently impaired. TMDLs developed for the water bodies address the lack of dissolved oxygen by putting restrictions on new sources of ammonia and oxygen-depleting nutrients in the water bodies, and, they address the elevated level of polychlorinated biphenyls by restricting new sources of polychlorinated biphenyls. The proposed project is not anticipated to contribute new or elevated sources of substances that decrease the dissolved oxygen or elevate the polychlorinated biphenyls concentrations in the water bodies. Additionally, continued operation and discharge of various process wastewaters from both the PSDF and Plant Gaston facilities are closely controlled and monitored to assure regulatory compliance for plant process waste water discharges; and to identify and address any potential conditions posing a threat to water quality in the vicinity of the project site area. Continued operation of plant intake structures provides important habitat for a Federally endangered species that requires turbulent waters for survival in a river area that has been so extensively modified that there are almost no free flowing water conditions in the Coosa River near the NCCC. As a result of the incremental contribution of water intake and discharge from

the facility operation proposed under this action, both long-term minute adverse and beneficial cumulative impacts to water resources and biological resources would result, respectively.

On an airshed level, the State of Alabama takes into account the effects of all past, present, and reasonably foreseeable emissions during the development of the SIP. The State of Alabama accounts for all significant stationary, area, and mobile emission sources in the development of this plan. Estimated emissions generated by the Proposed Action would be *de minimis* and would not be regionally significant. Therefore, it is not anticipated that the Proposed Action would contribute significantly to adverse cumulative effects to air quality. On an even larger scale, the proposed project has the potential to contribute long-term, major beneficial impacts towards the future reduction of domestic and global CO_2 emissions by providing key R&D activities in the efforts to develop cost-effective and efficient CO_2 capture technology.

4.9 MITIGATION MEASURES

All future actions proposed as part of this project should employ the following mitigation measures to ensure that environmental impacts from operation of the project are minimized to the greatest extent possible. Adherence to the following mitigation measures, in conjunction with adherence to all applicable and appropriate local, state, and Federal regulations and permits, should ensure that the development and operation of the -NCCC has no significant impacts to the environment.

Soil

- Store and maintain all fuels in a designated equipment staging area to reduce the potential for soil contamination. Closely monitor the fueling operation, and have an emergency spill kit containing absorption pads, absorbent material, a shovel or rake, and other cleanup items, readily available on site in the event of an accidental spill.

Water Resources

- To the extent practicable, sediment runoff from the site should be captured and prevented from entering area surface water bodies.

Air Quality

- Continue to implement reasonable measures, such as applying water to exposed surfaces or stockpiles of dirt, when windy and/or dry conditions promote problematic fugitive dust emissions. Adhering to these BMPs would minimize any fugitive dust emissions.

Waste Management

- Continue to recycle and/or reuse as many materials as possible during the operation phases of the project in order to minimize the amount of waste generated by the facilities. All hazardous waste and materials stored and/or generated at the development should be properly and uniformly labeled and housed in appropriate storage facilities.

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APPENDIX A

AIR EMISSIONS CALCULATIONS

Operational Emissions

The tables below show the potential emissions calculations and the actual emissions calculations from 2008 through 2012 for Nitrogen Dioxide, Sulfur Dioxide, Carbon Monoxide, Particulate matter, and Volatile Organic Compounds (VOCs). The calculations are based on emission factors obtained from air compliance testing for the respective years shown in Table A-1. The actual emissions are shown in Table A-3. The average of the Emission Factors was then used to calculate potential emissions shown in Table A-2. Based on the average emission factors for each of the respective pollutants, Nitrogen Dioxide and Sulfur Dioxide potential to emit exceeds the 100 tons per year threshold. Therefore the facility must submit a permit application for a major source. However, the facility could opt for a Synthetic Minor Operation Permit (SMOP) should it elect to take restrictions to keep SO_2 and NO_2 below the 100 tpy thresholds. The PSDF has elected not to apply for the SMOP even though the reduced hours of operations over the past five years show a trend that could support the SMOP.

An application was submitted to the Alabama Department of Environmental Management to renew the facility air permit. A new permit was issued in January 2011. In that application, the Foster Wheeler Process was removed from the permit and a 10.2 MBTu Process heater was added. The heater burns No. 2 diesel fuel and supplies heat for the lignite coal drying process when it is used. It is not used for sub-bituminous coal. The air permit did not require an emissions stack test and permitted emissions to be estimated from emission factors supplied by the heater manufacturer Cleaver Brooks. These emissions would then be added to other process emissions, KBR Gasifier, for total facility emissions. The emissions from the heater are given in Table A-3. Table A-4 is the Total Facility Emissions obtained by adding the KBR Gasifier emissions and the 10.2 MBTu Coal Drying Heater. These are given in tons per year for Potential to Emit and compared to Actual Emissions from compliance test data and hours of operation.

Table A-1. Five Year Hourly Emission Rates in Pounds per Hour for NO_2, SO_2, CO, PM, and VOCs, 2008 through 2012 for the KBR Gasifier and Five Year Average

Pollutant	2008	2009	2010	2011	2012	Total	Five Year Average
NO_2	32.9	31.2	20.6	20.9	28.5	134.1	26.8
SO_2	18.6	38.8	24.0	20.1	26.7	128.2	25.6
CO	0	0	0	0	0	0	0
PM	0.3	0.8	0.7	0.7	0	2.5	0.5
VOCs	0.4	0.1	0.2	0.1	0	0.8	0.2

Table A-2. Five Year Emission Summaries for the KBR Gasifier in Tons per Year, 2008 through 2012 and Five Year Average

Pollutant	2008	2009	2010	2011	2012	Total	Five Year Average
NO_2	15.1	21.6	15.3	22.2	18.3	92.5	18.5
SO_2	8.5	27.5	7.3	22.2	17.1	82.6	16.5
CO	0	0	0	0	0	0	0
PM	0.1	0.6	0.3	0.8	0.9	2.7	0.5
VOCs	0.4	0.1	0.2	0.1	0	0.8	0.2

Table A-3. Five Year Emission Summaries in Tons per Year, 2008 through 2012 and Five Year Average for the Coal Drying Process Heater

Pollutant	2008 (4)	2009	2010	2011	2012	Total	Five Year Average
NO_2	0.6	0.3	0.5	0	0	1.4	0.3
SO_2	0.3	0.2	0.3	0	0	0.8	0.2
CO	0.1	0.04	0.1	0	0	0.24	0.05
PM	0.1	0.07	0.1	0	0	0.27	0.05
VOCs	0.01	0.003	0.005	0	0	0.02	0.004

Table A-4. Potential Total Facility Emissions versus Actual Total Facility Emissions in Tons per Year Sum of KBR and Coal Drying Heater emissions

	KBR Process		Coal Drying Heater		Total Facility	
Pollutant	Potential [1]	Actual [2]	Potential [3]	Actual [4]	Potential	Actual
NO_2	117.4	18.5	8.3	0.3	125.7	18.8
SO_2	112.1	16.5	4.5	0.2	116.6	16.7
CO	0	0	1.7	0.05	1.7	0.05
PM	2.2	0.5	1.1	0.05	3.3	0.6
VOCs	0.9	0.2	0.09	0.002	1.0	0.2

1. Potential KBR process emissions are calculated from average emission factors from compliance tests from 2008 to 2012:

   NO_2 = 26.8 lbs/hr x 24 hr/day x 365 days/yr x 1 Ton/2000 lbs = 117.4
   SO_2 = 25.6 lbs/hr x 24 hr/day x 365 days/yr x 1 Ton/2000 lbs = 112.1
   CO = 0 lb/hr x 24 hrs/day x 365 days/yr x 1 Ton/2000 lbs = 0
   PM = 0.5 lbs/hr x 24 hrs/day x 365 days/yr x 1Ton/2000 lbs = 2.2
   VOCs = 0.2lb/hr x 24 hrs/day x 365 days/yr x 1 Ton/2000 lbs = 0.9

2. The KBR process actual annual emissions are the average annual emissions from 2008 to 2012.
3. Emission factors from heater manufacturer Cleaver Brooks. Heat input is 10.2 MBTu/hr. Potential emissions based on 24 hours and 365 days. Actual emissions based on hours the heater actually operated. Heater Potential to Emit and an example calculation for Heater Emissions in 2008 are given below.

Heater Emission Factors (Cleaver-Brooks)

NO_2 = 0.186 lb/MBtu
SO_2 = 0.1 lb/MBtu
CO = 0.039 lb/MBtu
PM = 0.025 lb/MBt
VOCs = 0.002 lb/MBtu

Potential to Emit: 24 hours per day and 365 days per year

NOx = 0.186 lb /MBtu x 10.2 MBtu/hr x 8760 hrs x 1 ton/2000 lb = 8.3 tons
SO_2 = 0.1 lb/MBtu x 10.2 MBtu/hr x 8760 hrs x 1 ton/2000 lb = 4.5 tons
PM = 0.025 lb/MBtu x 10.2 MBtu/hr x 8760 hrs x 1 ton/2000 lb = 1.1 tons
CO = 0.039 lb/MBtu x 10.2 MBtu/hr x 8760 hrs x 1 ton/2000 lb = 1.7 tons
VOCs = 0.002 lb/MBtu x 10.2 MBtu/hr x 8760 hrs x 1 ton/2000 lb = 0.09 ton

(4) From Table A-9

An example of heater emission calculations for 2008: Total hours in operation = 640

NOx	= 0.186 lb /MBtu x 10.2 MBtu/hr x 640 hr x 1 ton/2000 lb	= 0.6 ton
SO_2	= 0.1 lb/MBtu x 10.2 MBtu/hr x 640 hr x 1 ton/2000 lb	= 0.3 ton
PM	= 0.025 lb/MBtu x 10.2 MBtu/hr x 199 hr x 1 ton/2000 lb	= 0.1 ton
CO	= 0.039 lb/MBtu x 10.2 MBtu/hr x 199 hr x 1 ton/2000 lb	= 0.1 ton
VOCs	= 0.002 lb/MBtu x 10.2 MBtu/hr x 199 hr x 1 ton/2000 lb	= 0.01 ton

In May, 2013, a new regulation went into effect that covered Stationary Reciprocating Internal Combustion Engines 40 CFR Part 63 subpart ZZZZ. The NCCC Emergency Generator came under this regulation and is in compliance with this new regulation. To comply, a catalytic converter was added to the exhaust in order to reduce the CO content to 23 ppm. A compliance test was conducted on September 4th , 2013, by an outside contractor to confirm that it was in compliance.

APPENDIX B

AGENCY CORRESPONDENCE

Jun 24 2008 11:43AM USFWS 251-441-6222 p.1

2008-TA-0570 WTA/TM

THE MANGI ENVIRONMENTAL GROUP, INC.
7915 Jones Branch Dr. McLean VA 22102
703 760 4801 Fax 703 760 4899
www.mangi.com

RECEIVED JUN 2008 DAPHNE FIELD OFFICE

Viet Nam Veteran Owned

June 2, 2008

Bill Pearson, Field Supervisor
Daphne Ecological Services Field Office
U.S. Fish and Wildlife Service
1208-B Main Street
Daphne, AL 36526

Post-it® Fax Note 7671 | Date 6/24/08 | # of pages ▸ 2
To A. M. Lundin | FROM: Sandy M
Co./Dept. Mangi | Co.: USFWS
Phone # | Phone #: 251-441-5184
Fax # 703-760-4899 | Fax#: 251-441-6222

Dear Mr. Pearson:

The United States Department of Energy, National Energy Technology Laboratory (DOE/NETL) is preparing an Environmental Assessment (EA) to evaluate the proposed Carbon Research Center (CRC) project to be located at the existing Power Systems Development Facility (PSDF) plant near Wilsonville in Shelby County, Alabama. A small component of the CRC project would be located at the adjacent E.C. Gaston Generating Plant (*please reference enclosed maps*). The DOE/NETL has hired our firm to conduct the Environmental Assessment, and to assess the potential environmental, social, and cultural impacts attributable to the proposed project. We are soliciting your comments and concerns about potential impacts to wildlife or vegetation within, or in the vicinity of, the project area.

The PSDF is a facility designed and built to evaluate advanced coal-based power technologies at a scale large enough to provide meaningful data for scale-up and under conditions that would adequately represent temperature, pressure, and contaminant conditions of a commercial embodiment. Operation of the PSDF was initiated September 14, 1990, and is currently set to expire on September 30, 2008. However, research and development efforts at the PSDF, in the form of the CRC, are proposed for another 5-year period.

The initial EA for the development, construction, and operation of the PSDF was issued with a Finding of No Significant Impact (FONSI) in 1993. The proposed action currently being evaluated is for DOE to provide, through a 60-month cooperative agreement with Southern Company Services, Inc., financial assistance for the proposed development of the CRC Project at the PSDF plant. If approved, DOE would provide project assistance to test components and advanced power systems, including carbon (in the form of CO_2) capture technology, under realistic conditions using coal-derived gas streams.

No major modifications to existing operational permits for the PSDF are anticipated to be required as a result of the implementation of this action. No previously undisturbed ground would be developed. The project would primarily involve the installation of new components on existing facilities in order to research and develop carbon capture technologies, and, the continued operation of the PSDF facility for a period of 5 years.

Jun 24 2008 11:43AM USFWS 251-441-6222 p.2

2008-TA-0570

We request that you provide any information, issues, or concerns regarding the resources under your jurisdiction, per Section 7 of the Endangered Species Act, on or in the vicinity of the subject property by July 2, 2008. Please inform us of any current federally listed threatened or endangered species, species of concern, or any other special status species that might occur in the project area, and any designated critical habitats that may be present for these species. Please submit your comments or data resources to:

Roy G. Spears
NEPA Document Manager
National Energy Technology Laboratory
U.S. Department of Energy
3610 Collins Ferry Road
Morgantown, WV 26505

Comments can also be submitted by email (roy.spears@netl.doe.gov) or fax (304-285-4403). We look forward to your prompt response. Your assistance in this effort is greatly appreciated.

Sincerely,

Anna M. Lundin
Project Manager
Mangi Environmental Group

U.S. Fish and Wildlife Service
1208-B Main Street – Daphne, Alabama 36526
Phone: 251-441-5181 Fax: 251-441-6222

No federally listed species/critical habitat are known to occur in the project area. As described, the project will have no significant impact on fish and wildlife resources. IF PROJECT DESIGN CHANGES ARE MADE, PLEASE SUBMIT NEW PLANS FOR REVIEW. We recommend use of best management practices specific to your project (See http://www.fws.gov/daphne/section7/bmp.html).

William J. Pearson, Field Supervisor — Date 6/24/08 — #3

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

FRANK W. WHITE
EXECUTIVE DIRECTOR

TEL: 334-242-3184
FAX: 334-240-3477

June 27, 2008

Anna M. Lundin
MANGI Environmental Group
7915 Jones Branch Drive
McLean Virginia 22102

Re: AHC 08-0852
Carbon Research Center
E. C. Gaston Generation Plant
Shelby County, Alabama

Dear Ms. Lundin:

Upon review of the above referenced project, we have determined that the project activities will have no effect on any known cultural resources listed on or eligible for the National Register of Historic Places. Therefore, we concur with the proposed project activities.

However, should artifacts or archaeological features be encountered during project activities, work shall cease and our office shall be consulted immediately. Artifacts are objects made, used or modified by humans. These include but are not limited to arrowheads, broken pieces of pottery or glass, stone implements, metal fasteners or tools, etc. Archaeological features are stains in the soil that indicate disturbance by human activity. Some examples are postholes, building foundations, trash pits and even human burials. This stipulation shall be placed on the construction plans to insure contractors are aware of it.

We appreciate your efforts on this project. Should you have any questions, the point of contact for this matter is Greg Rhinehart at (334) 230-2662. Please have the AHC tracking number referenced above available and include it with any correspondence.

Truly yours,

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/GCR/gcr

THE STATE HISTORIC PRESERVATION OFFICE
www.preservealа.org