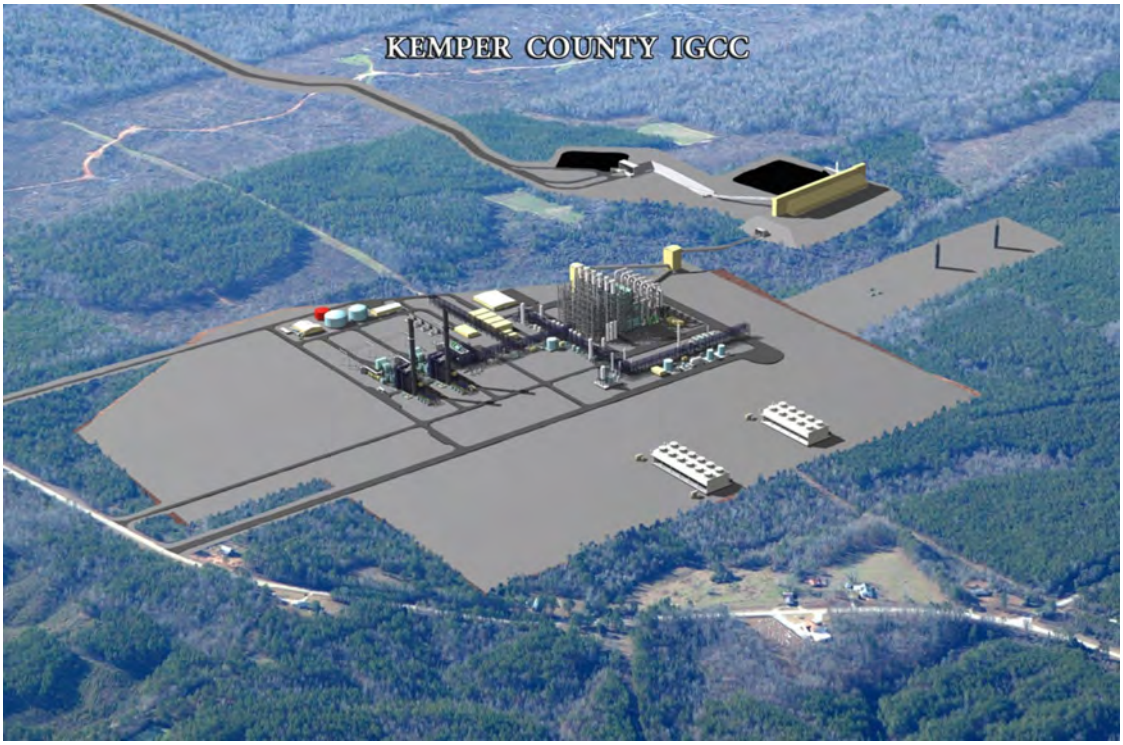
U.S. Department of Energy
in cooperation with
U.S. Army Corps of Engineers

KEMPER COUNTY IGCC PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

DOE/EIS-0409D

VOLUME 1



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LEAD AGENCY

U.S. Department of Energy (DOE)

COOPERATING AGENCY

U.S. Army Corps of Engineers (USACE)

TITLE

Kemper County Integrated Gasification Combined-Cycle (IGCC) Project, Draft Environmental Impact Statement (EIS) (DOE/EIS-0409D)

LOCATION

Kemper County, Mississippi

CONTACTS

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ABSTRACT

This Draft EIS assesses the potential environmental impacts that would result from a proposed DOE action to provide cost-shared funding and possibly a loan guarantee for construction and operation of advanced power generation plant in Kemper County, Mississippi. The project was selected under DOE's Clean Coal Power Initiative to demonstrate IGCC technology. Mississippi Power also was invited to submit a formal application for a loan guarantee under the Energy Policy Act of 2005. The power generation components (i.e., coal gasifiers, synthesis gas [syngas] cleanup systems, combined-cycle unit, and supporting infrastructure) would convert coal into syngas to drive gas combustion turbines, and hot exhaust gas from the gas turbines would generate steam from water to drive a steam turbine. Combined, the three turbines would generate a nominal 582 megawatts (MW) of electricity. Although DOE funding would support only the IGCC power plant, the project would include new electrical power transmission lines and upgrades of some existing transmission lines, a surface lignite mine, a natural gas supply pipeline, a reclaimed water supply pipeline, and a carbon dioxide pipeline. The construction and operation of these facilities are considered connected actions in this Draft EIS.

The Draft EIS evaluates potential impacts of the proposed facilities on air quality, geology, water resources, floodplains, wetlands, ecological resources, land use, aesthetics, social and economic resources, waste management, noise, and human health and safety. The EIS also evaluates potential impacts on these resource areas for the no-action alternative, under which DOE would not provide cost-shared funding or a loan guarantee and the power plant and connected action facilities would likely not be built.

The U.S. Army Corps of Engineers is a cooperating agency in the preparation of this EIS and will consider the environmental impacts for the evaluation of Department of the Army permits in accordance with Section 404 of the Clean Water Act for stream and wetland disturbances related to the proposed mine, power plant project, power transmission lines, and pipelines.

In preparing the Final EIS, DOE will consider all comments received or postmarked during the 45-day public comment period that will begin when the U.S. Environmental Protection Agency publishes a Notice of Availability of this Draft EIS in the Federal Register. DOE will consider late comments to the extent practicable.

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LIST OF ACRONYMS AND ABBREVIATIONS

$/kW	dollar per kilowatt
°C	degree Celsius
°F	degree Fahrenheit
µg/L	microgram per liter
µg/m^3	microgram per cubic meter
µm/minute	micrometer per minute
µmhos/cm	micromhos per centimeter
10^6 gal/yr	million gallons per year
10^{-6} lb/MWh	0.00001 pound per megawatt-hour
10^6 scf/yr	million standard cubic feet per year
7Q10	7-day, consecutive low-flow with a 10-year return frequency
AAB	Jackson International Airport
AADT	average daily traffic
ac-ft	acre-foot
ADEM	Alabama Department of Environmental Management
AEGL	acute exposure guideline level
AERMOD	American Meteorological Society (AMS)/EPA Regulatory Model
AFM	acid-forming material
AGR	acid gas removal
ALOHA	Areal Locations of Hazardous Atmospheres
AM	amplitude-modulated
AMD	acid mine drainage
AMS	American Meteorological Society
ANSI	American National Standards Institute
APE	area of potential effect
AQI	air quality index
AQRVs	air quality-related values
ASHRAE	American Society of Heating,Refrigerating and Air-Conditioning Engineers, Inc.
AST	aboveground storage tank
ATV	average traffic volume
AUM/ac	animal unit month† per acre
BACT	best available control technology
BAT	best available technology
BBS	Breeding Bird Survey
BCD	Biological Conservation Database
BF	bottomland forest
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	best management practice
bpf	blows per foot
BPIP	Building Profile Input Program
BSSC	Building Seismic Safety Council
Btu/kWh	British thermal unit per kilowatt-hour
Btu/lb	British thermal units per pound
bu/ac	bushel per acre

C	active construction
CAA	Clean Air Act
$CaCO_3$	calcium carbonate
CAIR	Clean Air Interstate Rule
CBC	Christmas Bird Count
CCPI	Clean Coal Power Initiative
CCSP	U.S. Climate Change Science Program
CDHS	California Department of Health Services
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic foot per second
cfs/mi^2	cubic foot per second per square mile
cm	centimeter
cmbs	centimeter below surface
CNA	Central North America
CO	carbon monoxide
CO_2	carbon dioxide
COS	carbonyl sulfide
CPCN	Certificate of Public Convenience and Necessity
CT	combustion turbine
CWA	Clean Water Act
DAT	deposition analysis threshold
dBA	A-weighted decibel
dbh	diameter at breast height
DGPS	digital global positioning system
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DSM	demand-side management
Eagle Act	Bald and Golden Eagle Protection Act of 1940
ECT	Environmental Consulting & Technology, Inc.
EEOC	U.S. Equal Employment Opportunity Commission
EIA	Energy Information Agency
EIS	environmental impact statement
ELF	extremely low frequency
EMEPA	East Mississippi Electric Power Association
EMF	electric and magnetic field
EOR	enhanced oil recovery
EPA	U.S. Environmental Protection Agency
EPAct05	Energy Policy Act of 2005
EPT	Ephemeroptera + Plecoptera + Trichoptera
ERPGs	Emergency Response Planning Guidelines
ES&EE	Earth Science & Environmental Engineering
ESA	Endangered Species Act of 1973
F	open field
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FFPPA	Federal Farmland Protection Policy Act

FGD	flue-gas desulfurization
FHWA	Federal Highway Administration
FLAG	Federal Land Managers' Air Quality-Related Values Workgroup
FLM	Federal Land Managers
FM	frequency-modulated
FR	*Federal Register*
ft	foot (feet)
ft bls	foot below land surface
ft/day	foot per day
ft/day/ft	foot per day per foot
ft^2/day	square foot per day
ft^3	cubic foot
ft^3/hr	cubic foot per hour
ft-msl	feet above mean sea level
ft-NGVD	feet National Geodetic Vertical Datum
G	gas pipeline corridors
g/cm^3	gram per cubic centimeter
$g/m^2/yr$	gram per square meter per year
GAQM	Guideline on Air Quality Models
GCP	good combustion practice
GHG	greenhouse gas
GIS	geographical information system
GLO	General Land Office
gpd	gallon per day
gpd/ft	gallon per day per foot
gpd/ft^2	gallon per day per square foot
gpm	gallon per minute
gpm/ft	gallon per minute per foot
GPS	global positioning system
gr/dscf	grain per dry standard cubic foot
GS	G sand interval
GSA	Geological Society of America
H	hardwoods
H'	taxa diversity index
H_2	hydrogen
H_2O	water
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HABS	Historic American Building Survey
HAP	hazardous air pollutant
HAS	habitat assessment score
HCN	hydrogen cyanide
HDPE	high-density polyethylene
Hg_p	particle-bound mercury
HHV	higher heating value
HP	hardwood-pine
hr/yr	hour per year
HRSG	heat recovery steam generator
HUD	Department of Housing and Urban Development
Hz	Hertz

I-10	Interstate 10
I-20	Interstate 20
I-59	Interstate 59
IARC	International Agency for Research on Cancer
IBC	International Building Code
ICNIRP	International Commission on non-Ionizing Radiation Protection
IDLH	immediately dangerous to life or health
IGCC	integrated gasification combined-cycle
IRP	integrated resource plan
IRS	Internal Revenue Service
ISO	International Standards Organization
JS	J sand interval
KBR	Kellogg Brown & Root, Inc.
KCS	Kansas City Southern
Kf	soil erodibility of the fine-earth fraction (material less than 2 millimeters in size)
kg/ha/yr	kilogram per hectare per year
kg/km^2/month	kilogram per square kilometer per month
kg/m^3	kilogram per cubic meter
km	kilometer
kV	kilovolt
lb	pound
lb CO_2/MWh	pound of carbon dioxide per megawatt-hour
lb/ac	pound per acre
lb/ft^2	pound per square foot
lb/hr	pound per hour
lb/min	pound per minute
lb/MMBtu	pound per million British thermal units
lb/MWh	pound per megawatt-hour
lb/yr	pound per year
LCOE	levelized cost of electricity
L_{dn}	day-to-night sound level
L_{eq}	equivalent sound level
lf	linear foot
LOS	level of service
LPN	listing priority number
LWA	Lower Wilcox aquifer
MACT	maximum achievable control technology
MARIS	Mississippi Automated Resource Information System
M_b	body-wave magnitude
MBCI	Mississippi Band of Choctaw Indians
MCEQ	Mississippi Commission on Environmental Quality
MCL	maximum contaminant level
MDA	Mississippi Development Authority
MDAH	Mississippi Department of Archives and History
MDEQ	Mississippi Department of Environmental Quality
MDEQ SMCRA Regulations	Regulations Governing Surface Coal and Mining in Mississippi adopted by MDEQ's MCEQ
MDOT	Mississippi Department of Transportation
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks

MEI	Meridian Key Field Airport
meq/100g	milli-equivalent per 100 grams
mg/kg	milligram per kilogram
mg/L	milligram per liter
MGD	million gallons per day
mi^2	square mile
mills/kWh	0.1 cent per kilowatt-hour
Mississippi Power	Mississippi Power Company
MM5	Version 5 of the Penn State/NCAR Mesoscale Model
MMbtu/hr	million British thermal units per hour
mmhos/cm	millimhos per centimeter
MNHP	Mississippi Natural Heritage Program
MOA	Memorandum of Agreement
MODFLOW	Modular Three-Dimensional Finite Difference Ground Water Flow Model
mph	mile per hour
MS	Mississippi State Highway
MSDH	Mississippi State Department of Health
MSHA	Federal Mining Safety and Health Act
MSMRA	Mississippi Surface Mining and Reclamation Act of 1977
MW	megawatt
MWA	Middle Wilcox aquifer
MWh/yr	megawatt-hour per year
MWQCIIC	Mississippi's Water Quality Criteria for Intrastate, Interstate, and Coastal Waters
N_2	nitrogen
NAAQS	national ambient air quality standard
NACC	North American Coal Corporation
NADP	National Atmospheric Deposition Program
NAS	Naval Air Station
NCDC	National Climatic Data Center
NCEDC	Northern California Earthquake Data Center
ND	not detected above method detection limits
NEHRP	National Earthquake Hazards Reduction Program
NEIC	National Earthquake Information Center
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
New South	New South Associates, Inc.
NGCC	natural gas combined-cycle
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NIOSH	National Institute for Occupational Safety and Health
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPB	National Radiation Protection Board
NSPS	New Source Performance Standards

NSR	New Source Review
NTU	nephelometric turbidity units
NWI	National Wetlands Inventory
NWS	Norfolk Southern Systems
O&M	operation and maintenance
OLF	outlying landing field
OLWR	Office of Land and Water Resources
OPC	Office of Pollution Control
OSHA	Occupational Safety and Health Administration
OUC	Orlando Utilities Commission
PAC	protection action criteria
PAC	process air compressor
PAH	polynuclear aromatic hydrocarbon
PC	pulverized coal
PCB	polychlorinated biphenyl
PGA	peak ground acceleration
PH	pine-hardwood
PHMSA	Pipeline and Hazardous Materials Safety Administration
PHWD	Pat Harrison Waterway District
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 micrometers
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers
POM	polycyclic organic matter
POTW	publically owned treatment works
PP	planted pine
ppb	part per billion
ppm	part per million
ppmv	part per million by volume
ppmvd	part per million by dry volume
PRIME	plume rise model enhancement
PSC	Public Service Commission
PSD	Prevention of Significant Deterioration
PSDF	Power Systems Development Facility
psi	pound per square inch
psia	pound per square inch absolute
QA/QC	quality assurance/quality control
R	road
R/C	residential/commercial
RBA	rapid bioassessment
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RGM	reactive gaseous divalent mercury (Hg^{2+})
RHPP	Red Hills Power Project
RIMS	Regional Industrial Multiplier System
RMP	risk management plan
ROD	Record of Decision
RV	recreational vehicle

S	shrubland
s.u.	standard unit
SA	spectral acceleration
scf	standard cubic foot
SCR	selective catalytic reduction
SCS	Southern Company Services, Inc.
SFWMD	South Florida Water Management District
SIA	significant impact area
SIL	significant impact level
SIP	State Implementation Plan
SMCRA	Surface Mine Control and Reclamation Act
SMEPA	South Mississippi Electric Power Association
SNG	Southern Natural Gas
SO_2	sulfur dioxide
SO_3	sulfur trioxide
SO_x	sulfur oxides
SPCC	spill prevention, control, and countermeasure
SPLP	synthetic precipitation leaching procedure
SPR	strategic petroleum reserve
SPT	standard penetration test
STEL	short-term exposure limit
SWPPP	stormwater pollution prevention plan
syngas	synthesis gas
T	soil loss tolerance
t/1000t	ton of material
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TFM	toxic-forming materials
TGPL	Tennessee Gas Pipeline Company
THPO	Tribal Historic Preservation Officer
TMD	toxic material drainage
TMDL	total maximum daily load
tpd	ton per day
tph	ton per hour
tpy	ton per year
TRIG™	Transport Integrated Gasification
TSS	total suspended solids
TVA	Tennessee Valley Authority
TVAR	Tennessee Valley Archaeological Research
U.S. 45	U.S. Highway 45
U.S. 78	U.S. Highway 78
U.S. 80	U.S. Highway 80
U.S.C.	United States Code
UB	underburden
UHF	ultra high frequency
UIC	underground injection control
UNEP	United Nations Environment Programme
URE	unit risk estimate
URF	unit risk factors
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
V/m	volts per meter
VHF	very high frequency
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
Vittor	Barry Vittor & Associates, Inc.
VMT	vehicle-mile traveled
VOC	volatile organic compound
WGS	water gas shift
WHO	World Health Organization
WIC	Women, Infants, and Children
WMA	Wildlife Management Area
WMO	World Meteorological Organization
WPA	Works Progress Administration
WRAP	Wetland Rapid Assessment Procedure
WRDA	Water Resources Development Act
WRIR	Water Resources Investigation Report
WSA	wet gas sulfuric acid
WSS	Web Soil Survey
WWTP	wastewater treatment plant

GLOSSARY

100-year floodplain	Land that becomes or will become submerged by a flood that has a chance to occur every 100 years.
7Q10	Seven-day low flow average with a 10-year recurrence interval.
acre-foot	The volume that would cover one acre to a depth of one foot.
aerodynamic diameter	A term used to describe particles with common aerodynamic properties, which avoids the complications associated with varying particle sizes, shapes, and densities. For example, PM_{10} is defined in 40 CFR Part 50 as consisting of particles 10 micrometers or less in aerodynamic diameter, meaning particles that behave aerodynamically like spherical particles of unit density (1 gram per cubic centimeter) having diameters of 10 micrometers or less.
aerosol	A suspension of fine solid or liquid particles in a gas.
aesthetics	The perception of appearance of features in relation to one's sense of beauty.
air dispersion model	A computer program that incorporates a series of mathematical equations used to predict downwind concentrations in the ambient air resulting from emissions of a pollutant. Inputs to a dispersion model include the emission rate; characteristics of the emission release such as stack height, exhaust temperature, and flow rate; and atmospheric dispersion parameters such as wind speed and direction, air temperature, atmospheric stability, and height of the mixed layer.
air quality	The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150% of its standard, even if levels of other pollutants are well below their respective standards).
alluvial	Relating to clay, silt, sand, gravel, or similar detrital material deposited by running water.
alternative	One of two or more things, courses, or propositions to be chosen.
ambient	The surrounding environment or atmosphere.
ambient noise	Background noise associated with a given environment. Ambient noise is typically formed as a composite of sounds from many near and far sources, with no particular dominant sound.
ancillary	Subsidiary or supplementary.
anion	A negatively charged ion.
anticline	A geologic fold that is arch-like in form, with rock layers dipping outward from both sides of the axis, and older rocks in the core. The opposite of syncline.

approximate original contours	Surface configuration achieved by backfilling and grading of the mined area, such that the reclaimed area closely resembles the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain.
aquatic	Characteristics of or pertaining to water.
aquifer	A subsurface saturated rock unit (formation, group of formations, or part of a formation) of sufficient permeability to transmit groundwater and yield usable quantities of water to wells and springs.
aquitard	Low permeability units that can restrict the flow of groundwater from one aquifer to another.
archaeological resources	Material remains of past activity.
area of potential effect (APE)	The geographic region that may be impacted as a result of the construction and operation of the Proposed Action or alternatives.
arterial highway	Highway generally characterized by its ability to quickly move a relatively large volume of traffic, but often with restricted capacities to serve abutting properties. The arterial system typically provides for high travel. The rural and urban arterial highway systems are connected to provide continuous through movements.
artesian	Groundwater conditions in which water in wells rises above its level in the aquifer, including conditions in which groundwater rises to the ground surface or above.
ash	The mineral content of a product remaining after complete combustion.
ash management unit	Area designated within the generation facility boundary for the management of ash for beneficial use or storage.
attainment	Those areas of the U. S. that meet National Ambient Air Quality Standards as determined by measurements of air pollutant levels.
attenuate	To lessen the amount of force, magnitude, or value of something.
A-weighted scale	Assigns a weight to sound frequencies that is related to how sensitive the human ear is to each sound frequency. Frequencies that are less sensitive to the human ear are weighted less than those for which the ear is more sensitive. A-weighted measurements indicate the potential damage a noise might cause to hearing.
baghouse	An air pollution control device that filters particulate emissions, consisting of a bank of bags that function like a vacuum cleaner bag to intercept particles that are mostly larger than 10 micrometers in aerodynamic diameter.
baseline	Existing conditions of the environment.
bedrock	The rock of Earth’s crust that is below the soil and largely unweathered.
bench	A leveled area near the pit that provides a safe location for the equipment to operate.
beneficiation	The process of washing or otherwise cleaning coal to increase the energy content by reducing the ash content.

benthic invertebrates	An animal lacking a spinal column and living on lake and stream bottoms.
berm	A mound or wall of earth.
best management practice (BMP)	A practice, or combination of practices, that is determined to be the most effective, practical means of preventing or reducing non-point source pollution to a level compatible with maintaining water quality.
biocide	A substance (e.g., chlorine) that is toxic or lethal to many organisms and is used to treat water.
biomass	The amount of living matter, as in a unit area or volume of habitat.
blasting	Use of explosives to loosen consolidated overburden materials or lignite.
blowdown	Portion of circulating cooling tower water (or steam or water removed from a boiler) removed to maintain the amount of dissolved solids and other impurities at an acceptable level.
boiler	A pressurized system in which water is vaporized to steam, the desired end product, by heat transferred from a source of higher temperature, usually the products of combustion from burning fuels.
brackish	Water that has high concentrations of salts, but that may still be suitable for some uses.
brine	Water saturated with salt.
building downwash	The downward movement of an elevated plume toward the area of low pressure created on the lee side of a structure in the wake around which the air flows.
capacity factor	The percentage of energy output during a period of time, compared to the energy that would have been produced if the equipment operated at its maximum power throughout the period.
carbon dioxide (CO_2)	A colorless, odorless, nonpoisonous gas that results from fossil fuel combustion and is normally a part of the ambient air.
carbon monoxide (CO)	A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.
carcinogenic	Capable of producing or inducing cancer.
cation	A positively charged ion.
census tract	A small, relatively permanent statistical subdivision of a county. Census tracts, which average about 4,000 inhabitants, are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions.
Class I area	Under the Clean Air Act, a Class I area is one in which visibility is protected more stringently than under the national ambient air quality standards, with only a small increase in pollution allowed. Class I areas include national parks, wilderness areas, monuments, and other areas of special national and cultural significance. Only very slight deterioration of air quality is allowed in Class I areas.

Class II area	Most of the country not designated as Class I is designated as Class II. Class II areas are generally cleaner than air quality standards, and moderate increases in new pollution are allowed after a regulatory mandated impacts review.
Clean Water Act	Primary federal law governing water pollution. The Clean Water Act's (CWA's) goals include eliminating toxic substance releases to water, eliminating additional water pollution, and ensuring that surface waters meet standards necessary for human sports and recreation (see National Pollutant Discharge Elimination System).
coal gasification	A process that converts coal into a gaseous product, which involves crushing coal into a powder and heating the powder in the presence of steam and oxygen in a reducing or sub-stoichimetric atmosphere. After impurities (e.g., sulfur) are removed, the gas can be used as a fuel or further processed and concentrated into a chemical or liquid fuel.
Combined-cycle electric power plant	A power plant that uses both a steam turbine generator and a combustion turbine generator at one location to produce electricity.
combustion turbine (CT)	A gas turbine that burns natural gas, fuel oil, or other similar fuels and drives a turbine and generator to produce electricity, and is typically used as the primary generator of electricity in a combined cycle installation.
combustor	Equipment in which coal or other fuel is burned at high temperatures.
conductivity	The ability to carry an electrical charge in ions. The conductivity of aqueous solutions is increased by dissolved salts, and thus is a measure of the amount of ionized salts in solution.
confined aquifer	An aquifer that is bounded by two confining units, and in which the water level in wells usually rises above the top of the aquifer.
confining unit	A geologic formation or bed that has lower permeability than layers above and below it, and therefore restricts vertical water movement. (Confining units are also called aquitards.)
conservative	As applied to calculations or estimates, assumptions that would tend to over-estimate the calculated or estimated impact or cause the impact to be at the high end of the plausible range.
contaminant	A substance that contaminates (pollutes) air, soil, or water. It may also be a hazardous substance that does not occur naturally or that occurs at levels greater than those that occur naturally in the surrounding environment.
contamination	The intrusion of undesirable elements (unwanted physical, chemical, biological, or radiological substances; or matter that has an adverse effect) to air, water, or land.
contiguous	Adjacent or touching.
continuous equivalent sound level	Steady-state decibel level which would produce the same A-weighted sound energy over a stated period of time as an equivalent sound over time.
conveyor system	Method used to transport material in a continuous fashion, consisting of a drive, belt, pulleys, and conveyor stands. Material is placed on the belt and is moved by rotating the belt over pulleys.

cooling tower	A structure that cools heated condenser water by circulating the water along a series of louvers and baffles through which cool, outside air convects naturally or is forced by large fans.
cooling tower drift	The dispersion and deposition of wet or dry aerosols emitted from natural or mechanical draft cooling towers.
cooling water	Water that is heated as a result of being used to cool steam and condense it to water.
corona noise	Noise caused by partial discharges on insulators and in air surrounding electrical conductors of overhead power lines. Corona noise level is dependent on weather conditions.
criteria	Standards on which a judgment or decision may be based.
croplands	Lands used for growing agricultural crops such as soybeans and corn.
cultural resources	Archaeological sites, historical sites (e.g., standing structures), Native-American resources, and paleontological resources.
cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
day-night	A-weighted equivalent decibel level for a 24-hour period with an additional 10-dB.
decibel (dB)	A unit for expressing the relative intensity of sounds on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans.
deciduous	Shedding leaves at a certain season.
demand-side management	Activities which influence electricity use on the customer’s side of the meter.
density	Ratio of a substance's weight relative to its volume.
dissolution	Process of dissolving a substance into a liquid.
disturbed area	Any area where vegetation, topsoil, or overburden is removed or upon which spoil is placed.
diversions	The amount of water taken from a stream, spring, or well by channel, embankment, or other man-made structure constructed for the purpose of diverting water from one area to another.
dragline	An electric-powered excavating machine used for digging or removal of overburden with a large capacity bucket that is lowered and raised by dragging in, paying out, hoisting, and lowering the wire rope attached to the bucket.
drawdown	The process by which the water table adjacent to a well is drawn down after active pumping from an aquifer.

dredged material	Material that is dredged or excavated from waters of the United States, including wetlands.
duct firing	Supplemental firing of fuel in burners within a heat recovery steam generator (HRSG) as a means of increasing steam production or temperature and, correspondingly, power generated by a steam turbine.
ecosystem	A community and its environment treated together as a functional system of complementary relationships involving the transfer and circulation of energy and matter.
effects	The consequences or results of an action; synonymous with impacts. Includes direct effects caused by an action that occur at the same time and place, and indirect effects caused by an action that are later in time or further removed in distance but still reasonably foreseeable. Potential effects can be adverse, beneficial, cumulative, irretrievable, irreversible, long-term, or short-term.
effluent	Waste stream flowing into the atmosphere, surface water, groundwater, or soil.
electric and magnetic fields (EMF)	Two types of energy fields which are emitted from any device that generates, transmits, or uses electricity.
emergent	Erect, rooted herbaceous plants, such as cattails and bulrush, which dominate wetlands.
emission	A material discharged into the atmosphere from a source operation or activity.
endangered species	Any species in danger of extinction throughout all or a significant portion of its range or territory.
environmental justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies. Executive Order 12898 directs Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations.
epicenter	Area on the earth's surface directly above the focus of an earthquake.
equivalent sound (L_{eq})	Weighting imposed on the equivalent sound levels occurring during nighttime.
erosion	The process by which particles of soils or other material are removed and transported by water, wind, and/or gravity to some other area.
evaporation	A physical process by which a liquid is transformed into a gaseous state.
evapotranspiration	The amount of water removed from a land area by the combination of direct evaporation and plant transpiration.
fault	A fracture or fracture zone in rock along which the sides have been displaced vertically or horizontally relative to one another.

fecal coliforms	A large and varied group of bacteria flourishing in the intestines and feces of warm-blooded animals, including man. Large amounts of fecal bacteria in water indicate sewage, feedlot, or other animal waste pollution.
fill material	Material used for the primary purpose of replacing an aquatic or wetland area with dry land, or changing the bottom elevation of a waterway.
floodplain	Flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding.
flue gas	Residual gases after combustion that are vented to the atmosphere through a flue or chimney.
fluvial	Relating to, or produced by, stream or river action.
fly ash	The small ash particles that are carried out of a combustor with the flue gas.
formation	The primary unit associated with formal geological mapping of an area. Formations possess distinctive geological features and can be combined into "groups" or subdivided into "members."
fossil fuel	Coal, including lignite, oil, or natural gas, formed from vegetation and animals under high pressure and temperatures during a past geological age.
fragipan horizon	A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard and has a higher bulk density than the horizon or horizons above.
frequency	The number of cycles of completed occur[r]ences per unit of time of a sound wave, most often measured in Hertz.
fresh water	Water with a low concentration of salts (typically less than 1,000 parts per million of dissolved solids).
fugitive dust	Particulate matter composed of soil; can include emissions from haul roads, wind erosion of exposed surfaces, and other activities in which soil is removed and redistributed.
fugitive emissions	Air pollutant emissions that cannot be traced to a particular point source.
gasification	Conversion process of fuel to gas or a gas-like phase.
Gaussian	Concentrations of pollutants downwind of a source are assumed to form a normal distribution (i.e., bell-shaped curve) from the centerline of the plume in the vertical and lateral directions.
generation facility	Electrical power generating station.
geographic	Belonging to or characteristic of a particular region.
geologic sequestration	CO_2 capture and storage in deep underground geologic formations.

global warming	The theory that certain gases such as carbon dioxide, methane, and chlorofluorocarbon in the earth's atmosphere effectively restrict radiation cooling, thus elevating the earth's ambient temperatures or creating a greenhouse effect.
greenhouse gas (GHG)	Gas that contributes to the greenhouse effect by absorbing infrared radiation and ultimately warming the atmosphere. GHGs include water vapor, nitrous oxide (NO_x), methane, CO_2, ozone (O_3), halogenated fluorocarbons, hydrofluorocarbons, and perfluorinated carbons.
groundwater	Water within a geologic stratum that supplies wells and springs.
habitat	The environment occupied by individuals of a particular species, population, or community.
hazardous air pollutant (HAP)	Air pollutants that are not covered by ambient air quality standards but that present, or may present, a threat of adverse health or environmental effects. These include an initial list of 189 chemicals designated by Congress that is subject to revision by the EPA.
hazardous waste	A by-product of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special Environmental Protection Agency lists.
haze	Atmospheric moisture, dust, smoke, and vapor suspended to form a partly opaque condition.
heat rate	Amount of heat required (usually in Btu) to produce an amount of electricity (usually in kW-hr).
heavy metals	Natural trace elements such as lead, mercury, cadmium, and nickel, that are leachable and potentially toxic.
herbicide	Any substance or mixture of substances intended to prevent the growth of or destroy unwanted plants or vegetation.
heterogeneity	The quality or state of consisting of dissimilar ingredients or constituents.
highwall	The face of exposed overburden and lignite in an open cut of a surface mine.
historic property	Prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places.
historic site	A site that is more than 50 years old.
hydrology	A science dealing with the properties, distribution, and circulation of water on the surface of the land, in the soil and the underlying rocks, and in the atmosphere.
impacts	The consequences or results of an action; synonymous with effects.
impoundment	A body of water confined by a dam, dike, floodgate, or other barrier.

industrial and/or process waste	Any liquid, solid, semisolid, or gaseous waste generated when manufacturing a product or performing a service. Examples include cutting oils; paint sludges; equipment cleanings; metallic dust sweepings; used solvents from parts cleaners; and off-specification, contaminated, or recalled wholesale or retail products. The following wastes are not industrial process wastes: uncontaminated packaging materials, uncontaminated machinery components, general household waste, landscape waste, and construction or demolition debris.
infiltration	The process of water entering the soil at the ground surface and the ensuing movement downward. Infiltration becomes percolation when water has moved below the depth at which it can return to the atmosphere by evaporation or evapotranspiration.
infrastructure	The underlying foundation of basic framework, as in a system or organization.
integrated gasification combined-cycle (IGCC)	A process that uses synthesis gas derived from coal to drive a gas combustion turbine and exhaust gas from the gas turbine to generate steam from water to drive a steam turbine.
integrated resource planning	A utility planning process that evaluates supply-side resources and demand-side resources on a level field to reliably meet the future energy needs of customers.
irretrievable commitments	Those that are lost for a period of time.
irreversible commitments	Those that cannot be reversed, except perhaps in the extreme long term.
issue	An expressed concern regarding the scope and analyses included in an EIS.
landfill	Waste disposal method where waste material is stockpiled until the landfill is full, at which time the material is buried and reclaimed in accordance with the applicable regulations for that type of landfill.
laydown area	Material and equipment storage area during the construction phase of a project.
leachate	Solution or product obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.
level of service (LOS)	Measure of traffic operation effectiveness on a particular roadway facility type.
lignite	A brownish-black coal in which the alteration of vegetal matter has proceeded farther than peat, but not so far as sub-bituminous coal.
lignite seam	A distinct layer of lignite with the potential to be mined
lithic scatters	Concentrations of waste flakes resulting from the manufacture of stone tools.
lithological	Pertaining to the study of rocks and rock formations.
loam	A soil composed of a mixture of clay, silt, sand, and organic matter.
long-term	Occurring over or involving a relatively long period time.

low income population	A community that has a proportion of low-income population greater than the respective average. Low income populations in an affected area should be identified with the annual statistical poverty thresholds from Bureau of the Census Current Population Reports, Series P-60, Income and Poverty.
magnitude (of an earthquake)	A quantity that is characteristic of the total energy released by an earthquake. Magnitude is determined by taking the common logarithm of the largest ground motion recorded on a seismograph during the arrival of a seismic wave type and applying a standard correction factor for distance to the epicenter. A one-unit increase in magnitude (e.g., from magnitude 6 to magnitude 7) represents a 30-fold increase in the amount of energy released.
makeup pond	Pond used to store makeup for cooling water.
Maximum contaminant level goal (MCLG)	The maximum concentration of a substance in drinking water at which there is no known or anticipated adverse effect on human health, and which allows an adequate margin of safety, as determined by the U.S. Environmental Protection Agency.
mean sea level	Average ocean surface height at a particular location for all stages of the tide over a specified time interval (generally 19 years).
Megawatt (MW)	Unit of power equal to one million watts or 1,000 kilowatts (kW). A power plant with 1 MW of capacity operating continuously for a year could supply electricity to approximately 750 households.
metamorphic rocks	Rocks that have undergone chemical or structural changes produced by an increase in heat and temperature or by replacement of elements by hot, chemically active fluids.
meteorology	The science dealing with weather and weather conditions.
minority	Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.
minority population	Identified where either the affected area's minority population exceeds 50 percent or the affected area's minority population percentage is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.
mitigation	Efforts to lessen the severity or to reduce adverse impacts: including avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action; repairing, rehabilitating or restoring the affected environment; reducing or eliminating the impact over time by preservation; and compensating for the impact by replacing or providing substitute resources or environments.
mixing height	The height in the lower atmosphere within which relatively vigorous mixing of pollutant emissions occurs.
monitoring	Periodic or continuous determination of the amount of substances present in the environment.

National Ambient Air Quality Standards (NAAQS)	Uniform, national air quality standards established by the Environmental Protection Agency that restrict ambient levels of certain pollutants to protect public health (primary standards) or public welfare (secondary standards). Standards have been set for ozone, carbon monoxide, particulates, sulfur dioxide, nitrogen dioxide, and lead.
National Energy Policy	The National Energy Policy (NEP), developed by the National Energy Policy Development Group in 2001 with members of the President's cabinet, is based on three principles: provide a long-term, comprehensive energy strategy; advance new, environmentally-friendly technologies to increase energy supplies and encourage cleaner, more efficient energy use; and seek to raise the living standards of the American people, recognizing that to do so our country must fully integrate its energy, environmental, and economic policies.
National Environmental Policy Act	Signed into law on January 1, 1970, the National Environmental Policy Act (NEPA) declared a national policy to protect the environment and created the Council on Environmental Quality (CEQ) in the Executive Office of the President. To implement the national policy, NEPA requires that environmental factors be considered when federal agencies make decisions, and that a detailed statement of environmental impacts be prepared for all major federal actions significantly affecting the human environment.
National Oceanic and Atmospheric Administration	Department of Commerce agency focused on the condition of the oceans and atmosphere. NOAA divisions include the National Weather Service, the National Hurricane Center, and the National Marine Fisheries Service.
National Pollutant Discharge Elimination System	Provision of the Clean Water Act that prohibits discharge of pollutants into U.S. waters unless a special permit is issued by EPA, a state, or where delegated, a tribal government on a Native American reservation, abbreviated NPDES.
native species	Species normally indigenous to an area; not introduced by man.
new source performance standards (NSPS)	Regulation under Section 111 of the Clean Air Act enforcing stringent emission standards for power plants constructed on or after January 30, 2004.
nitrogen oxides (NO_x)	A product of combustion by mobile and stationary sources and a major contributor to the formation of ozone in the troposphere.
noise	Any sound that is undesirable because it interferes with speech and hearing; if intense enough, it can damage hearing.
nonattainment	An area that does not meet air quality standards set by the Clean Air Act for specified localities and time periods. Locations where pollutant concentrations are greater than the NAAQS.
nonpoint sources	Pollution sources that are diffuse and do not have a single point of origin or are not introduced into a receiving stream from a specific outlet. The pollutants are generally carried off the land by stormwater runoff.
notice of intent (NOI)	Notice that an environmental impact statement will be prepared and considered, and is published in the Federal Register as soon as practicable as an agency knows that an EIS is required for a proposed action.

overburden	Material that lies above the area of economic or scientific interest, such as the rock, soil, and ecosystem that lies above the coal seam.
oxidized overburden	Overburden which has been exposed to oxygen, resulting in the oxidation (loss of electrons) of many minerals.
ozone (O_3)	A form of oxygen found naturally in the stratosphere and that provides a protective layer for shielding the Earth from ultraviolet radiation.
palustrine	Living or thriving in a marshy environment.
particulate matter (PM)	Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.
particulates	Small particles of solid or liquid materials that, when suspended in the atmosphere, constitute an atmospheric pollutant.
peak demand	The maximum rate of electricity use, expressed in kW.
peaking capacity	Capacity that is available for use and used to meet peak load, but usually designed to operate for relatively short periods of time.
pedogenic	Having to do with soil horizons.
permeability	Rate at which fluids flow through the subsurface and reflects the degree to which pore space is connected.
pH	A measure of the relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7, and basic (i.e., alkaline) solutions have pH values higher than 7.
piezometer	An instrument for measuring pressure or compressibility of a material subjected to hydrostatic pressure.
Plume	A flowing, often somewhat conical, trail of emissions from a continuous point source.
point sources	A stationary location or fixed facility from which pollutants are discharged or emitted. Also, any single identifiable source of pollution, for example, a pipe, ditch, or stack.
postmining land use	The land use that is selected by the landowner for use after the mining and reclamation process has been completed.
potable water	Water that is safe and satisfactory for drinking and cooking.
potentiometric surface	Imaginary surface defined by the elevations to which the groundwater in an aquifer would rise in wells completed in the aquifer.
Prevention of Significant Deterioration (PSD)	An Environmental Protection Agency program in which federal or state permits are required that are intended to restrict emissions for new or modified sources in places where air quality is already better than required to meet primary and secondary ambient air quality standards.

prime farmland	Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion.
proposed action	The activity proposed to accomplish a Federal agency's purpose and need. An EIS analyzes the environmental impacts of the Proposed Action. A proposed action includes the project and its related support activities (preconstruction, construction, and operation, along with post-operational requirements).
pulverized coal	Crushed coal used to fuel a coal power plant. Currently the principal electric generation technology in the US
qualitative	Analysis based on professional judgment of quality, generally lacking hard data.
quantitative	Analysis based on hard data or numbers that can generally be repeated.
recharge	The movement of water from an unsaturated zone to a saturated zone.
reclaimed effluent	Treated effluent, typically from a municipal wastewater treatment plant, that is beneficially reused. Examples of reuses include agricultural irrigation, dust control, watering of golf courses, cooling tower makeup, and other industrial uses.
reclamation	Restoration of land, water bodies, or other affected environmental resources to the original use, or equal to or better alternate use.
reconstructed soil	Overburden material that consists of suitable materials, based on physical and chemical parameters analyzed during a comparison of the native soils and the oxidized portion of the overburden material, selected to replace the native soils as a topsoil-substitute material.
record of decision (ROD)	The concluding document of the NEPA process, as based on the conclusions of the EIS process, which states the agency's decision for the preferred alternative, along with its rationale for its selection, including the major environmental reasons.
recycled	The process of reusing or reprocessing a material after its initial use.
reference concentrations	Estimates of continuous inhalation exposure to human populations (including sensitive subgroups) that are likely to be without an appreciable risk of deleterious effects during a lifetime.
region of influence (ROI)	The physical area that bounds the environmental, sociologic, economic, or cultural features of interest for the purpose of analysis.
revegetation	The process of establishing new vegetative cover.
Richter scale	A measure of earthquake magnitude developed by Charles Richter.
riparian	Pertaining to, situated, or dwelling on the bank of a river or other body of water.
ruderal area	Heavily disturbed land, such as along roadsides, where vegetation is typically weedy.
runoff	The portion of precipitation falling on the land that flows over the surface, rather than soaking into the surface.

saline	Describes water with high concentrations of salts (typically more than 10,000 parts per million dissolved solids), making it unsuitable for use.
scoping meeting	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.
scrubber	A device that removes noxious gases from flue gases (such as sulfur dioxide) by using absorbents suspended in liquid solution.
scrub-shrub	Woody vegetation less than 20 ft tall. Species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.
secondary drinking water standards	Non-enforceable Federal guidelines regarding cosmetic effects (e.g., tooth or skin discoloration) or aesthetic effects (e.g., taste, odor, or color) of drinking water.
sediment	Material that has been eroded, transported, and deposited by erosional processes, typically wind, water, and/or glaciers.
sediment control	The planning and construction of facilities for prevention of excessive damage by water in flood stages.
sedimentary rocks	Rocks formed by the accumulation of sediment in water or from air. Sandstone, chert, limestone, dolomite, shale, siltstone, and mudstone are types of sedimentary rocks identified in the EIS. They are differentiated by chemistry and texture.
sedimentation	The process or action of depositing sediment.
seedling	A young plant developing from a seed. In a commercial forestry context, a live tree less than 1.0 inch in diameter.
seismic	Pertaining to, characteristic of, or produced by earthquakes or earth vibrations.
seismicity	A seismic event or activity such as an earthquake or earth tremor; seismic action.
selective catalytic reduction (SCR)	A system to reduce NO_x emissions by injecting a reagent, such as ammonia, into exhaust gas to convert NO_x emissions to nitrogen gas and water via a chemical reduction reaction.
sensitive receptor	As used in this EIS, any specific resource (i.e., population or facility) that would be more susceptible to the effects of the impact of implementing the proposed action than would otherwise be.
sequestration	As used in this EIS, the process of injecting CO_2, which has been compressed into a liquid state, into the deep subsurface, potentially isolating CO_2 from the atmosphere for centuries. While the technologies currently exist to directly inject CO_2 into the deep ocean, the knowledge base is inadequate to determine what biological, physical, or chemical impacts might occur from interactions with the marine ecosystem.
short-term	Occurring over or involving a short period of time.
significant	As used in an EIS, a measure of the severity of an impact, based on the setting, timing, and intensity of the impact.

sludge	A semi-solid residue containing a mixture of solid waste material and water from air or water treatment processes.
slurry	A watery mixture or suspension of fine solids, not thick enough to consolidate as a sludge.
soil	A dynamic natural medium composed of mineral and organic materials in which plants grow.
soil amendments	Fertilizers and other materials added to soil to make it suitable for prescribed uses.
solubility	Ability or tendency of one substance to dissolve into another at a given temperature and pressure.
sound pressure	The physical force from a sound wave that affects the human ear, typically discussed in terms of decibels (dB).
sour water	Water with dissolved sulfur compounds and other contaminants condensed from synthesis gas (syngas).
spill prevention control and countermeasure (SPCC) plan	A plan that is implemented to protect navigable waters of the US from harmful quantities of petroleum discharges.
spoil	Overburden material from the mined—out pit, which would be utilized to backfill an open pit, or otherwise be used to achieve original topography.
spring	A location on the land surface or the bed of a surface water body where groundwater emerges from rock or soil without artificial assistance.
stratification	The seasonal layering of water within a reservoir due to differences in temperature or chemical characteristics of the layers.
streams	A continually, frequently, or infrequently flowing body of water that follows a defined course. The three classes of streams are: ephemeral: a channel that carries water only during and immediately following rainstorms, intermittent: a watercourse that flows in a well-defined channel during the wet seasons of the year, but not the entire year. perennial: a watercourse that flows throughout the year or nearly 90 percent of the time in a well-defined channel.
sub-bituminous	A type of coal, which is used primarily as fuel for electrical power generation, whose properties range between those of lignite and those of bituminous coal. At the lower end of the range it may be dull, dark brown to black, soft, and crumbly. At the higher end of the range it may be bright, jet black, hard, and relatively strong. Sub-bituminous coal contains 20 to 30% moisture by weight. Heating value varies from 7,000 Btu/lb to slightly over 9,000 Btu/lb.
subsidence	A sinking of a part of the surface topography.
substation	An assemblage of equipment for the purposes of switching and/or changing or regulating the voltage of electricity.

substrates	The base or material to which a plant is attached and from which it receives nutrients.
sulfur dioxide (SO_2)	A heavy, pungent, colorless, gaseous air pollutant formed primarily by the combustion of fossil-fuel plants.
supercritical CO_2	CO_2 usually behaves as a gas in air or as a solid in dry ice. If the temperature and pressure are both increased (above its supercritical temperature of 88°F [31.1°C] and 73 Atmosphere [1073 psi]), it can adopt properties midway between a gas and a liquid, such that it expands to fill its container like a gas, but has a density like that of a liquid.
surface water	Streams, rivers, ponds, lakes, and man-made reservoirs.
syngas	Synthesis gas. Gas mixture containing varying amounts of carbon monoxide (CO) and hydrogen (H_2) generated by the gasification of a carbon-containing fuel.
threatened species	A species that is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range.
topography	The configuration of a surface including its relief and position of the natural and manmade features.
topsoil	The upper native soil layer, usually consisting of the A and E horizons.
transmission corridor	Area used to provide separation between the transmission lines and the general public and to provide access to the transmission lines for construction and maintenance.
transmissivity	The quality of transmitting groundwater through a geologic stratum or formation.
turbidity	Defined as capacity of material suspended in water to scatter light. Highly turbid water is often called muddy; although all manner of suspended particles contribute to turbidity.
turbine	A machine for directly converting the kinetic energy and/or thermal energy of a flowing fluid (air, hot gas, steam, or water) into useful rotational energy.
understory	Saplings, shrubs, forbs, and other low-growing vegetation present in a forest.
upconing	Vertical upward intrusion from lower water into a shallower groundwater zone caused by pressure reductions in the shallower groundwater zone; usually applies when water in the deeper zone is denser.
upland	The higher parts of a region, not closely associated with streams or lakes.
upset or upset condition	An unplanned or unpredictable failure of process components or subsystems that leads to an overall malfunction or temporary shutdown of the power plant or subsystem while an issue with a component is corrected.
vibration	Force that oscillates about a specified reference point. Vibration is commonly expressed in terms of frequency such as cycles per second (cps), Hertz (Hz), cycles per minute (cpm), and strokes per minute (spm).
viewshed	A non-managed area with aesthetic value.

volatile organic compounds (VOCs)	Any organic compound that participates in atmospheric photochemical reactions except for those designated by the EPA as having negligible reactivity.
wastewater	A combination of liquid and water-carried wastes from residences, commercial buildings, and/or industrial facilities.
water table	(1) The upper limit of the saturated zone (the portion of the ground wholly saturated with water). (2) The upper surface of a zone of saturation above which the majority of pore spaces and fractures are less than 100 percent saturated with water most of the time (unsaturated zone) and below which the opposite is true (saturated zone).
watershed	A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.
wetlands	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Indicators of wetland include types of plants, soil characteristics, and hydrology of the area. Wetlands generally include swamps, marshes, bogs and similar areas.
wind rose	Circular diagram that illustrates the relative frequency of wind speeds for each compass direction based on a time interval.
worst-case	A situation in which the combination of factors that would produce the worst potential impact on the environment.
zero liquid discharge system	Process separates solids and dissolved constituents from the plant wastewater and allows the treated water to be recycled or reused in the industrial process, resulting in no discharge of industrial process wastewater to the environment.

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SUMMARY

The U.S. Department of Energy (DOE) has prepared this environmental impact statement (EIS) to evaluate the potential impacts of a power generation project proposed by Mississippi Power Company in Kemper County, east-central Mississippi. The proposed power plant would demonstrate an advanced integrated gasification combined-cycle (IGCC) power generation system at a commercial scale. The facility would convert Mississippi lignite mined by North American Coal Corporation (NACC) into a synthesis gas (syngas), which would fuel the plant's combustion turbine (CT) generating units. The new power plant would be capable of generating 582 megawatts (MW) (nominal capacity) of electricity while reducing emissions of carbon dioxide (CO_2), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), mercury, and particulates compared to conventional lignite-fired power plants. New electrical power transmission lines and upgrades of some existing transmission lines, a natural gas supply pipeline, a reclaimed water supply pipeline, and a CO_2 pipeline would be constructed in connection with the power plant (the pipelines and transmission lines are sometimes referred to as *linear facilities*). NACC's proposed mine would be located on adjacent properties in Kemper County but would extend into Lauderdale County; it would supply lignite to the power plant over its planned 40-year life. Figure S-1 shows the locations of the project's principal components.

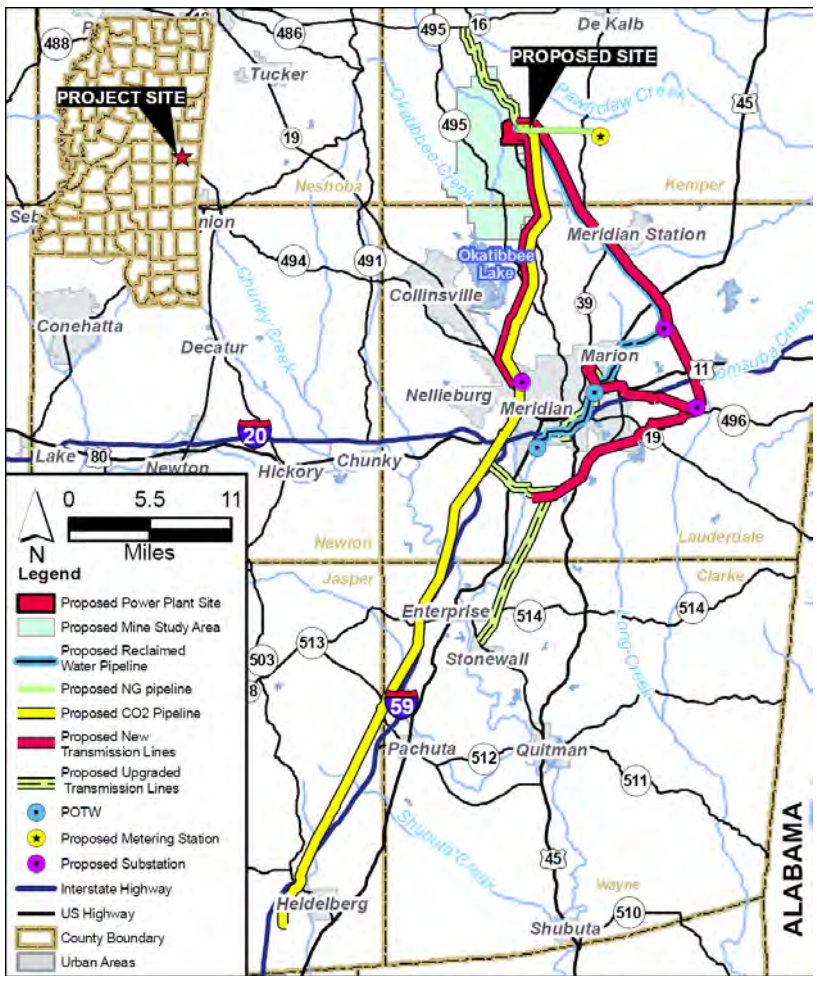

Figure S-1. Proposed Kemper County IGCC Project, NACC Mine, and Linear Facilities

Sources: US Census, 2000; MARIS, 2008; ECT, 2009.

DOE is the lead federal agency responsible for the preparation of this EIS, while the U.S. Army Corps of Engineers (USACE) (Mobile District) is a cooperating agency. In compliance with the National Environmental Policy Act of 1969 (NEPA), as amended (Chapter 42, Part 4321, *et seq.*, United States Code [U.S.C.]), DOE is evaluating the environmental impacts associated with the proposed project as part of its decision on whether or not to provide financial assistance and a loan guarantee. USACE is evaluating the potential environmental impacts before deciding whether to issue permits under the Clean Water Act (CWA) for stream and wetland disturbances that would be associated with the proposed mine, power plant, electrical transmission lines, and pipelines.

PROPOSED AGENCY ACTIONS, PURPOSES AND NEEDS

DOE

DOE's proposed action has two components: first, to release funding for cost-shared financial assistance and, second, to issue a loan guarantee. DOE proposes to provide an additional $270 million in cost-shared financial assistance under the Clean Coal Power Initiative (CCPI) program to the Kemper County IGCC Project. DOE's proposed action encompasses those activities that are eligible for this DOE cost-shared funding, including the construction of the onsite power plant components, such as the gasification island, the combined-cycle power generation unit, and the auxiliary facilities. DOE has already provided a portion of the original funding ($24.4 million of an original $294 million) to Southern Company for cost sharing in the preliminary design and definition of this project at a previous location. In addition to sharing in certain costs, DOE may issue a loan guarantee pursuant to the Energy Policy Act of 2005 (EPAct05). The financial assistance would apply to the planning, design, permitting, equipment procurement, construction, startup, and 4.5-year demonstration of the power plant technology. The loan guarantee would apply to the planning, design, permitting, equipment procurement, construction, and startup of the power plant. If approved for DOE loan guarantee, a portion of the power plant's construction costs would be funded through the U.S. Treasury Department's Federal Financing Bank. The loan would then be guaranteed by DOE, resulting in interest expense savings for Mississippi Power. The U.S. Congress established the CCPI program to accelerate commercial deployment of advanced technologies for generating clean, reliable, and affordable electricity in the United States using abundant domestic reserves of coal. EPAct05 established the Federal Loan Guarantee Program for eligible energy projects that employ innovative technologies (i.e., projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases" and "employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued").

The purpose and need of DOE's action under the CCPI program are to demonstrate the feasibility of this selected IGCC technology at a size that would be attractive to utilities for commercial operation, thereby satisfying the responsibility Congress imposed on DOE to demonstrate advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. The lignite gasifier design is based on a technology that Southern Company, Kellogg Brown & Root LLC (successor in interest to Kellogg Brown & Root, Inc. [KBR]), and DOE have been developing since 1996 at a research facility near Wilsonville, Alabama. The proposed Transport Integrated Gasification (TRIG^{TM}) IGCC technology appears most cost-effective when using low-heating value, high-moisture, or high-ash coals, including lignite. These coals constitute approximately one-half of the proven United States' and world's coal reserves. Successful demonstration of the TRIG^{TM} technology would generate technical, environmental, and financial data from the design, construction, and operation of the facility to confirm that the technology can be implemented at a commercial scale.

The purpose and need of DOE's loan guarantee would be to comply with DOE's mandate under EPAct05 by selecting eligible projects that meet the goals of EPAct05, which are to encourage early commercial use in the United States of new or significantly improved energy technologies and reduce emissions of greenhouse gases. The Kemper County IGCC Project would include carbon capture systems sufficient to reduce CO_2 emissions from the power plant by up to 67 percent by removing carbon from the syngas downstream of the gasification process.

The project would then sell the captured CO_2 for beneficial use and geologic storage in existing enhanced oil recovery (EOR) operations in Mississippi.

USACE

USACE is considering whether to grant permits under the CWA for various stream and wetland impacts that would result from construction and operation of the power plant, mine, transmission lines, and pipelines. Therefore, the purpose of USACE's proposed action is to fulfill its Congressionally mandated responsibilities related to dredging and filling of wetlands and other waters of the United States under Section 404 of the CWA.

EIS SCOPING PROCESS

DOE announced the public scoping meeting in the Notice of Intent (NOI) in the *Federal Register* on September 22, 2008, and published notices in four newspapers in the Kemper County area between October 8 and October 12. An information packet including the NOI was delivered to 171 stakeholders including federal, state, and local agencies and environmental groups to announce the meeting and solicit comments on the proposed project. Postcards publicizing the meeting were mailed to 1,440 residents and businesses within a 3-mile radius of the proposed power plant site and all landowners having real property within the mine study area or within 200 feet (ft) of the centerline of the proposed linear facilities for which routes were planned at that time.

DOE held the public scoping meeting for the Kemper County IGCC Project EIS on October 14, 2008, at Kemper County High School in De Kalb, Mississippi (De Kalb is the Kemper County seat). Sixty-six individuals signed in with the registration/comment cards. Fifteen individuals spoke to present oral comments or ask questions. Comments were also submitted to DOE by e-mail, telephone, and regular mail. Overall, 245 individual comments were tabulated from the collective submissions.

During the scoping process, commenters expressed desires that alternatives to the proposed project be considered, including technology alternatives and conservation, and concerns were voiced about potential environmental, socioeconomic, and other impacts that could result from the project. A number of comments suggested that consideration be given to alternatives to coal-based technologies (e.g., solar energy). Among the potential effects of the proposed project, the public expressed the most concern about impacts on water and ecological resources, impacts due to greenhouse gas emissions (e.g., global climate change), and possible worsening of local traffic conditions. A number of respondents commented on favorable aspects of the project, including jobs and other positive economic impacts, as well as the use of Mississippi lignite as a way to increase energy independence.

Input obtained during the scoping process helped DOE to improve the list of issues to be analyzed and provided additional focus to the analysis of previously identified issues. Table S-1 lists the composite set of issues identified for consideration in the EIS (i.e., issues identified in the NOI and additional relevant issues identified during public scoping that expanded the scope of the assessment).

Table S-1. Issues Identified for Consideration in the EIS

Issues identified in the NOI			
Atmospheric resources	Visual impacts	Ecological resources	Community impacts
Water resources	Floodplains	Safety and health	Cultural resources
Infrastructure and land use	Wetlands	Construction	Cumulative effects
Solid wastes			
Additional issues identified during public scoping that expanded the scope of the assessment			
Impacts on Lake Okatibbee operations		Options for CO_2 capture, transport, and beneficial use and geologic storage	

DOE'S AND USACE'S ALTERNATIVES TO PROPOSED ACTIONS

NEPA requires that federal agencies evaluate reasonable alternatives to their proposed actions. The purpose of and need for the proposed action determines the range of reasonable alternatives. In this case, the purpose of and need for DOE action is defined by the CCPI program (and enabling legislation, Public Law 107-63) and the Federal Loan Guarantee Program (and enabling legislation, EPAct05). Given these programmatic purposes and needs, reasonable alternatives available to DOE prior to the selections of this project under CCPI Round 2 and the Loan Guarantee Program would have been to select another project that applied to and met the eligibility requirements of the CCPI and loan guarantee programs. For these programs, other applications (and their potential environmental impacts) were considered during the evaluation and selection process. Given the selection of this project under both programs, DOE's decision is whether or not to provide financial assistance, a loan guarantee, or both. Therefore, this EIS analyzes in detail the project as proposed (proposed action), the proposed action as modified by the applicant or in response to conditions such as mitigation, and the no-action alternative.

Under the no-action alternative, DOE would neither provide further financial assistance under the cooperative agreement nor issue a loan guarantee for the project. In the absence of this assistance and loan guarantee, Mississippi Power could build the gasifiers, syngas cleanup systems, CT/heat recovery steam generators (HRSGs), and supporting infrastructure as proposed without DOE support. In this case, the proposed mine and linear facilities would remain unchanged. The environmental impacts of this option would be essentially the same as those resulting from the proposed action. This outcome is unlikely given the cost and financial risk associated with such a large-scale demonstration project. More likely, Mississippi Power would choose not to pursue the Kemper County IGCC Project. If this project does not go forward, the no-action alternative would not contribute to the goal of the CCPI program, which is to accelerate commercial deployment of advanced coal technologies that provide the United States with clean, reliable, and affordable energy. Similarly, the no-action alternative would not contribute to the loan guarantee program's goals of facilitating energy projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases" and "employ new or significantly improved technologies."

Under the proposed action alternative, DOE assessed the impacts of alternative water sources, alternative linear facility routes, and alternative levels of CO_2 capture. The first water source development alternative is that reclaimed effluent would provide for most of the power plant's water requirements. Nonpotable ground water from a deep aquifer would supplement the reclaimed water when needed. The second water source development alternative is that this ground water source would supply all of the power plant's needs. However, the use of rec-

laimed water is currently considered to be preferable, barring unforeseen limitations on its availability, as the engineering issues, costs, and environmental impacts of ground water use would be greater.

Mississippi Power applied its route selection procedures to all proposed linear facilities. Their procedures considered various route selection factors, such as making use of (or paralleling) existing rights-of-way and avoiding developed and/or sensitive areas. Nonetheless, consistent with its procedures, Mississippi Power might, at some future date, revise, alter, or amend the precise final route for one or more of its linear facilities based on further engineering studies.

Mississippi Power has considered a range of alternative levels of CO_2 capture: 25, 50, and 67 percent and greater than 67 percent. After initially basing the design on 25-percent capture, Mississippi Power updated its designs to target 50- and then 67-percent capture. Mississippi Power determined that gas turbine design and operation at higher hydrogen contents of syngas has not evolved sufficiently to confidently design the plant for commercial operation at capture levels higher than 67 percent and that the plant would not be economically feasible. The proposed action is based on a capture rate of 67 percent. This higher capture rate would require more fuel input to achieve the same net power output relative to the 50-percent case. Air quality impacts would vary slightly between the 50- and 67-percent cases, and some other differences would result (e.g., there would be small variations in outputs of byproducts). Overall, the differences in operating characteristics and impacts for either 50- or 67-percent capture would not alter the conclusions regarding the ability to permit the facility or the levels of potential impacts.

This EIS also reviews the power plant site selection process that was conducted by Mississippi Power. Mississippi Power found that the only reasonable site is the Kemper County site, based on location of accessible lignite reserves near Mississippi Power's service territory, proximity to infrastructure, topography, environmental concerns, and available open space. This EIS does not analyze in detail the alternative power plant sites considered by Mississippi Power, because: (a) DOE's role is limited to making a final decision on whether to provide financial assistance and a loan guarantee for this project, as proposed by the applicant, and (b) DOE agrees with Mississippi Power's conclusion that other sites are not reasonable alternatives. The site selection process that Mississippi Power followed in selecting the proposed site is provided in this EIS.

With regard to alternative power generation technologies, DOE considered other coal-based technologies in evaluating the proposals received under the CCPI solicitation. Other non-coal-based technologies (e.g. solar, wind, natural gas) would not address DOE's purpose and need to demonstrate advanced coal-based power generation technologies.

Both DOE and USACE have responsibilities under Executive Orders 11998 (floodplain management) and 11990 (wetlands) to consider flood hazards and potential effects of floodplain activities for any action undertaken, avoid impacts to floodplains to the extent practicable, and avoid short- and long-term impacts to wetlands if a practicable alternative exists. Agencies must evaluate practicable alternatives that avoid actions in floodplains and/or wetlands, including alternate sites, alternate actions, and no action.

USACE would review and take action on the applicants' Section 404 permit applications after DOE has published its NEPA Record of Decision (ROD), which could include required mitigation for adverse effects to wetland and floodplains. USACE may undertake further NEPA review as necessary to fulfill its obligations under NEPA when considering the issuance of permits.

Under Section 404 of the CWA, USACE has two alternatives: issuance or denial of one or more dredge and fill permits, with mitigation requirements also considered. Permits would be needed to construct and operate

the proposed facilities, including the connected actions. Denial of any application would equate to DOE's no-action alternative. Issuance of permits would correspond to DOE's proposed action.

Under Executive Orders 11990 and 11998 and the CWA, USACE issuance of any permits would be limited to the least environmentally damaging practicable alternative selected for each permit application (e.g., IGCC facilities, linear facilities, mine, etc.). The selected alternative also would have to meet USACE's public interest test criteria and conform to USACE's mitigation regulations. USACE's impact minimization analyses would focus on alternative arrangements for plant structures and equipment and mine plans.

DESCRIPTION OF KEMPER COUNTY IGCC PROJECT AND DESIGN ALTERNATIVES

MISSISSIPPI POWER'S PROJECT PURPOSE AND NEED

Mississippi Power's load forecast identifies an additional generation need of between 318 and 601 MW of base load power beginning during the summer season of 2014. The Kemper County IGCC Project is intended to meet that generation need while demonstrating the proposed technology using local lignite as a fuel source. Beyond maintaining sufficient generation capacity to avoid shortages, the proposed project would also address several risks and strategic considerations identified in Mississippi Power's planning process. Foremost among these considerations, the project would enhance the fuel diversity and asset mix of Mississippi Power's generating fleet, thereby mitigating the supply and price volatility risks associated with the predominant use of any one fuel source. Specifically, the proposed IGCC technology would allow Mississippi Power to use an additional fuel source: lignite, the cost of which is both lower and less volatile than that of natural gas and higher-ranked coals. The long-term lignite supply agreement associated with the project would provide a lower and more stable fuel price over the life of the plant for Mississippi Power's customers.

The Kemper County IGCC Project would also enhance the geographic diversity of Mississippi Power's generating units. This is important in support of voltage regulation, security, and area protection. But as Mississippi Power's experience after Hurricane Katrina showed, it is also increasingly important to locate units away from the coastal area to mitigate damage from severe tropical weather events and ensure service to important regional and national energy infrastructure.

Finally, the proposed project would help Mississippi Power manage uncertainty associated with the imposition of standards to address climate change through reduction of greenhouse gas emissions (primarily CO_2). The impact of national standards on Mississippi Power's customers could be significant, depending on their timing and requirements. While planning for the climate change standards, utilities with an existing coal-based fleet are faced with options to either install costly CO_2 capture retrofits using technology still under development or retire existing coal-fueled power plants and build new ones. The proposed Kemper County IGCC Project would intend to capture up to approximately 67 percent of the CO_2 emissions. The CO_2 would be sold for beneficial use and geologic storage via EOR. Thus, this project would provide Mississippi Power with an important means of managing its compliance with future regulation of greenhouse gas emissions.

PROJECT DESCRIPTION

As shown in Figure S-1, the approximately 1,650-acre site of the proposed IGCC power plant is located in southwestern Kemper County. The mine and linear facilities would extend into several other counties. The pro-

posed power plant and mine would be located in a rural, sparsely populated area. Figure S-2 illustrates the rural nature of the proposed power plant site and mine study area. The electrical transmission lines and pipelines would also traverse mostly rural areas.

Overall, the IGCC plant can be divided into two major systems or components: lignite coal gasification and combined-cycle power generation. The gasification systems would consist primarily of lignite handling, gasification, and syngas processing and cleanup. There would be two lignite gasifiers, which would use TRIG™ IGCC technology. At full capacity, the gasifiers would convert an average of 13,800 tons per day (tpd) of lignite into syngas. The design lignite feed rate to each gasifier would be approximately 290 tons per hour (tph). Lignite would be supplied by an adjacent mine, as discussed subsequently.

Syngas would be the fuel for the combined-cycle power generating units. The principal combined-cycle components would include two CTs, two HRSGs, and a single steam turbine. In a combined-cycle unit, fuel gas is combusted in one or more CTs, and hot exhaust gas exiting the CTs is then used to heat water into steam to drive a steam turbine. The reuse of the CTs' exhaust heat to power a steam turbine constitutes the combined-cycle approach, which is a proven and reliable method for increasing the amount of electricity that can be generated from a given amount of fuel. The two CTs and steam generator for the Kemper County IGCC Project would generate a nominal 582 MW (net) of electricity when duct firing natural gas (for supplemental energy input) in the HRSG. The CTs would be capable of operating on natural gas as well as syngas.

The proposed project would reduce SO_2, NO_x, mercury, and particulate emissions by removing constituents from the syngas. The removal of nearly 100 percent of the fuel-bound nitrogen from the syngas prior to combustion in the gas CTs would result in appreciably lower NO_x emissions compared to conventional coal-fired power plants. The facility would be designed with carbon capture systems sufficient to reduce CO_2 emissions by approximately 67 percent by removing carbon from the syngas downstream of the gasification process. Annual average capture rates near 67 percent would be expected, and this design case provides the basis for the estimates of emissions, byproduct production rates, and impacts in this EIS. However, the EIS also provides data and addresses impacts for a range of CO_2 capture from 50 to 67 percent on an annual average basis. The CO_2 would be compressed and piped offsite where it would be sold for beneficial use and geologic storage via EOR. Table S-2 highlights key technological and environmental performance features of the Kemper County IGCC Project.

As mentioned in Table S-2, reclaimed water from Meridian's municipal system would provide the main supply required for cooling water makeup, steam cycle makeup, and other processes. The proposed power plant would also discharge no cooling or process water effluent from the site. Ash generated by the gasifiers would be stored onsite and would be evaluated for beneficial use at the adjacent mine or for placement in an onsite management unit (where it could be recovered for future sale or use). Commercial grade anhydrous ammonia and sulfuric acid (H_2SO_4) would be recovered as byproducts and marketed. Table S-3 summarizes key IGCC plant operating characteristics, including capacities, uses of raw materials, outputs, and discharges.

Construction of the proposed IGCC power plant would begin in 2010, continue for 3.5 years, and end in spring 2014. During the 3.5-year construction period, an average of approximately 500 construction workers would be on the site, with approximately 1,150 workers required during the peak construction period of the first half of 2012. Most construction would occur during daylight hours.

The IGCC plant operational workforce would consist of approximately 105 employees, of which 15 would provide support only during the startup and demonstration phases of the project, while 90 employees would be needed over the lifetime of the facilities (i.e., during commercial operation).

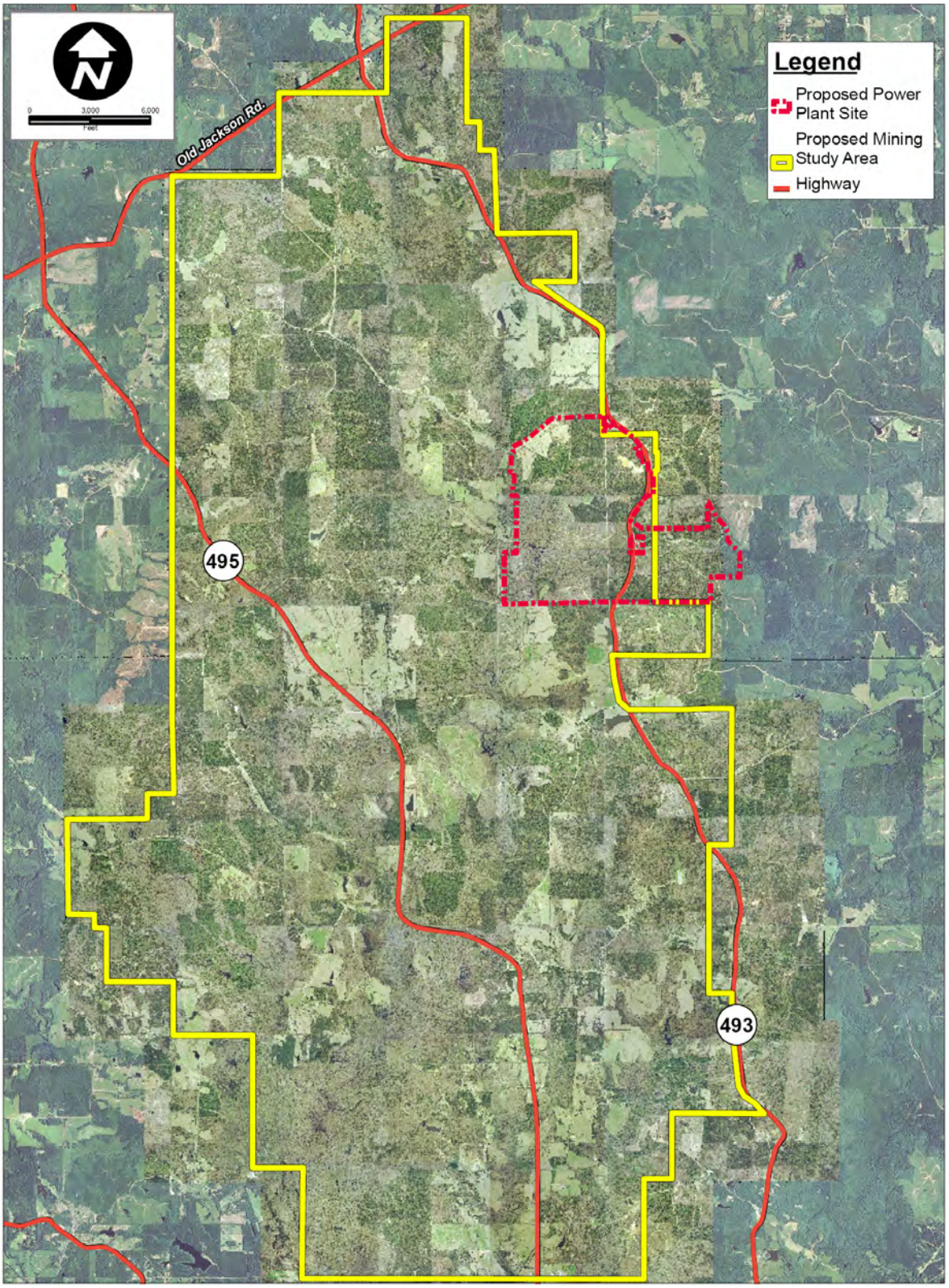

Figure S-2. 2008 Aerial Photograph of Power Plant Site and Mine Study Area
Sources: NACC, 2008. SCS, 2008. ECT, 2009.

Table S-2. Key Technology and Environmental Features of the Kemper County IGCC Project

TRIG™ Gasifiers	The TRIG™ gasifier technology is one of the most cost-effective when using low-quality coals, including lignite, which comprise half the proven United States and worldwide reserves. A key performance target for the proposed technology would be achieving gasifier availability of at least 80 percent.
Syngas cleanup	The syngas cleanup facilities would reduce CO_2, SO_2, NO_x, mercury, and particulate emissions as compared to conventional lignite-fired power plants. Filters would remove more than 99.9 percent of particulate emissions.
Sulfur removal and recovery	Up to 99 percent of the sulfur in the lignite would be removed from the syngas and converted to concentrated, commercial-grade sulfuric acid (H_2SO_4). The H_2SO_4 would be marketed for offsite use.
Mercury removal	A reactor containing alumina-based metal sulfide would remove more than 92 percent of the mercury from the syngas.
CO_2 removal, recovery, and beneficial use	Through a water gas shift (WGS) reactor, approximately 90 percent of the carbon monoxide (CO) in the syngas would be converted to CO_2, and an acid gas removal process would remove up to approximately 67 percent of the CO_2. The dried CO_2 would then be compressed to the pressure required to enter a pipeline, which would deliver it for beneficial use and geologic storage via EOR.
Ammonia recovery	Sour water from syngas production would be processed to produce ammonia, which would be concentrated to commercial grade (98.5 to 99.5 percent). The ammonia would be marketed for offsite use or recycled to the gasifier for destruction.
Use of reclaimed water	To provide makeup supply water to the cooling systems (replacing water lost through evaporation) and processes, reclaimed effluent from two publicly owned treatment works (POTWs) in Meridian, Mississippi, would be used. If inadequate supplies of makeup water were available from the POTWs, nonpotable ground water from onsite wells would supplement the treated water supply. No potable water would be used for cooling or processes.
Zero liquid discharge	During power plant operation, the proposed IGCC facilities would produce various process wastewaters, all of which would be discharged to treatment and/or reuse systems. No process wastewater streams or water treatment discharges would be released offsite.
Ash management	Gasification ash is expected to be nonhazardous and could have beneficial uses (e.g., road construction material, soil amendment, etc.). Project plans provide for onsite management and storage.

Table S-3. Principal Full Load Operating Characteristics of the Proposed Kemper County IGCC Project*

Operating Characteristics	Nominal Value/Range
Generating capacity (MW) (net)†	582
Capacity factor (%)‡	85
Power production (MWh/yr)	4.3×10^6
Coal consumption (tpy)§◊	4.2×10^6 to 4.3×10^6
Natural gas consumption (10^6 scf/yr)**◊◊	5,800
Fuel oil consumption (10^3 gal/yr)**	124
Water requirements	
Reclaimed water (MGD)	6.2 to 6.9
Nonpotable ground water (MGD)	0.0 to 0.7
Reclaimed gasifier water (MGD)	1.0
Potable ground water (MGD)	0.003
Air emissions (tpy)‡‡	
SO_2◊	570 to 590
H_2SO_4	55
NO_x◊	1,800 to 1,900
PM_{10}◊	450 to 470
CO◊	890 to 980
VOCs◊	130 to 150
CO_2 emissions (tpy)◊ §§	1.8×10^6 to 2.6×10^6
Process wastewater (gpm)	0
Solid wastes (10^3 tpy)	
Filter cake††	3 to 15
Byproducts (10^3 tpy)	
CO_2◊	2,500 to 3,500
Anhydrous ammonia◊	21 to 22
Gasification ash◊	550 to 560
H_2SO_4◊	132 to 139

Note: MWh/yr = megawatt-hour per year.

*All values estimated based on stated capacity factors and average operating conditions using syngas and not meant to be representative of any specific time period.
◊Range estimates the characteristics expected when operating between 50- and 67-percent carbon capture on an annual basis.
†Generating capacity represents full load with duct burners firing.
‡Capacity factor is percentage of energy output during period of time compared to energy that would have been produced if equipment operated continuously at maximum power throughout entire period.
§Based on lignite coal from Liberty Fuels Mine in Mississippi with an average heating value.
**Assuming ten plant startups per year.
◊◊Assuming constant use of duct burners at stated capacity factor.
††Range includes process water supply cases with and without supplemental ground water from the Massive Sand aquifer.
‡‡Potential facilitywide emissions with IGCC operating on syngas at stated capacity factor.
§§Average CO_2 emissions from IGCC operating on syngas with continuous duct burner operation at stated capacity factor. Continuous duct burner firing contributes approximately 0.3×10^6 tpy to the total CO_2 emission presented. Continuous duct burner firing CO_2 emissions presented to provide upper bound of potential operating conditions.

Source: SCS, 2009.

A reclaimed effluent supply pipeline, a natural gas pipeline, associated transmission lines (and substations), and a CO_2 pipeline would be constructed and operated as connected actions (shown in Figure S-1).

As a connected action, NACC would construct and operate an open-pit lignite mine. The proposed lignite mine (known as the Liberty Fuels Mine) would be located adjacent to the power plant site. Mining would occur on blocks of land within the approximately 31,000-acre study area for the proposed surface mine. The mine would be the primary source of feedstock for the IGCC project. Approximately 4.3 million tpy of lignite would be produced to fuel the IGCC facilities described for up to 40 years. Up to 12,275 acres would be disturbed over the life of the mine. Actual mining—the uncovering and extraction of lignite—would disturb between 175 and 375 acres per year and average 275 acres per year for up to 40 years, or a total of approximately 11,250 acres or 35.5 percent of the mine study area. After 3 to 5 years, approximately the same amount of acreage would be reclaimed each year as that newly disturbed. Up to 1,225 acres would be required for various mine support structures, including water diversions and water treatment (sedimentation) ponds.

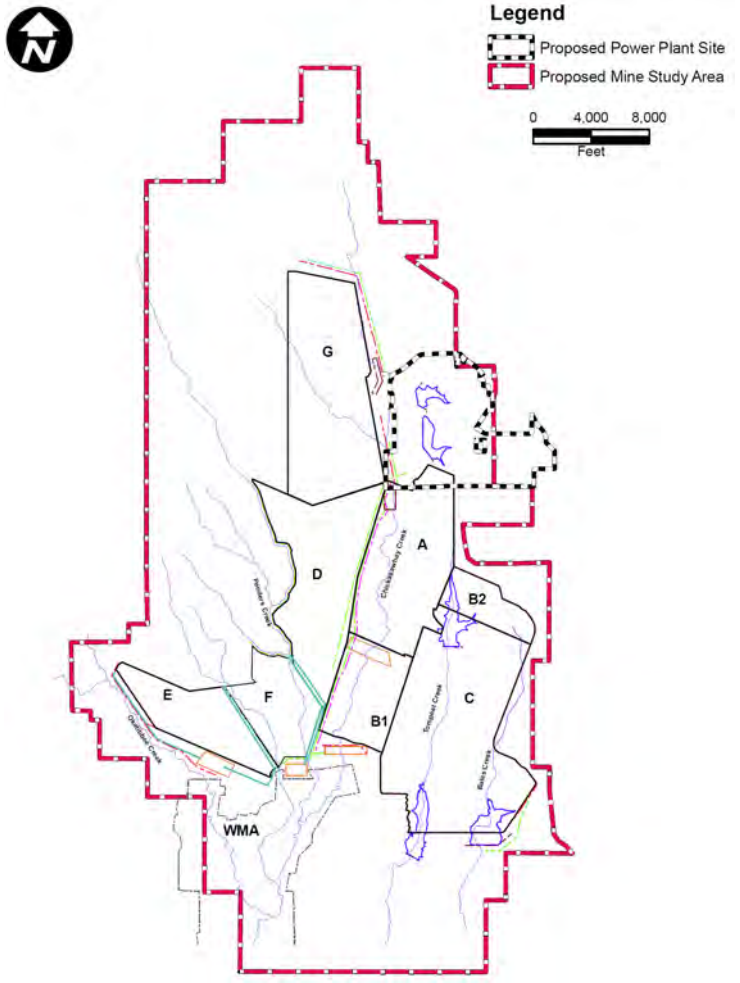

Figure S-3. Conceptual Life-of-Mine Plan for Liberty Fuels Mine

Source: NACC, 2009.

NACC's preliminary conceptual mine plan includes eight blocks, shown in Figure S-3. The overall advancement of mining would proceed sequentially from mine block A during the initial years (generally coinciding with the project demonstration period) to mine block G representing the final years of mining; each block would be mined during a 5- to 6-year period. As the lignite reserves in one mining block were being recovered, the next mining block in sequence would be permitted and prepared for mining to provide an uninterrupted supply of lignite. Since reclamation activities would follow mining, the number of acres in a disturbed state at any given time would range between approximately 1,300 and 1,900 acres.

Following lignite removal, an average of approximately 275 acres per year of mined land would be graded to the approximate premining land surface elevations and planted with various types of vegetative cover. Physical completion of land reclamation would occur approximately 3 years after lignite extraction.

Construction activities associated with the proposed Liberty Fuels Mine would commence in 2011 and continue through the first quarter of 2014, overlapping those of the IGCC power plant. The total mine construc-

tion workforce from 2011 through 2014 would vary from 45 to 155 people, depending upon the overlap between the various construction projects.

Operation of the surface lignite mine would commence in late 2013 with overburden removal in the initial mining area. Overburden removal to uncover the initial lignite to be extracted would occur during IGCC plant start-up. This would necessitate shipments of lignite for approximately 6 months, via truck, for use during start-up of the IGCC plant. These shipments would come from NACC's Red Hills Mine located in Choctaw County 70 miles northwest of the proposed site. The primary overburden removal machine would be a large, electrically powered walking dragline with an 80-cubic-yard bucket. Following overburden removal, the lignite would be loaded into trucks by large track-hoes, front-end loaders, or a continuous surface miner. Off-road trucks would then transport the lignite to the lignite handling facilities via mine haul roads constructed for the project. At the lignite handling facilities, the lignite would be crushed, sized, and conveyed to the silos that would supply the IGCC gasifiers.

The linear facilities would be the project's other connected actions:

- New 6-mile-long natural gas supply pipeline.
- 65 miles of new electrical transmission lines and 24 miles of existing lines that would require upgrading (also three new electrical substations).
- Approximately 9.5 miles of upgraded electrical distribution lines to support construction, and new electrical transmission lines of undetermined length (estimated at 10 miles) to provide power for mine operation.
- Approximately 29.5 miles of new pipeline to deliver reclaimed effluent from Meridian to the power plant site.
- New 61-mile-long pipeline to transport CO_2 for beneficial use in EOR.

As shown in Figure S-1, within much of the proposed new rights-of-way, two of the linear facilities would be co-located. Each of the new linear facilities would require permanent rights-of-way plus additional temporary rights-of-way for construction and new roads to provide access to the rights-of-way. Construction of the linear facilities would follow a schedule similar to those for the plant and mine facilities, beginning in 2011 and continuing through 2013. Construction would generally proceed from clearing to leveling and grading to trenching (pipelines) or excavating (transmission line structure foundations) to pipeline laying or transmission tower construction to right-of-way restoration, including revegetation.

PROJECT ALTERNATIVES

Several alternatives considered initially by project proponents have been dismissed by them from further consideration. These include alternative project size, alternative fuels, alternative plant layout on the site (the location of the plant footprint within the site boundaries), alternative mining methods, and options for CO_2 sequestration (e.g., injection in saline reservoirs versus sale of CO_2 for beneficial use in EOR operations).

This EIS presents alternative mine development plans. During the preparation of this EIS and as a result of preapplication consultations with USACE, the mine operator (NACC) responded to DOE and USACE comments and input by revising their mining plan. The mining plan as presently proposed is designed to be more protective of the project area hydrologic balance and reduce the impact on streams. This alternative would also re-

duce impacts to wetlands and floodplains. However, approximately 10.0 million tons of economically viable lignite reserves would remain in the ground, and long-term operational costs would increase as a result.

CHARACTERISTICS OF SITE AND AFFECTED AREAS

The setting for the proposed Kemper County IGCC Project, including its connected actions, is east-central Mississippi, centered near Meridian. With the exception of portions of the transmission lines, substations, and pipelines that would be built in and around Meridian, the project areas are rural and sparsely populated. Most of the rural areas are densely wooded (including pine plantations). The terrain of the project areas is gently to moderately rolling. Drainage of the project areas is provided by a number of creeks, streams, and small rivers. Table S-4 summarizes the area's existing conditions and characteristics.

ENVIRONMENTAL IMPACTS

Impacts on the existing environment arising from the proposed action alternative (i.e., DOE providing the funding and a loan guarantee and USACE issuing permits) would result from both construction and operation of the project facilities. Impacts under the no-action alternative assume that the project would not be built (as opposed to being built without DOE support). Thus, no impacts—positive or negative—would result, and the existing conditions would remain unaffected by the project. Table S-5 summarizes the key impacts by resource areas. Details of these and other impacts are presented in the full EIS.

MAJOR CONCLUSIONS, AREAS OF CONTROVERSY, AND OUTSTANDING ISSUES

If the Kemper County IGCC Project's TRIG^{TM} air-blown gasifiers could be successfully demonstrated on Mississippi lignite, while the syngas cleanup system achieved approximately 67-percent CO_2 capture, an important advancement in the use of abundant coals, including lignite, would be the result. The purpose and need of DOE's Congressional mandate to demonstrate advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States would be met. Furthermore, by demonstrating this technology at a commercial and economical scale, the project would meet DOE's purpose and need under the loan guarantee program to encourage early commercial use in the United States of new or significantly improved energy technologies and reduce or eliminate emissions of greenhouse gases and other air pollutants.

As with any large industrial project development, the construction and operation of the power generation, transmission, and mining facilities would impact the surrounding environment. The IGCC power plant would constitute a relatively large increase in emissions of some air pollutants in Kemper County, which currently has comparatively low emissions as a result of its sparse population and low number of large commercial/industrial facilities. The area's air quality would be impacted as a result, although modeling studies predict that air quality would remain within NAAQS and comply with PSD regulations.

Table S-4. Summary of Existing Conditions of the Kemper County IGCC Project Area

Air quality	Based on ambient monitoring in Meridian, existing air quality is classified as *good* to *moderate*. From 2006 through 2008, air quality was classified as *unhealthy for sensitive groups* on a total of 7 days (0.7 percent of days). The area has few large industrial emissions sources.
Geology	Most of the project area lies in an outcrop of the Wilcox Group: sand and sandy clay sediments that are typically unconsolidated and thus readily subject to erosion. Some mining of sand and clay occurs. Lignite occurs in discrete seams, the shallowest one approximately 100 ft below land surface. The area is not near any active crustal plate boundaries or major faults. Probability of seismic activity is low.
Soils	Uplands in the project area range from gently sloping to steep, with well to excessively drained soils formed from the unconsolidated sands and clays of the Wilcox geologic group. Floodplains and terraces along streams are nearly level to gently sloping, with soils formed from alluvial sediments eroded from nearby uplands. Floodplain soils are often flooded and are poorly to somewhat poorly drained. Most soils of the project area are mostly very strongly acid to moderately acid. The area has some prime farmland soils, but these are dispersed, only minimally cultivated, and do not rate highly for conversion impact.
Surface water	Most project facilities, including the power plant site and mine study area, are within the Pascagoula River basin; a small portion of the plant site is in the Tombigbee River watershed. Water bodies of interest include Okatibbee and Chickasawhay Creeks, Okatibbee Lake, Sowashee Creek, and the Chunky River. In addition, numerous ephemeral and intermittent streams are found in the proposed lignite mine study area and linear facility corridors. Okatibbee Lake serves for flood control, recreation, and water supply. All of these surface waters are listed as impaired to some degree. The Chunky River is a designated Scenic River under Mississippi's Scenic Streams Stewardship Program Act.
Ground water	The Wilcox Group aquifers provide most ground water in the project area. The Lower Wilcox aquifer (several hundred feet below land surface) provides several area public water supply systems. The Massive Sand aquifer (more than 3,000 ft below land surface) contains nonpotable water (high salinity) in the project area.
Terrestrial ecology	No previously undisturbed vegetation communities remain within the project facilities areas. Much of the historic vegetation has been converted to agricultural use, especially pine plantation and pasture. The predominant remnant forested vegetation is second- or third-growth hardwood, pine, or pine/hardwood-dominated forests characterized by canopies/sub-canopies comprised of loblolly pine, shortleaf pine, and other southern yellow pine species with sweetgum, flowering dogwood, elm, red cedar, oaks, and hickories, among others. Pine-dominated communities are most conspicuous since much of the original forest cover has been cleared; mostly these communities are pine plantations. Hardwoods are dominant in some areas, particularly on moister soils and on steep slopes and ravines where pine cultivation is limited. Along waterways, floodplain forests dominated by a variety of hardwoods predominate. Intermixed with the forested lands are areas of pasture, hayfields, and minor cropland. Price's potato bean, federally listed as threatened, was not found during surveys. Surveys did not reveal areas potentially critical to migratory birds. Wildlife species observed are common in this region of Mississippi. No unusual wildlife observations were made.
Aquatic ecology	Habitat assessments conducted on Okatibbee Creek, Chickasawhay Creek, Penders Creek, Dry Creek, and Tompeat Creek resulted in habitat scores that ranged from 56 to 115 out of a total possible score of 200. Habitat impairments include low riparian vegetation width, low sinuosity due to channelization, poor bank stability, low pool abundance, and poor substrate availability. Fish collections revealed the presence of only eight fish species. Macroinvertebrate diversity was also low at most sampling stations.
Floodplains	Most of the small ephemeral and intermittent streams draining hilly topography are incised with narrow floodplains that are infrequently flooded or have no floodplain at all. Chickasawhay Creek, while incised, has a broad floodplain with associated wetlands in the mine study area, although it is not clear how often creek flood flows enter its floodplain. Okatibbee Creek also has a broad floodplain. The 100-year floodplain of Okatibbee Creek has been mapped by the Federal Emergency Management Agency (FEMA), but no other floodplains have been mapped by FEMA in Kemper County.

Table S-4. Summary of Existing Conditions of the Kemper County IGCC Project Area (Continued, Page 2 of 2)

Wetlands	Wetlands comprise 27 percent of the power plant site, 19 percent of the mine study area, and are encountered within the linear facility corridors. Many of these wetlands have been impacted by pine plantations. Many area wetlands have also been further degraded by silt runoff from the highly erodable, cutover upland slopes.
Land use	The proposed power plant site and mine study area are located in rural, sparsely populated areas, as are most of the proposed linear facility corridors. Roughly three quarters of the project areas are forested, and the second-largest land use is pasture.
Socioeconomics	Kemper County's population has remained steady at just more than 10,000 for decades and is currently projected to increase only slightly. Neighboring Lauderdale and Neshoba Counties have grown in population. Kemper County has higher than state average unemployment, and more than half of the employed residents work outside the county. The median household income in Kemper County is below that of Lauderdale and Neshoba Counties and the state as a whole. Area-wide community services (e.g., schools, hospitals) are adequate. Two Kemper County census tracts near the plant site and the county as a whole have higher percentages of minorities and populations below poverty level than in the United States and the state of Mississippi. Conversely, the three nearby census tracts in Lauderdale County have lower percentages of minorities and populations below poverty level than national and state averages. The Mississippi Band of Choctaw Indians has four reservations in the area, the closest approximately 13 miles northwest of the power plant site.
Transportation	The area roadways from the existing population centers (primarily Meridian and Philadelphia and, less so, De Kalb) to the proposed project site are currently operating at acceptable levels of service, with the exception of a segment on MS 493 from Bailey-Topton/Dogwood Lake Road/Briarwood School Road northeast to Center Hill Road. Only the roads in the vicinity of Meridian and Philadelphia are more than two lanes.
Waste management	Kemper County has one permitted municipal landfill, which is in the process of expanding. The nearest hazardous waste landfill is located in Emelle, Alabama.
Recreation	The principal recreation facilities in the area are Okatibbee Lake, Okatibbee Wildlife Management Area (WMA), and Kemper County Lake.
Aesthetics	The visual characteristics of the proposed power plant site, mine study area, and linear corridors are not unique to Kemper County, eastern Mississippi, or the state as a whole.
Cultural/historic resources	There are few places listed on the National Register of Historic Places near any of the proposed project areas. There are four listed places in southern Kemper County, none proximate to proposed facility locations; the two listed places closest to the power plant site are 5 miles away. Field studies conducted on project properties at the proposed mine study area and within proposed linear facility corridors identified some sites that would or might be eligible for listing.
Noise	Measured sound levels in the area of the proposed power plant site and mine study area are typical of a rural area having some human activity.
Human health/safety	Based on an analysis of health data and statistics and the lack of environmental stressors, Kemper County residents enjoy relatively good health compared to most other counties in Mississippi. There are relatively few health risks and minimal exposures in the county. The county has low air pollutant emissions, the area air quality index is good to moderate, and there are no current exceedances of National Ambient Air Quality Standards (NAAQS).

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project

No-Action	Proposed Action
Air Quality and Climate	
No new sources of air emissions affecting air quality. No change in existing conditions.	Construction of the power plant would generate wind-blown fugitive dust, engine emissions, and other emissions that would result in localized air quality impacts. Projected emissions from power plant operations would include 590 tons per year (tpy) SO_2, 1,900 tpy NO_x, 470 tpy particulate matter (PM), 980 tpy CO, and lesser amounts of other pollutants. The impacts estimated from these emissions would potentially contribute to increase in pollutant concentrations ranging from approximately 2 to 12 percent of NAAQS and from 8 to 71 percent of Prevention of Significant Deterioration (PSD) Class II increments. Plant emissions would have insignificant impacts on the closest PSD Class I area, which is 225 km (140 miles) away from the power plant site. The power plant would also emit an estimated 1.8 million tpy of CO_2 annually, as well as small amounts of other pollutants (e.g., 55 tpy of H_2SO_4 mist and less than 0.1 tpy of mercury). In addition to CO_2, much smaller emissions of other GHGs (e.g., NO_x and methane) would be emitted for the operation of the IGCC plant and mine. Construction and operation of the lignite surface mine would generate wind-borne fugitive dust emissions from 1,500 to 2,000 acres cleared to facilitate mining; fugitive dust emissions from clearing, mining, and grading 275 acres per year for up to 40 years; fugitive dust emissions from off-road trucks and other vehicles traveling on internal, unpaved, mine roads; point source emissions of PM from transfer points at the coal preparation plant; and criteria and hazardous air pollutant emissions from combustion of gasoline and diesel fuel in construction and operating equipment. These emissions would have localized impacts.
Geology and Soils	
No changes in existing conditions. No new land disturbance. The lignite resource would remain for future use. Natural CO_2 deposits would continue to be used for EOR.	Economically feasible recovery of the lignite resource would be accomplished and the lignite used for the generation of electricity. Up to 196 million tons would be mined and consumed over the 40-year project life. A portion of the available lignite resource would not be recovered in order to minimize disturbance of wetlands and floodplains. The deepest lignite seams would not be economical to mine and would be left in place. Soils on up to 12,275 acres would be disturbed or removed over the life of the project by construction or lignite extraction at the adjacent mine. These soils would be replaced with oxidized overburden as part of the land reclamation effort if approved by MDEQ and USACE.
Surface Waters	
No changes in existing hydrologic conditions. No alterations of streams. Meridian sewage treatment plant effluent would continue discharge to Sowashee Creek.	No new process wastewater discharges are proposed for the power plant site. Use of reclaimed effluent would reduce flow in Sowashee Creek but would also remove a source of pollutants that contribute to the creek's impaired status. Up to approximately 32 miles of perennial stream channels and 24 miles of intermittent stream channels would temporarily be removed by construction and lignite extraction at the adjacent mine; USACE stream avoidance and mitigation regulations and guidance would be applied to determine avoidance, minimization, and mitigation requirements during the USACE permitting process. All impacted streams would be restored during the reclamation process. Temporary diversions of Chickasawhay, Tompeat, and Bales Creeks would occur as are proposed. Flows of certain intermittent streams would be intercepted by diversion channels and routed around active mining areas. Upon completion of all mining and reclamation, the existing drainage patterns would be restored. Operation of the mine would require mining within streams and diversion of flow. Studies conducted at the Red Hills Mine show that diversion canals provided similar habitat and contained similar biological communities to undisturbed streams at that mine and at the Kemper County site. Given the existing marginal habitat quality and low diversity of biological communities in existing streams at the Kemper County site, surface water diversions would be able to maintain existing aquatic communities. Habitat and aquatic communities located a short distance downstream of the active mining areas would be affected by diversions that would result in increased or decreased flow to downstream reaches. While the total volume of water reaching Okatibbee Lake would not be appreciably altered, the timing and quality of flows reaching Okatibbee Lake would be different during the time period of mine-related activities and before reclamation is complete.

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project (Continued, Page 2 of 6)

No-Action	Proposed Action
Ground Water	
No changes in existing conditions. No changes in aquifer levels.	The power plant could use up to 1 MGD of saline ground water from the Massive Sand aquifer. No adverse impacts to other users of the Massive Sand or other aquifers would result from drawdowns caused by this use. Construction and operation of the lignite mine would require ongoing activities for mine pit water control. These operations would cause drawdown in the shallow Middle Wilcox aquifer and could adversely impact some local ground water wells (depending on site-specific drawdown experienced and the specific circumstances of a given well [e.g., well depth, pump setting, etc.]). It is possible that the amount of drawdown at a given well could cause adverse impacts to that water user via diminution of supply. At other wells, the drawdown effects might be insignificant. If an existing supply became unusable, alternative supplies would provided by NACC, the mine operator, as required by the surface mining regulations. Postmining ground water quality could be impacted within the reclaimed mine area. Postmining ground water quality in the reclaimed mine area cannot be predicted with certainty, but based on histories of other similar mines, would likely have higher TDS than premining ground water. Therefore, development of shallow freshwater wells in mine spoil deposits might not be feasible. However, sufficient fresh water would be available from the Lower Wilcox aquifer and public water systems during and after mining.
Terrestrial Ecology	
No change in existing conditions. Terrestrial ecological resources would remain in current conditions.	Up to approximately 1,100 acres of terrestrial ecological resources would be altered due to construction of the power plant (including onsite mine-related facilities). Of this, approximately 443 acres are currently in agricultural production, mostly pine plantations and pasture/hay fields. Most wildlife located within the construction area would be mobile and relocate to suitable onsite or adjacent habitats; small, less mobile or burrowing animals might be lost. No federally listed plants or animals were observed on the site, nor are any known to occur there, although records exist for a few listed species in the surrounding region. Construction and operation of the facilities on the power plant site would not adversely affect either listed or migratory species. Lignite mine site preparation and construction activities would result in sequential vegetation removal from most of the mine facility construction areas. Approximately 1,455 acres would be affected during the initial construction phase. Thereafter, existing terrestrial resources would be cleared and reclaimed at an average rate of 275 acres per year. After mining, mine pits would be reclaimed and revegetated. As with the power plant site, mobile wildlife would likely relocate to adjacent, nonimpacted, or restored portions of the mine study area or to suitable offsite habitats. After reclamation, various wildlife species could return to reclaimed lands relatively quickly. Individuals of less mobile or burrowing species could be lost. No federally listed plants were observed in the mine study area, although Price's potato bean may occur in the region. It is unlikely that regional populations of listed or migratory species would be adversely affected by mining. The primary impact to terrestrial resources from linear facility construction or upgrades would result from vegetation clearing; smaller temporary impacts would be due to pipeline trenching. The only permanent impact would be due to any necessary pole placement or access road construction in or across wetlands. These impacts could be minimized by flexibility in final engineering design. Assuming that the entire width of each corridor would be cleared or otherwise altered, approximately 3,037 acres of terrestrial resources would be impacted. However, of this, approximately 1,485 acres have been cleared in the past and are currently pine plantations, pastures, hayfield, deer plots, existing transmission and gas pipeline corridors, roads, shrublands, or other development. For wildlife, existing forested and shrub-dominated communities would initially be cleared, resulting in a loss of forested habitats. Most wildlife would be mobile enough to relocate to offsite habitats during clearing and construction activities; most would return to utilize the herb- and shrub-dominated communities that would become dominant and maintained as such for the life of the project. Individuals of some less mobile species might be lost. Construction of the linear facilities would not be expected to adversely affect any endangered or threatened plant or wildlife populations, including migratory birds.

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project (Continued, Page 3 of 6)

No-Action	Proposed Action
Aquatic Ecology	
Existing aquatic communities would not be affected by the project. The existing impaired habitats and low diversity aquatic communities would remain.	The power plant would have direct impact on only one surface water body; the diversion of effluent currently discharged to Sowashee Creek to the power plant would reduce flows in the creek but also remove a source of pollutants. Biological communities downstream of POTWs are commonly suppressed or altered due to water quality changes. POTWs increase biological oxygen demand, increase fine particulate organic matter, increase ammonia concentrations, and add chlorine and chlorine byproducts to the stream environment. These changes cause shifts in the community composition of macroinvertebrates and fish from pollution-intolerant toward pollution-tolerant species. A reduction of effluent discharge would decrease these effects on the aquatic biology. If permitted by USACE and MDEQ, the lignite mine would displace mine site aquatic habitat during active mining and until habitat reclamation was completed. Diversion canals would temporarily replace the displaced aquatic habitat and would provide habitat similar to existing streams and support similar biological communities. Stream reclamation conducted in accordance with USACE and MDEQ guidelines and permit requirements would replace existing habitat impacted by the lignite mine.
Floodplains	
No change in existing conditions. No alteration or loss of existing floodplains, floodplain storage, or flood conveyance capacity.	The power plant construction and operation would not impact any floodplains. Flood storage capacity along Chickasawhay and Okatibbee Creeks would be reduced due to the construction of levees designed to protect the adjacent mining operations. Partially offsetting flood storage capacity would be created through the construction and operation of large sedimentation ponds designed to contain the runoff from the 10-year storm event. Construction and operation of the lignite mine would displace floodplain storage and conveyance capacity during active mining of the Chickasawhay Creek corridor; the entire 100-year-event discharge of Chickasawhay Creek would be diverted through a constructed channel. The levee along a portion of Okatibbee Creek, if permitted by USACE and MDEQ, would cause flood elevations to rise over a short upstream distance.
Wetlands	
No change in existing conditions. Wetlands would remain in their current status.	Approximately 133 acres of wetlands and streams would be lost or altered by construction activities associated with the power plant and mining-related facilities located on the power plant site. These impacts would require mitigation in accordance with USACE Section 404 permit requirements such that existing functional values of wetlands proposed to be impacted are replaced. Impacts to the 2,375 acres of wetlands that lie within the anticipated life-of-mine area would potentially occur over the 40-year life-of-mine. Any wetland impacts would require USACE CWA Section 404 permit issuance, which would require onsite mitigation (both on reclaimed mined lands and in adjoining upland areas not disturbed by mining), offsite mitigation, or a combination of both. Based on mitigation at other mine sites in the region, wetland functions would, after reclamation, be expected to return over time, as natural revegetation and succession and/or replanting occurs and wetland hydrology is restored. Within the linear facilities corridors, wetlands would be impacted primarily by conversion (partial clearing) of forested and some shrub-dominated wetlands for construction of linear facilities. Up to approximately 395 acres of wetlands and 58 acres of other waters (streams, ditches, ponds) could potentially be impacted by linear facilities construction. Most impacts would be conversion of forested and possibly shrub-dominated wetlands to shrub- and herbaceous-dominated wetland types. Construction practices in wetlands would retain the vegetative root mat in the right-of-ways not filled for access road or structure pad construction or in the pipeline trench excavation. Outside the areas where filling might be necessary for access roads, structure pads, or trenching for pipelines, herbaceous wetlands and other water resources (streams, ditches, and ponds) could potentially be avoided by construction during final engineering and design. All functional losses to wetlands would require mitigation as per USACE Section 404 permit requirements.

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project (Continued, Page 4 of 6)

No-Action	Proposed Action
Land Use	
No changes in area land use. Sites and linear facility corridors would remain in current uses.	Permanent IGCC power plant facilities (including transmission lines and pipelines) would alter almost 3,000 acres of land. The surface lignite mine would impact approximately 12,275 additional acres, although this land would not all be impacted simultaneously and would be reclaimed as mining progresses. The construction of the power plant would permanently convert the existing use of the power plant site (existing planted pine and hardwood forests) to an electrical power generating facility and mine support facilities, resulting in an approximately 0.24-percent loss of silviculture use in Kemper County. The development of the mine would temporarily change the existing land uses and would result in reduced silviculture until reclamation was complete. It is anticipated that a similar mix of land uses would exist after postmining reclamation as existed premining. Clearing of the transmission line and pipeline corridors and the substation sites would result in the permanent loss of the tree canopy and the current silvicultural use of the majority of the existing corridors and the substation sites.
Socioeconomics	
No change in existing socioeconomic conditions. No potential for economic stimulus from proposed project. No change in existing conditions relative to community services.	Project development would result in positive direct and indirect effects through ad valorem taxes, sales tax proceeds from employee spending, and sales tax proceeds for purchases of equipment and services. Beyond the estimated combined construction payroll for the plant and mine of $145 million, there would be an estimated additional indirect benefit of $81.94 million and 186 additional jobs. The corresponding numbers for the operation of the plant and mine would be a $25 million combined annual payroll (during demonstration), an indirect annual benefit of $11.4 million, and 97 additional jobs. Project development would impact housing availability during construction, but sufficient housing would likely be available. Impacts that might still occur could be mitigated by use of per diem, for example, which would encourage the sharing of housing.
Environmental Justice	
No change in existing conditions relative to minority and low-income populations. No potential for adverse impacts or economic benefits from proposed project.	The power plant and surface mine would be located in Kemper County census tracts that have a higher percentage of minorities and a higher percentage of population below the poverty level than other census tracts within a 7-mile radius around the plant and in the state as a whole. Therefore, DOE has concluded that an environmental justice population exists, and consideration must be given to the potential for "disproportionately high and adverse" health or environmental effects, consistent with Executive Order 12898. The potential effects analyzed included health impacts from air emissions and accidental releases, displacement of landowners due to the development of the lignite mine, effects on ground water wells, transportation impacts, housing availability, aesthetics, and noise levels in sensitive areas. Based on an analysis of these potential effects, DOE has determined that construction and operation of the proposed facilities would not place high and adverse impacts and burdens on an environmental justice community, while exporting all of the benefits (e.g., jobs, direct and indirect economic benefits, etc.). For example, landowners would be compensated for use of their land through negotiated agreements with the mine owner. Air quality, water quality, and noise and health impacts would not exceed regulatory standards. Transportation, housing availability, and aesthetic impacts to the environmental justice population would be the same as for the general population. Conversely, construction and operation of the proposed facilities could have positive economic effects for the environmental justice population by creating employment and direct and indirect income in the area. Therefore, DOE has concluded that the potential effects in each resource area would not be expected to result in "disproportionately high and adverse" impacts to environmental justice populations.
Transportation	
No change in existing vehicular traffic. Level of service (LOS) conditions would remain the same.	The area roadways connecting to the existing population centers (primarily Meridian and Philadelphia and, less so, De Kalb) would be adequate to accommodate the anticipated traffic during construction and operation. Local roads in proximity to the proposed power plant location would experience impact in the form of degraded LOS during both construction and operation. Mitigation could take the form of carpooling or park and ride facilities. Heavy haul routes in proximity to the proposed plant location, specifically on Mississippi State Highway (MS) 493 from MS 16 south to the power plant site, would require evaluation by heavy haul carriers/providers for weight or other limitations. The initial coal hauling route from the Red Hills Mine to the proposed plant site would experience up to 80 trucks per day spread over a 16-hour day for a period of approximately 6 months.

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project (Continued, Page 5 of 6)

No-Action	Proposed Action
Waste Management	
No change in existing conditions. No increase in the risk of a hazardous waste release.	The existing Kemper County Solid Waste Landfill is undergoing expansion and has additional acreage within which to expand. There is no anticipated impact to the capacity of the landfill as a result of the proposed project. The landfill is currently undergoing expansion from 8.17 to 22.37 acres and has the ability to expand further within its 102-acre property.
Recreation	
No changes in use of recreational facilities.	Increases in construction and operation employment would equate to an increase in the combined populations of Kemper, Lauderdale, and Neshoba Counties of an estimated 1.1 percent (construction) and 0.4 percent (operation). The existing recreational facilities provide opportunities on a regional basis. These facilities would not be impacted by the relatively small population increases anticipated. The total volume of water reaching Okatibbee Lake would increase slightly, as would the levels of total dissolved solids in the lake; the change in lake water quality would neither result in changes in fish populations or species nor result in exceedances of state water quality standards. Localized increases in summer water temperatures would not be measurable in the lake. No other water flow or quality effects would occur. The recreational value of the lake would not be diminished.
Aesthetics and Visual	
No change in existing conditions. No change in viewsheds or aesthetic resources.	There are no unique views or scenic vistas in the area of the proposed power plant and surface mine sites and linear facilities corridors. There would be a change in the view to local residents and the traveling public along local roads where there would be lines of site to observe the taller plant structures and the transmission lines. The tallest stacks would likely require lighting per FAA requirements, and the lights would be noticeable from some vantage points in the area. The infrequent full operation of the emergency flares would result in a bluish purple flame that would be visible at night.
Cultural/Historic Resources	
All potentially impacted resources would remain in-place and unrecovered.	Construction of the proposed power plant could impact one onsite historic resource (house dating from approximately 1900). Mining could impact cultural resources, which have yet to be evaluated in terms of value. Mining of future mine blocks and construction of linear facilities would likely impact several sites that have been assessed as potentially eligible for listing. An effort would be made to avoid cultural resources when siting facilities. Evaluation and appropriate resource recovery would be guided by plans and protocols approved by the SHPO in consultation with Native American tribes. A project-specific programmatic agreement would be developed and followed.
Noise	
No new sources of noise would be built and operated. The existing sound environment would remain.	Power plant construction noise impacts would be temporary but noticeable at several nearby residences. With one exception, the highest levels experienced by residents would be no louder than maximum levels from passing vehicular traffic on MS 493. Steam blows that would be necessary over several days near the end of plant construction would potentially reach levels of annoyance to persons outdoors at the closest residences. Noise associated with power plant operation would result in an impact of 57 A-weighted decibels (dBA) (day-night sound level) at one adjacent residence, exceeding the U.S. Environmental Protection Agency residential guideline of 55 dBA but less than the Department of Housing and Urban Development residential guideline of 65 dBA. Mining would also result in localized noise impacts, primarily in the area surrounding the active mine block.

Table S-5. Summary of Potential Impacts of the Kemper County IGCC Project (Continued, Page 6 of 6)

No-Action	Proposed Action
Human Health/Safety	
No added health and safety risks. No increases in the probabilities of construction or operational health and safety risks.	Construction of all of the proposed facilities would involve hazards typical of any large industrial construction project. Health and safety risks would accompany the construction efforts and could affect local residents as well as construction workers. Some injuries to construction workers would be likely, as indicated by industry statistics. Operations of the proposed industrial project facilities would entail risks, as well, given the nature of the facilities and based on industry statistics. The IGCC power plant would emit a maximum of 9.9 tpy of hazardous air pollutants (HAPs), including approximately 3 tpy of formaldehyde. Modeling studies to assess the potential impacts on health found that plant-emitted HAPs would not result in or contribute significantly to inhalation health risks. For instance, the total cancer risk was predicted to be less than one in a million (i.e., 3.5 in ten million). A cancer risk of one in a million is the level below which exposures are generally considered to be acceptable. The noncancer risks from the worst-case maximum exposure to the plant emissions would be far below levels considered to have adverse health effects, i.e., the total hazard quotient from exposure to all toxic emissions was much less than one (i.e., 0.0075). A hazard quotient below one is considered to have no adverse health effects. Similarly, predicted total deposition of emitted mercury was estimated to be less than 12 percent of that measured at a regional site. Additional health and safety risks would result from the handling, storage, and transport of hazardous materials, including ammonia and CO_2, especially as the result of an accidental release or intentional acts of sabotage or terrorism. A catastrophic (worst-case) rupture of an ammonia storage tank or tanker truck would potentially cause severe health effects up to 1.7 and 1.2 miles from the accident, respectively. A complete rupture of the CO_2 pipeline would potentially result in adverse health effects to exposed persons within 0.7 mile of the accident. Population along the pipeline corridor is sparse, and given the limited extent of the affected area (e.g., the plume width would only affect a small sector), it is unlikely that an accident would be result in injuries. All of these results were based on the worst-case accidental release scenarios. Based on estimates of employee and other facility-related vehicle-miles traveled, there would be the potential for fatalities during the operational life of the power plant and surface mine.

The power plant's use of reclaimed effluent from two Meridian POTWs would remove a source of pollutants contributing to the impaired water quality of Sowashee Creek. At the same time, this manmade source of flow in the creek, which dominates total flow in the creek during natural low-flow conditions, would be removed. The result would be to return the creek to its more natural flow and quality characteristics.

The proposed facilities would provide permanent employment opportunities in a county where most residents currently travel out-of-county for work. The facilities would also offer opportunities for higher-paying industrial jobs and would add significantly to the economy of Kemper County and the surrounding area. However, local roads would experience large increases in traffic, especially during power plant and mine construction.

The acoustic environment of the area immediately surrounding the power plant site would change noticeably as a result of operation of the IGCC plant. For several of the closest residents along MS 493 east of the plant site, noise generated by the plant would alter the generally quiet environment that currently exists.

A few small ephemeral streams drain the hilly topography of the proposed power plant site. Portions of these drainages would be altered by construction of the power plant. The lignite mine study area contains several intermittent and perennial streams, the largest of which are Okatibbee and Chickasawhay Creeks. If permitted by USACE and MDEQ, construction and operation of the lignite mine as presented in this EIS would require the temporary diversion or channelization of some streams, including phased channelization of Chickasawhay Creek to allow mining within a portion of its existing valley. Mining would result in the temporary loss of aquatic habitat, and this loss would be somewhat offset by habitat provided in the diversion canals. USACE and MDEQ guidelines and permit conditions would require reclamation to replace the lost/impacted aquatic habitat functions associated with any streams permitted to be disturbed.

INCOMPLETE AND UNAVAILABLE INFORMATION

Several mining-related surface water and aquatic ecology issues have not been addressed quantitatively due to incomplete or unavailable information. More detail would be provided in future mine permit applications to MDEQ and USACE. Generally, the specifics surrounding proposed wetland mitigation and stream reclamation are presently unknown because reclamation and mitigation plans have not yet been developed. However, future permit applications would include detailed plans for mitigating wetland impacts and reclaiming streams. If permits are issued by USACE, wetland mitigation and stream restoration would be required in types and amounts determined by USACE to fully offset the functional values lost. Quantitative analysis is also not available with regard to potential impacts on downstream hydraulics, sediment transport, and channel stability resulting from diversion of Chickasawhay Creek and the related loss of floodplain storage and conveyance during mining operations. A qualitative assessment based on the best available information is provided.

Some issues associated with mining of future mine blocks would be considered in more detail during the permitting processes that would precede mining in those areas. While the area of the planned first mine block (i.e., the block that would be mined during the demonstration period) has been evaluated to a great extent, subsequent blocks have not received the same levels of characterization and evaluation. For example, the ecological resources and cultural/historical resources of future mine blocks would require further characterization. These further studies would occur closer in time to when mining would occur. It is possible that some areas currently identified for mine blocks would change in the future as mining progressed. For purposes of complying NEPA, a qualitative assessment using the best information available has been made in this EIS.

Similarly, corridors for several linear facilities have not been fully established and therefore have not been fully surveyed in the field. These include a portion of the planned corridor for the reclaimed effluent pipeline, the right-of-way for existing distribution lines needing upgrades to provide power for power plant and mine construction, and the new electrical transmission line to deliver power at a voltage required for mine facilities operation. Due to the lack of specific information on these routes or timely access to them, neither field studies to characterize the routes nor detailed assessments of impacts were possible. However, readily available information on area characteristics was assembled, and potential impacts were qualitatively assessed to the extent possible. The needs for access roads to support linear facilities construction have not been studied, so no assessment of potential impacts that would be associated with new or upgraded roads was possible for this EIS. Despite these limitations, the existing characteristics of the unsurveyed corridors and potential impacts within them because of project-related construction would likely be similar to those described in greater detail for the surveyed routes due to similar topographical, ecological, and land use characteristics.

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