1 of 1

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL ASSESSMENT

WABASH RIVER
COAL GASIFICATION COMBINED CYCLE (CGCC)
REPOWERING PROJECT

A PROJECT PROPOSED BY
WABASH RIVER COAL GASIFICATION
REPOWERING PROJECT JOINT VENTURE
AT THE
WABASH RIVER GENERATING STATION
WEST TERRE HAUTE, INDIANA

MAY 1993

MASTER

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LIST OF ACRONYMS AND ABBREVIATIONS

AGR	acid gas removal
APCD	Air Pollution Control Division
AQCR	Air Quality Control Region
Btu	British thermal unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CCT	Clean Coal Technology
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CGCC	Coal Gasification Combined Cycle
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
dB	decibel
DOE	(U.S.) Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	(U.S.) Environmental Protection Agency
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
gal/yr	gallons per year
GEP	Good Engineering Practice
gpd	gallons per day
HRSG	heat recovery steam generator
H ₂ SO ₄	sulfuric acid
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IOSHA	Indiana Occupational Safety and Health Administration
ISCST	Industrial Source Complex Short-Term dispersion model
lb/yr	pounds per year
MDEA	methyldiethanolamine
mgd	million gallons per day
mg/L	milligrams per liter
MMBtu	million British thermal units
MMscf/yr	million standard cubic feet per year
msl	mean sea level
MWe	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO _x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
OSHA	Occupational Safety and Health Administration
PM	particulate matter
PM ₁₀	particulate matter less than 10 microns in diameter

LIST OF ACRONYMS AND ABBREVIATIONS (cont.)

PON	Program Opportunity Notice
ppm	parts per million
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SIP	State Implementation Plan
SO ₂	sulfur dioxide
s.u.	standard units
TGI	tail gas incinerator
tpd	tons per day
tpy	tons per year
TRS	total reduced sulfur
TSS	total suspended solids
μg/m ³	micrograms per cubic meter
VOC	volatile organic compound
yd ³ /month	cubic yards per month

1. INTRODUCTION

In October 1989, Public Law 101-121, "An Act Making Appropriations for the Department of the Interior and Related Agencies for the Fiscal Year Ending September 30, 1990, and for Other Purposes" (the Act), was signed into law. Among other things, the Act provided \$600 million in funding to the Department of Energy (DOE) to conduct cost-shared Clean Coal Technology (CCT) projects under the fourth round of the Clean Coal Technology Demonstration Program (CCT-IV). The Act included funding appropriations for the design, construction, and operation of cost-shared, clean coal projects to demonstrate technologies capable of replacing, retrofitting, or repowering existing power generating facilities. These technologies were to be capable of (1) achieving significant reductions in the emissions of sulfur dioxide (SO₂) and/or nitrogen oxides (NO_x) from existing facilities to minimize environmental impacts such as transboundary and interstate pollution and/or (2) providing for future energy needs in an environmentally acceptable manner.

On November 5, 1990, Public Law 101-512 (Department of the Interior and Related Agencies Appropriation Act of Fiscal Year 1990) was signed into law, requiring that a request for proposals for CCT-IV be issued no later than February 1, 1991. To that end, a Program Opportunity Notice (PON) was issued by the DOE in January 1991, soliciting proposals to conduct cost-shared Clean Coal Technology projects demonstrating innovative, energy-efficient technologies capable of being commercialized in the 1990's. In May 1991, DOE received 33 proposals in response to the PON, 9 of which were selected for award. Wabash River Coal Gasification Repowering Project, proposed by the Wabash River Coal Gasification Repowering Project Joint Venture, was one of those nine. The Joint Venture partners, also referred to as the Industrial Participants in the project, are PSI Energy, Inc. (PSI), of Plainfield, Indiana, and Destec Energy, Inc. (Destec), of Houston, Texas. The Joint Venture has requested financial assistance from DOE for the design, construction, and operation of a nominal 2,600-ton-per-day (tpd) of coal, 268 Megawatt (MWe), coal gasification combined cycle (CGCC) repowering demonstration project to repower Unit 1 of the existing Wabash River Generating Station in West Terre Haute, Indiana. The proposed CGCC project is based on an entrained-flow gasifier capable of utilizing high-sulfur bituminous coal. The project, including the demonstration phase, would last 71 months at a total proposed cost of \$396 million. DOE's share of the project cost would be 50 percent, or \$198 million.

DOE has established a three-tiered approach to assess the environmental impacts of the CCT program and associated proposed projects, and to comply with the National Environmental Policy Act (NEPA). This approach is consistent with Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508) and the DOE regulations for compliance with NEPA (57 FR 15122, April 24, 1992, to be codified at 10 CFR 1021).

This strategy includes the consideration of programmatic and project-specific environmental impacts during and subsequent to the project selection process. The first level of this approach involved the preparation of a Programmatic Environmental Impact Statement (DOE/EIS-0146) for the CCT program by DOE (DOE, 1989).

That Environmental Impact Statement (EIS) ensured that relevant environmental consequences, and reasonable programmatic alternatives, were evaluated. As a second level, prior to project selection, DOE prepared a confidential, project-specific review for internal DOE use in the decision-making process. This review included an assessment of the project-specific proposal's discussion of environmental, health, safety, and socioeconomic issues; alternative sites and/or processes reasonably available to the offeror; environmental impacts and appropriate mitigating measures; and a list of permits required to implement the proposed project as described in the proposal. This Environmental Assessment (EA) represents the third level of NEPA review, and provides a site-specific analysis of the potential environmental impacts of the proposed Wabash River CGCC Repowering Project.

The repowering project would involve the construction of a coal gasification plant at the Wabash Station to produce synthetic gas for use in a new combustion turbine. The existing Wabash Station Unit 1, which is a conventional pulverized coal-fired boiler, would be retired from service. The power generated by the existing Unit 1 boiler would be replaced by retrofitting the Unit 1 steam turbine to utilize steam generated from the heat produced by the exhaust of the new combustion turbine. Together, the new combustion turbine and the retrofitted Unit 1 steam turbine would increase the electrical generating capacity of the existing Unit 1 by 185 percent.

The proposed CGCC system for the Wabash River CGCC Repowering Project is similar to the Louisiana Gasification Technology, Inc. (LGTI) system owned and operated by Destec, in Plaquemine, Louisiana. All of the data concerning emissions from the proposed project are based on emissions at LGTI, and on subsequent changes made to the LGTI process design and technology that are expected to improve effluent streams from the proposed Wabash River project.

The proposed project would result in a combined cycle power plant with lower emissions and higher efficiency than most existing coal-fired power plants of comparable size. The net plant heat rate (energy content of the fuel input per useable electrical generation output; i.e., Btu/kilowatt hour) for the new repowered unit would be a 21% improvement over the existing unit, while reducing SO₂ emissions by greater than 90% and limiting NO_x emissions by greater than 85% over that produced by conventional coal-fired boilers. The technology, which relies on gasified coal, is capable of producing as much as 25% more electricity from a given amount of coal than today's conventional

coal-burning methods. Besides having the positive environmental benefit of producing less pollutants per unit of power generated, the higher overall efficiency of the proposed CGCC project encourages greater utilization to meet base load requirements in order to realize the associated economic benefits. This greater utilization (i.e., increased capacity factor) of a cleaner operating plant has global environmental benefits in that it is likely that such power would replace power currently being produced by less efficient plants emitting a greater volume of pollutants per unit of power generated.

2. PURPOSE AND NEED FOR THE PROPOSED ACTION

The Clean Air Act Amendments of 1990 (CAAA) require the U.S. Environmental Protection Agency (U.S. EPA) to implement a regulatory program achieving significant reductions in SO₂ emissions. The CCT program, in concert with the CAAA, encourages and assists in the development of clean-burning coal technologies from coal-burning electrical generating plants. In the CAAA, 110 coal-fired boiler electric generating stations, including the Wabash Station, were identified and targeted for SO₂ emission reductions. SO₂ emissions reduction is being pursued to meet post year 2000 air quality standards. The Federal regulatory emphasis on air emission controls to mitigate the effects of acid rain has occurred simultaneously with an increased demand for electric power, the need to replace or update aging electrical generating plants, and an increased use of domestic energy resources such as coal.

The CCT Program was created by Congress to address both the need for reliable domestic production of power and the need for a clean environment. The purpose of the proposed action is to fund a project that would demonstrate one of the new clean-burning technologies identified by the CCT Program. The Wabash River CGCC Repowering Project was identified as a project that could demonstrate the potential for large-scale commercial operation, while achieving reductions in the emissions of SO₂ and NO_x.

The Wabash River CGCC Repowering Project (the proposed project) would show that reductions in the emission of National Ambient Air Quality Standard (NAAQS) criteria air pollutants can be achieved while providing a reliable, efficient base of electrical generating capacity. However, as noted in Section 4.1.1, certain non-criteria pollutants would increase following implementation of the proposed project. The proposed project would demonstrate entrained flow coal gasification of high-sulfur bituminous coals, and would repower one of the six boilers of the Wabash Station with Destec's coal gasification technology. Specifically, the proposed project would demonstrate that an oxygen-blown gasification plant can be combined with an advanced combustion turbine and heat recovery steam generator (HRSG) to repower an existing steam turbine.

This EA has been prepared by DOE in compliance with the requirements of NEPA. The sources of information for this EA include the Joint Venture's technical proposal for the project submitted to DOE in response to the CCT-IV PON, discussions with the Joint Venture's staff, the volume of environmental information for the project (Radian, 1992), supplementary information provided by the Joint Venture's staff, and a field visit to the proposed project site.

3. PROPOSED ACTION AND ALTERNATIVES

3.1 PROPOSED ACTION

The Proposed Action is for DOE to provide cost-shared funding to design, construct, and demonstrate a CGCC system at the Wabash River Generating Station in West Terre Haute, Vigo County, Indiana. Project sponsors are the Wabash River Coal Gasification Repowering Project Joint Venture Partners (Destec and PSI).

3.1.1 Location

The proposed project would be located at the Wabash Station in Vigo County, southwestern Indiana (Figure 3-1). PSI owns and operates the Wabash Station, located on approximately 400 acres west of the municipal limits of Terre Haute. The existing facility is bounded on the east by the Wabash River and can be accessed from the west from State Route 63 via 62nd Avenue or Bolton Road. The land surrounding the Wabash Station is primarily rural, with several scattered residences within a half mile of the facility. The predominant land use is agricultural (e.g., corn and soybean production), although several coal-mining and quarry operations are conducted nearby. Average temperatures in the Terre Haute area range from 26°F in January to 76°F in July. On average, 38 inches of rain and 19 inches of snow are received annually. Predominant winds are from a southerly direction.

Thirty-seven acres of property required for the proposed project area have been donated to PSI by the Peabody Coal Company. This acreage is immediately adjacent to the existing plant and in direct proximity to the rail spur that would service the facility. This property was previously disturbed by underground (i.e., deep shaft) mining operations and has subsequently been reclaimed. Geotechnical investigations of subsurface conditions on this site were conducted in 1991 and 1992. The 1991 geotechnical study identified the geological attributes resulting from the shallow mining activities of a mine known as the Viking mine. Subsequent to this study, documentation of a second, deeper mine at this site was found, and a follow-on geotechnical study was conducted in 1992. The results of the second geotechnical study indicated that the original proposed project footprint would require modification to avoid areas potentially subject to subsidence because of mine shafts located 100 feet or more below the surface. The resulting proposed project footprint, as documented in this EA, would not be subject to ground subsidence related to the previous underground mining activities (Lessig, 1992).

3.1.2 Wabash River Station Existing Facilities

The proposed project involves repowering one of the six boilers at PSI's Wabash Station with CGCC process technology developed by DOW Chemical Company and owned by Destec. The existing facility utilizes six pulverized-coal-fired electrical generating units,

Figure 3-1. Wabash River CGCC Repowering Project location map.

each fitted with an electrostatic precipitator for particulate matter control.

The boilers for all six units utilize a common exhaust stack that is 450 feet high. Each unit is fueled by pulverized bituminous coal; No. 2 fuel oil is used for boiler startup and flame stabilization.

The proposed project would repower the existing Unit 1 steam turbine, which was put into service in 1953. This unit is currently permitted to operate at 99 MWe, but is limited to 90 MWe during routine operations as set forth under the Wabash Station's State air quality permit. Units 2 through 4 are similar to Unit 1 in design and operating features. These units are also permitted at 99 MWe but are limited to 90 MWe during routine operations. Unit 5 is permitted at 121 MWe and is limited to 103 MWe during routine operations; and Unit 6 is permitted at 354 MWe and is limited to 342 MWe during routine operations. Therefore, the total permitted electrical generating capacity of the existing Wabash Station is 871 MWe.

Currently, the Wabash Station burns bituminous coal supplied from midwestern mines (Illinois Basin). In 1990, coal consumption for the entire facility was approximately 1,456,900 tons, of which Unit 1 (the unit to be repowered) consumed 164,900 tons. Coal is supplied to the site by rail and is stored in a 45- to 90-day working pile. The sulfur content of this coal is between 2.0 and 2.2 percent. The coal heating values range from 10,600 to 10,900 British thermal units (Btu) per pound. There are no auxiliary gaseous fuel sources at the Wabash Station, although natural gas would be provided for the proposed project. Currently, the Wabash Station uses approximately 1.5 million gallons of No. 2 fuel oil per year for boiler startup.

The Wabash Station generating units currently operate under State air quality Permit Nos. 21-4911-01-90 through 21-4911-06-90, issued by the Vigo County Air Pollution Control Division (APCD). The permits limit startup opacity, and SO₂ and particulate matter (PM) emissions. SO₂ and total PM emissions are limited to not more than 4.04 pounds per million British thermal units (lb/MMBtu) and 0.1338 lb/MMBtu, respectively. Air emissions associated with this coal-burning facility include SO₂, NO_x, PM, carbon monoxide (CO), volatile organic compounds (VOCs) (e.g., benzene, toluene), total reduced sulfur (TRS), and carbon dioxide (CO₂).

The sole water source for the Wabash Station is the Wabash River. The facility has three intake structures on the river and withdrew an average of 450.1 million gallons per day (mgd) of surface water in 1990. The facility operates under a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit (Permit No. IN0002810), issued by the Indiana Department of Environmental Management (IDEM), for five outfalls as denoted in Figure 3-2. The discharges allowed for Outfalls 001 and 002 under this permit are presented in Table 3-1 and Table 3-2, respectively. The permit limits for these outfalls

Figure 3-2. Wabash River Generating Station.

Table 3-1. Wabash Station Outfall 001 current NPDES permit limitations summary and average of monitored values.

Effluent Parameter	Discharge Limitations		Units	Monitoring Requirements		Average of Monitored Values ^f
	Monthly Avg.	Daily Max.		Frequency	Type	
Effluent flow ^b	Report	Report	mgd	Daily	24-hr total	443.2
Upstream stream flow ^c	Report	Report	mgd	Daily ^d	Gauge	9,233
Intake temperature ^{e,e}	Report	Report	°F	Daily ^d	Continuous	60.7
Effluent temperature ^e	Report	Report	°F	Daily ^d	Continuous	74.0
Mixed river temp. ^e	Report	Report	°F	Daily ^d	Continuous	62.3
Total residual chlorine ^f	Report	0.2	mg/L	3x/Week	Grab ^g	0.006
Free available chlorine ^h	0.2	0.5	mg/L	3x/Week	Grab ^g	0.005
Chlorination frequency ^f	Report	Report	events/day	Monthly	Report	1.0
Chlorination duration ^f	Report	Report	min/day	Monthly	Report	0.49
Plant capacity factor	Report	Report	% of total	Monthly	Report	41.6

^a Average of monitored values reported in NPDES Discharge Reports, Nov. 1990 - Sept. 1991.

^b Flow may be estimated based on engineering calculations.

^c River flow is measured at the U.S.G.S. Terre Haute gauging station. Temperature is measured at the Units 1 and 2 intake structure.

^d Excluding weekends and holidays.

^e Thermal requirements are contained in Part III. A. of the permit.

^f The discharge of total residual chlorine (TRC) is limited to 40 minutes per event, with each event separated by at least 5 hours.

^g Samples are to be taken during expected peak concentration of TRC or Free Available Chlorine (FAC).
^h FAC limitations apply to the discharge from each individual unit, prior to mixing with the condenser cooling water from other units. Simultaneous multi-unit chlorination is prohibited. For the purposes of the permit, Units 1 and 2 and Units 3 and 4 are considered to be single units. The duration of measurable discharge of FAC cannot exceed 120 minutes per unit per day.

Table 3-2. Wabash Station Outfall 002 current NPDES permit limitations summary and average of monitored values.

Effluent Parameter	Discharge Limitations			Monitoring Requirements		
	Monthly Avg.	Daily Max.	Units	Frequency	Type	Average of Monitored Values ^a
Effluent flow	Report	Report	mgd	Weekly ^b	Instantaneous	5.3
TSS	30	70	mg/L	Weekly	Grab	8.78
Oil and grease	15	20	mg/L	Monthly	Grab	<1.6
Total iron ^c	Report	1.0 ^d	mg/L	Daily	Grab	0.126 ^e
Copper ^c	0.04	0.09	mg/L	Daily	Grab	0.02 ^e
pH	6.0 to 9.0	6.0 to 9.0	s.u.	Weekly ^b	Grab	7.6-8.4

^a Average of monitored values reported in NPDES Discharge Monitoring Reports, November 1990 - September 1991.

^b Daily during discharge of metal cleaning wastes.

^c These limitations and monitoring requirements apply at Outfall 002 only during discharge of metal cleaning wastes.

^d Iron limitations apply on a net basis.

^e The iron and copper values are each an average of 20 days of monitoring results from April to June 1988, the first time metal cleaning wastes were discharged into the ash pond system.

were derived from the national effluent limits and guidelines for the steam electric-power generating point source category at 40 CFR Part 425 and the Indiana Water Quality Standards at 327 Indiana Administrative Code (IAC) Article 2.

The NPDES thermal effluent requirements are applicable only to Outfall 001 due to the condenser cooling water discharge. This outfall discharges an average of 443.2 mgd of untreated once-through condenser cooling water and boiler blowdown. The NPDES permit provides that the Wabash Station may operate in its current condenser cooling mode, as long as the heat rejection rate (based on total station MWe capacity) is not exceeded and subject to the temperature limitations described below. The outfall's thermal discharge is not subject to temperature limitations from November through April of each year. However, from May through October of each year, the State requires PSI to monitor the water intake temperature, the effluent temperature, and the mixed river temperature (measured approximately 2 miles downstream of Outfall 001 on the Indiana 63 bridge over the Wabash River). The thermal limitations specify that the mixed river temperature cannot exceed certain maximum instantaneous limits more than 1 percent of the hours in the May-October period and cannot exceed these maximum limits by more than 3°F at any time during the May-October period. The relevant maximum instantaneous temperature limits are as follows:

- May: 80°F
- June: 90°F
- July: 90°F
- August: 90°F
- September: 90°F
- October: 78°F

Outfall 002 discharges approximately 5.3 mgd of ash sluice water and intermittent flows (i.e., strainer washwater; clarifier and filters backwash and flowdown; softener backwash; demineralizer, pre-heater, and metal cleaning wastes; coal yard drains; and evaporator waters). This wastewater stream is settled in a series of on-site ash ponds before discharge to the Wabash River. Permit limits for this outfall are applicable to total suspended solids, oil and grease, total iron, copper, and pH.

Outfalls 003 through 005 discharge backwash from the plant intake screens. Two generating units discharge through each of these three outfalls. The NPDES permit effluent limits for Outfalls 003 through 005 pertain solely to the discharge of debris from intake screen washing operations. The existing sanitary wastewater stream is managed in an on site septic system.

As shown in Table 3-3, the existing Wabash Station produced over 150,000 tons of ash, 65,000 gallons of liquid maintenance waste, and miscellaneous other waste products in 1990. All ash produced by the Wabash Station is managed on site in the ash pond system. Wastes other than ash are temporarily stored on site, then transferred off site for disposal.

Table 3-3. Wastes generated by the existing Wabash River Generating Station in 1990.

<u>Source/Type</u>	<u>Units</u>	<u>Quantity</u>
Boiler ash		
Fly ash	tons/year	122,200
Bottom ash	tons/year	30,500
Total boiler ash*	tons/year	152,700
Spent filters	lbs/year	2,000
Liquid maintenance wastes	gal/year	65,000
Miscellaneous solids	yd ³ /month	120

* Unit #1 produced a total volume of 17,300 tons of ash in 1990.

3.1.3 Proposed Coal Gasification Combined Cycle System

The proposed demonstration would repower the existing 99 MWe Unit 1 steam turbine with a 268 MWe (net) coal gasification combined cycle power plant. The repowering project is scheduled to be in operation for approximately 25 years. The proposed DOE-assisted demonstration period covers the first 3 years of operation.

The CGCC process is an alternative to the conventional coal-fired electric power generation with postcombustion emission controls. Because of the overall design of the CGCC system for this project, emissions of sulfur dioxide, nitrogen oxides, and particulates are projected to be lower than those from the existing Wabash Station Unit 1 and other conventional pulverized coal boiler units of similar size. A CGCC facility would be expected to produce approximately 40 percent of the solid waste produced by comparable conventional pulverized coal power generation plants equipped with a flue gas desulfurization system. Additionally, the process by-products (elemental sulfur and solidified slag particles) can be recovered and are considered marketable.

A CGCC facility utilizes four major processes:

- Converting coal into fuel gas (via partial oxidation and gasification),
- Cleaning the fuel gas,
- Using the clean fuel gas to fire a combustion turbine generator, and
- Treating the waste streams generated (DOE, 1989).

Repowering an existing facility, using the CGCC technology, would involve the following major components: coal-handling facilities, a gasification plant, a combined-cycle power unit, and the supporting facilities for these units.

3.1.3.1 Project Facilities

The CGCC facilities would be installed adjacent to the existing Wabash Station facility (Figures 3-3 and 3-4). The location of the existing transportation and utility infrastructure at the Wabash Station leave limited viable site-specific configuration options for the proposed project. The 37-acre tract of land designated for the proposed project would contain the process area. This tract of land would contain the gasification plant, oxygen unit, gas combustion turbine, and heat recovery steam generator (HRSG), as well as the construction laydown and parking areas, and supporting structures (i.e., power delivery system, auxiliary boiler, feedwater demineralizer system, cooling water system, wastewater and sanitary sewage system, fire and service water system, instrument air systems, and ancillary buildings). The coal-handling and slag-handling facilities to be utilized during the 3-year demonstration period, as well as the proposed stormwater and process wastewater ponds, would be located on approximately 9.4 acres of land, which is already within the station boundaries.

The proposed project would require the construction of four new exhaust stacks, ranging from 50 to 310 feet in height, cooling towers, and a dual column air separator. These stacks would be located within the 37-acre tract of land designated for the process area (Figure 3-4). Table 3-4 denotes the proposed stacks and corresponding stack heights, diameters, and Good Engineering Practice (GEP) stack heights. All of the proposed new stacks

Table 3-4. Proposed Wabash River CGCC Project stack heights.

Stack	Height ^a (feet)	Diameter (feet)	GEP Height (feet)
Combustion turbine/HRSG	225	20	515
Auxiliary boiler	50	6	N/A ^b
Flare	185	3	N/A ^b
Tail gas incinerator	310	3	327
Cooling tower (4 cells)	31	20	N/A ^b

^a All stacks are within Good Engineering Practice heights.

^b Stack height under 213 feet; GEP criteria not applicable.

comply with GEP stack heights, which were determined by adding the height of the nearest structure plus 1.5 times the lesser dimension (height or projected width) of the nearest structure. GEP stack heights have been established to comply with the provisions of Rule 7 of the Indiana Air Pollution Control Regulations (326 IAC 1-7-1 to 1-7-5). Both the height and projected width of the structure are determined from the structure frontal area projected onto a plane perpendicular to the direction of the wind. GEP regulations are premised on the observation that in the immediate vicinity of a structure or terrain obstacle, atmospheric flow is disrupted by aerodynamic

Figure 3-3. Proposed Wabash River CGCC Repowering Project facilities.

Figure 3-4. Proposed lay-out of the Wabash River CGCC Repowering Project facilities.

forces. The GEP stack height criteria do not apply to sources with stacks of 65 meters (approximately 213 feet) or less. The GEP criteria define the stack height for each source that will safely prevent downwash and that represents the maximum creditable height allowed for assessing ambient impacts based on dispersion modeling.

3.1.3.2 Process Description

The proposed project would achieve reductions in the overall emissions of SO_2 , NO_x , PM, particulate matter 10 microns or smaller (PM_{10}), lead, fluorides, and methane (CH_4) as compared with the existing operation of the Wabash Station. This project would involve the installation of a new gasifier, cleanup system, and advanced-cycle combustion turbine to replace the coal-fired boiler of existing Unit 1. This unit would operate on synthetic fuel gas (syngas) made from locally mined, high-sulfur (4.5 percent to 4.9 percent sulfur) coal. The syngas would be produced in an on-site gasification facility capable of processing approximately 2,600 tons of coal per day. Additionally, an HRSG would be installed in the combustion turbine exhaust to generate steam to repower the existing Unit 1 steam turbine. The coal-fired boiler that currently supplies steam to the Unit 1 turbine would be retired in place upon implementation of this project. There would be no plans to repower this boiler.

A diagrammatic representation of the CGCC process that would be utilized at the Wabash Station is shown in Figure 3-5. The two major components of the demonstration project would be the gasification island and the power island. In the gasification island, coal would be ground with water to form a slurry that would be pumped into the gasification vessel. Oxygen would be added to this gasification vessel to form a hot, raw gas through partial combustion of the coal. During this gasification process, the non-carbon materials in the coal would melt and flow out of the gasification unit. This material is the gasifier slag by-product, a black, glassy, non-leaching, and sand-like material. The hot raw gas would be cooled in a heat exchanger to generate high-pressure steam. Particulates, sulfur, and other impurities would be removed from the raw gas before combustion to make it an acceptable fuel for the combustion turbine in the power island.

In the gasification process, approximately 2,600 tons per day (tpd) of coal would be gasified at full load. Coal from the rod mill feed hopper would enter an open circuit feed hopper where coal slurry would be produced by wet grinding. The coal slurry process is designed to maximize solids concentration in the coal feed to the gasifier, producing high efficiency in the first stage gasifier and improved conversion in the second stage. Recycled water would be fed into the rod mill inlet along with the coal to produce the desired slurry solids. The Destec gasification process consists of two stages. The first would be

Figure 3-5. Diagrammatic representation of the CGCC process to be utilized at the Wabash Station.

an entrained flow slagging stage, and the second would be an entrained flow non-slagging stage. The slagging stage would be a horizontal refractory-lined vessel in which coal slurry and oxygen are combined in a partial combustion atmosphere at an elevated temperature and pressure to produce a high-temperature syngas. The coal would be almost totally gasified to syngas in this environment. All coal ash would flow out of the taphole in the bottom of the gasifier into a water-filled quench tank. Water quenching turns the molten ash into solidified slag, which would be continuously removed from the gasifier, crushed, dewatered, and stored for later disposition.

The raw syngas generated in the first stage would flow up from the horizontal section into the non-slagging stage (i.e., second stage) of the gasifier. This section would be a vertical, refractory-lined vessel in which additional coal slurry would be reacted with the hot syngas stream exiting the first stage. This additional slurry and some recycled cooled syngas serve to create and quench additional syngas. The cooled syngas would leave the reactor and move to a high-temperature heat recovery unit where it would be further cooled. The cooled syngas would then flow to a dry particulate removal section where particles would be separated from it and recycled to the gasifier. The syngas would be further cooled through a series of heat exchangers prior to hydrogen sulfide removal. As the gas cools, water containing ammonia, CO_2 , and other dissolved gases would be collected and treated in a water treatment unit for recycling to the slurry preparation plant to make more coal slurry. Water treatment would separate the CO_2 and most of the dissolved hydrogen sulfide (H_2S) from the ammonia and remaining H_2S . The portion of the water not recycled for slurry would be treated to remove the remaining ammonia and H_2S , and would pass through filters designed to be the final barrier for removal of trace organics and solids. The hydrogen sulfide would be removed from the syngas by an acid gas removal (AGR) system that removes over 98 percent of the sulfur in the syngas. The syngas would then be reheated before being sent to the power plant.

The cleaned syngas would be routed to a combined cycle system for electric power production. The syngas would be piped to a combustion turbine to generate approximately 191 MWe of electricity. The HRSG would use heat from the combustion turbine exhaust to produce high-pressure steam. This steam, in combination with the steam generated in the gasification process, would be piped to the existing Unit 1 steam turbine to generate an additional 111 MWe of electricity. Addition of the gas and steam turbine generator outputs, less 34 MWe required for the proposed project's auxiliary power needs, would produce a total net output of 268 MWe for the project.

To protect against the uncontrolled release of syngas, a flare system is proposed to combust process stream components during cold startups, shut down, and during upset conditions when the combustion turbine is unavailable. Additionally, a tail gas

incinerator (TGI) would be installed to destroy H_2S and other contaminants in the sulfur recovery system tail gas and process vent streams.

3.1.3.3 By-products

By-products of the proposed CGCC process would include elemental sulfur (35,280 tons per year at 90 percent capacity factor) and gasifier slag (93,838 tons per year (tpy) at 90 percent capacity factor). Both by-products are considered usable and would be actively marketed. Elemental sulfur can be sold as raw material to make agricultural fertilizer. The gasifier slag can be used as structural fill for construction projects and as an aggregate in asphalt roads. Testing of the gasifier slag produced in the LGTI facility (Section 1) has demonstrated that this by-product is not a hazardous waste as defined under Federal and State rules. The slag is a glassy, sand-like material that does not leach toxic concentrations of metal or organic contaminants, and would be stored in the southeast corner of the Wabash Station's existing ash pond system, pending off-site utilization. The sulfur would be stored on site in railroad tank cars pending shipment to a buyer.

3.1.3.4 Performance Characteristics

For the purpose of this EA, the performance of the Wabash Station proposed CGCC demonstration project is assessed based on a 90 percent annual capacity factor, since this is the maximum capacity of the permit being requested from the State. The term "90 percent capacity factor" means operation of combustion sources at 100 percent load for 90 percent of the hours in a year. At this capacity, approximately 861,000 tons of coal would be consumed by the CGCC process components (gasified and burned) annually, generating 191 MWe of electricity from the combustion turbine, and 111 MWe from the steam turbine. Approximately 34 MWe would be required for CGCC auxiliary equipment operation. Hence, the net power output from the CGCC system (steam and combustion turbines) would be 268 MWe, and the total net increase in power output for the Wabash Station from implementation of the CGCC demonstration project would be approximately 174 MWe. This represents a 23 percent increase over the existing gross permitted electrical generating capacity of the entire Wabash Station, and a 185 percent increase over the net capacity of Unit 1.

Table 3-5 identifies the estimated total quantities of pollutants emitted by the existing Wabash Station and the proposed CGCC demonstration project that are regulated under the Federal and State Prevention of Significant Deterioration (PSD) program. The table also indicates the total estimated emissions of greenhouse gases (e.g., CO_2 , and CH_4) from the existing facility and proposed project. The annual emission numbers are based on annual capacity factors of 90 percent for the gasification plant, 90 percent for combustion turbine operation

on syngas, plus 10 percent for combustion turbine operation on fuel oil.

Table 3-5. Wabash River current and proposed CGCC Repowering Project air emissions (units are tons per year).

Pollutant	Current Station Unit 1 ^a	Current Station Units 1-6 ^a	Proposed Project ^b	Proposed Project and Units 2-6 ^{a,b}	Net Decrease/ Increase	% Change
SO ₂	5,713	51,219	2,500.6	48,006.6	-3,212.4	-6.3
NO _x	1,370	11,732	1,101.7	11,463.7	-268.3	-2.3
PM _f	126	1,133	100.8	1,107.8	-25.2	-2.2
PM ₁₀	126	1,133	83.6	1,090.6	-42.4	-3.7
Lead	0.09	0.80	0.07	0.78	-0.02	-2.5
Fluoride	8.5	75.9	0	67.4	-8.5	-11.2
CO	94	842	2,046.6	2,794.6	+1,952.6	+232
VOCs	5	44.7	24.9	64.6	-19.9	+44.5
H ₂ SO ₄ mist	63.5	569.3	660.5	+91.2	+16	
TRS	0.23	2.07	8.54	10.38	+8.31	+401.5
CO ₂	317,054	2,823,102	2,121,423	4,627,471	+1,804,369	+63.9
CH ₄	2.2	19.4	1.9	19.1	-0.3	-1.5

^a Based on a capacity factor of 39.3% for entire Station, 37.3% for Unit 1 (actual 1989-90).

^b Based on a capacity factor of 90%.

^c Includes PM₁₀.

^d Percent change has been estimated on the basis of tons of pollutant emitted annually from the entire plant as it is projected to operate following repowering of Unit 1 versus current operations at the Wabash Station. Following completion of the proposed project, Units 2 through 6 would continue to operate at their existing generation capacity and level of utilization (approximately 39% capacity factor). However, the generation capacity of Unit 1 would increase from 99 MWe to 268 MWe and its capacity factor would increase from 37.3% to 90%. Since the repowered unit would not only have greater generation capacity, but also be operating at a higher capacity factor, the station as a whole would be consuming more fuel and be operating more hours annually. Therefore, if it were not for the pollution abatement/prevention aspects of the proposed repowering technology, including the ability to produce as much as 25% more electricity from a given amount of coal, there would be less of a decrease and more of an increase in the percentage changes associated with the various annual pollutant emissions. For example, due to the increased coal-to-electricity efficiency resulting from the proposed project, CO₂ emissions would be reduced by approximately 20% on the basis of coal per unit of electricity produced.

As shown in Table 3-5, the performance characteristics of the proposed CGCC demonstration unit allow the entire Wabash Station to achieve a 6.3 percent reduction in SO₂, and 2.3 percent reduction in NO_x from overall emissions (Units 2 through 6 plus the proposed CGCC unit). These reductions occur simultaneously with increased consumption of coal and increased production of electricity. However, as shown in Table 3-5, the proposed project would result in an overall increase in the amounts of CO, VOC, sulfuric acid (H₂SO₄) mist, TRS, and CO₂ emitted by the Wabash Station.

3.1.3.5 Construction Activities

Detailed engineering design of the proposed project is scheduled to be completed by the end of 1993, with on-site construction to be completed by mid-1995. The CGCC repowering project is scheduled to be in operation for approximately 25 years. The proposed DOE-assisted demonstration period covers the first 3 years of operation. Commercial operation of the plant is then slated to continue through the year 2020.

3.1.3.6 Resource Requirements

Net increases or decreases in resource requirements resulting from the proposed action are shown in Table 3-6.

Fuel. Based on 1990 operations, the Wabash Station consumed 1,456,900 tpy of Illinois Basin bituminous coal. Of this total, the Unit 1 boiler used 164,900 tpy. The amount of coal required for the proposed action (based on 90 percent annual capacity factor) would be approximately 860,897 tpy, a net increase of approximately 695,997 tpy. Raw coal would be delivered from nearby mines to the proposed facility via the existing rail facilities. During the demonstration phase, the ability of the gasifier to operate on coals other than the design coal would be evaluated. At least two other coals would be tested for periods of 30 days each, and the results of the operations would be documented.

The proposed project would require construction of an 8-inch-diameter, approximately 1.5-mile natural gas pipeline from an existing transmission main west of Wabash Station, running parallel to Bolton Road (Figure 3-3), to supply approximately 1,320 million standard cubic feet per year (MMscf/yr) of natural gas for gasifier startups, flaring, and operation of the auxiliary boiler. The pipeline installation would include acquiring a 30-foot easement or right-of-way from the affected landowners along Bolton Road. The station currently utilizes No. 2 fuel oil for boiler startups. Approximately 11,300,000 gallons per year (gpy) of fuel oil would be used for the proposed project as the backup fuel for the CGCC combustion turbine, and for boiler startup.

Table 3-6. Resource requirements for the proposed Wabash River CGCC Repowering Project.

Resource	Units	Current Station Unit 1	Current Station ^a	Project ^b	Net (Decrease) or Increase	% Change
Coal	tons/yr	164,900	1,456,900	860,897	695,997	48
Land	acres	N/A	437	35.4 ^c	N/A	N/A
Oxygen (95% pure)	tons/yr	0	0	634,300	634,300	N/A
Natural gas ^d	Mscf/yr	0	0	1,320	1,320	N/A
Fuel oil ^e	gal/yr	222,600	1,533,000	11,300,000	11,077,400	723
AGR solvent	tons/yr	0	0	7.5	7.5	N/A
Water supply	mgd	48.2	450.1	91	42.8	9.4
Auxiliary power required	MWe	6	55	34	28	51
Water treatment chemicals:						
Sulfuric acid	tons/yr	0	114.6	325	325	284
Caustic	tons/yr	0	79.2	550	550	695
Coagulant	tons/yr	0	33.2	7.5	7.5	23
Ferric sulfate	tons/yr	0	0	110	110	N/A
Hydrazine	lb/yr	0	1,480	2,920	2,920	197
Lime	tons/yr	0	0	365	365	N/A
Phosphate	tons/yr	0	200	0.1	0.1	0.05
Chlorine	tons/yr	0	0	200	200	N/A
Employment	individuals	N/A	N/A	450	450	N/A
Construction	individuals	N/A	250	107	107	42.8
Operation						

^a 1990 consumption figures.

^b 90% annual capacity factor for the gasification plant.

^c Approximately 35.4 acres would be directly affected by the proposed project elements, all of which are located within the Station's current property boundaries.

^d Used for flare, auxiliary boiler, and gasifier startups.

^e Used for boiler startup, and based on a 10% annual capacity factor for combustion turbine operation on fuel oil.

N/A = Not Applicable.

Process Materials. There would be an incremental increase in chemical use, primarily for water treatment. The chemicals expected to show a net increase in consumption due to the proposed action are shown in Table 3-6.

Water. The proposed project would result in an increase in total withdrawals of water needed for Wabash Station operations. The Wabash Station currently withdraws 450.1 mgd. Following completion of the proposed project, the Wabash Station would withdraw 493 mgd, a 9.5 percent increase in withdrawal. This volume of water would be diverted from the Wabash River through the Wabash Station's existing intake structures. The majority (over 490 mgd) of this water would be returned to the river after being used for cooling purposes.

Energy. At 90 percent capacity, the proposed CGCC project would require approximately 34 MWe of power for auxiliary power needs. Currently, in-plant power requirements associated with existing Unit 1 are 6 MWe, and current station requirements total 55 MWe. The station's internal power consumption after the implementation of the proposed CGCC project would be approximately 83 MWe.

Land. The Wabash Station occupies approximately 400 acres including the donated Peabody Coal Company land. The proposed CGCC facility would occupy a total of 35.4 acres, all of which are located within the property boundaries of the Wabash Station. The acreage required for the proposed CGCC facility is not inclusive of that currently occupied by Unit 1. The current Unit 1 boiler is located in the Station's existing boiler house and would be retired in place. Approximately 26 acres would be utilized for the project construction area, with the remaining 9.4 acres utilized for material handling (i.e., coal handling and slag storage), and wastewater and stormwater ponds.

Labor. Approximately 250 persons are currently employed at the Wabash Station. Peak construction labor requirements for the proposed CGCC project have been estimated at 350 to 450 persons. Following construction, there will be a demand for up to 107 new employees to operate and maintain the facility.

3.2 ALTERNATIVES TO THE PROPOSED ACTION

The alternatives discussed in the following sections were considered through all three elements of the NEPA strategy presented in Section 1. The No Action alternative was considered in the Final Programmatic EIS (DOE/EIS-0146) for the CCT Demonstration Program (DOE, 1989) as well as in the preparation of this EA. Alternative sites and technologies available to the CCT Program were considered during the project selection process. The project-specific preselection environmental review prepared by DOE for the Wabash River CGCC Repowering Project also considered alternative sites and technologies available to the offeror. Brief summaries of the alternatives are provided here.

3.2.1 No Action

Under the No Action alternative, DOE would not provide cost-shared funding for the Wabash River CGCC Repowering Project. The industrial participant may elect to complete the project without DOE participation or cancel the project. Project cancellation would result in the project not contributing to the objective of the CCT program, which is to make a number of advanced, more efficient, economically feasible, and environmentally acceptable coal technologies available to the U.S. energy marketplace. If the applicant canceled the project, the incremental power would likely be provided by conventional (potentially less efficient and less environmentally desirable) coal-fired technologies, with flue gas desulfurization and nitrogen oxides controls to meet New Source Performance Standards (NSPS). Without DOE funding, the Industrial Participants (Destec and PSI) have indicated that it is unlikely that the proposed CGCC project would be constructed.

3.2.2 Alternative Sites

In its selection of proposals for CCT-IV funding, DOE considered the technical and environmental merit of the proposals and did not define area limits for the location of the proposed demonstrations, although the proposed demonstration was to be located within the United States. The Wabash River Coal Gasification Repowering Project Joint Venture proposal to demonstrate the Wabash River CGCC Repowering Project, with PSI acting as the host utility, was one of nine proposals selected. In its selection process, DOE prepared a preselection environmental review based on project-specific environmental data and analyses that proposers supplied as part of each proposal. This review, developed for internal DOE use only, included a discussion of the advantages and disadvantages of the proposed and alternative sites reasonably available to each offeror. No other alternative sites are currently being considered for this project. Because DOE has considered alternative sites in its preselection review, they will not be addressed again in this EA.

3.2.3 Alternative Technologies

Other commercially available technologies could be used at the Wabash Station, but these technologies would not provide the information to be gained by demonstration of the proposed Wabash River CGCC Repowering Project. The proposed process was selected because of its potential application in reducing SO₂ and NO_x emissions of commercial-scale power stations. The preselection environmental review developed by DOE for internal use during the selection process included a discussion of the advantages and disadvantages of the proposed and alternative technologies reasonably available to each offeror. Alternative technologies were considered by DOE and selected for demonstration at other locations. Site-specific analyses of alternative technologies are provided in NEPA documents prepared by DOE for other CCT projects. Programmatic analyses of alternative technologies are

provided in the Final Programmatic EIS (DOE/EIS-0146) for the CCT Demonstration Program (DOE, 1989), and are consequently not addressed in this EA.

4. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

4.1 PROPOSED ACTION

4.1.1 Air Quality

The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) for SO₂, NO_x reported as NO₂, lead, PM₁₀, CO, and ozone (40 CFR 50, as amended). These standards are applied nationwide by aggregating air quality measurements regionally. These regional aggregates are called Air Quality Control Regions (AQCRs). Wabash Station is located within the Wabash Valley Intrastate AQCR 84. This AQCR attains the NAAQS for NO₂, lead, CO, and ozone. Vigo County has an approved State Implementation Plan (SIP) for SO₂, but is currently classified nonattainment for this NAAQS pollutant (40 CFR 52.771; 326 IAC 1-4-1). A portion of the county excluding Wabash Station is also classified nonattainment for PM; however, the county has a State Implementation Plan (SIP) for PM compliance. Ambient SO₂ concentrations measured in 1990 were below the NAAQS limits, and the county has been proposed for reclassification as attainment for SO₂.

The principal regulatory compliance issue affecting the proposed CGCC repowering project involves compliance with Federal regulations promulgated pursuant to the 1990 CAAA. In the Federal Register of June 14, 1991, the U.S. EPA proposed rules to implement, among other actions, the 1990 CAAA provisions. In summary, repowering projects that are awarded Clean Coal Technology funding are proposed to be exempted from Prevention of Significant Deterioration (PSD) program (40 CFR 52.21) and New Source Performance Standard (NSPS) requirements (40 CFR 60), provided that potential emissions from the unit being repowered do not increase as a result of project implementation. "Potential emissions" are defined in 40 CFR 52.21(b)(4) as emissions from the maximum capacity of the source, taking into account physical and operational limits. Air emissions from the facility during the operational phase would include SO₂, NO_x, CO, PM, VOCs, lead, H₂SO₄ mist, TRS, and greenhouse gases (e.g., CO₂ and CH₄). The proposed project is expected to reduce the amount of SO₂, NO_x, PM, PM₁₀, lead, and fluoride from current levels. However, the proposed project is expected to generate greater volumes of CO, CO₂, TRS, H₂SO₄ mist, and VOCs than the existing facility (see Table 3-5).

Air emissions from Wabash Station are subject to the Clean Air Act (CAA) and the Indiana Environmental Management Plan. These programs are administered jointly by the IDEM Office of Air Management and the Vigo County APCD. Six ambient air quality monitoring stations in Vigo County are maintained by the Vigo County APCD; these are located southeast of the Station. The generating units at the Wabash Station currently operate under air quality permit Nos. 21-4911-01-90 through 21-4911-06-90, and

exhaust through a common stack. These permits limit SO₂ and PM emissions, and startup opacity.

During the proposed project construction phase, air emissions would include dust and emissions from construction vehicles, trucks, and heavy equipment. Increases in construction traffic would include approximately 375 cars and 20 heavy-duty trucks traveling to and from the Wabash Station each day. There are no recent traffic surveys indicating vehicle frequencies along State Highway 41 and State Road 63 near the Wabash Station against which to compare these estimates of increased vehicular activity. However, as covered in Section 4.1.10, the Terra Haute Area Planning Department has confirmed that such an increase in traffic should not result in severe congestion of these roads. To reduce dust on 62nd Avenue caused by construction traffic, a chip and seal coat, which is a paving process using an oil base and crushed stone, would be applied. Areas within the Wabash Station subject to fugitive particle emissions would be wetted as necessary to limit these emissions.

SO₂ emissions would be due, primarily, to the presence of sulfur species in the syngas emitted from the HRSG stack. Other sources would include the TGI, the sulfur recovery system, the auxiliary boiler, and the flare during gasifier startup and process upset conditions. Annual average SO₂ emissions would be ≤ 0.25 lb/MMBtu, equivalent to 3,213 tpy less than current emissions and below the 1.2 lb/MMBtu to be implemented by the year 2000 per the CAAA of 1990.

NO_x emissions would be present in the flare gases, TGI stack gas, auxiliary boiler, and primarily from the combustion turbine/HRSG stack gas. Annual average NO_x emissions from the proposed project would be approximately 0.088 lb/MMBtu, or 268 tpy less than current emissions and below the 0.6 lb/MMBtu required under NSPS for coal-fired utility steam-electric plants.

CO emissions would be produced as a result of incomplete combustion in the combustion turbine, TGI, and flare, as well as from fugitive emissions (i.e., equipment leaks) in the gasification unit. The flare would emit CO at a rate of 0.034 lb/hr or 0.15 tpy during normal facility operations as a result of the combustion of natural gas used for the flare pilot and purging. Under start-up, shutdown, and upset conditions, the flare would emit a maximum CO rate of up to 11,099.27 lb/hr (approximately 1,400 g/sec). This rate is based on an expected 95 percent efficiency of CO combustion in the flare. In the absence of the flare, the syngas released under start-up, shutdown, and upset conditions could contain up to 221,985 lb/hr of CO (Forsite Corp., 1992). Total project CO emissions have been estimated at 2,047 tpy, or an annual average of 0.22 lb/MMBtu of coal energy input. CO emissions at Wabash Station, resulting from project implementation, are expected to increase by 1,953 tpy due to increased operating hours and a higher annual

capacity factor (90 percent capacity factor) for the proposed project.

PM emission sources would primarily include the combustion turbine/HRSG stack gases, the TGI, the flare, the cooling tower, and coal and slag handling and storage operations. PM emissions have been estimated at 101 tpy, equivalent to an annual average of 0.011 lb/MMBtu. PM_{10} emissions have been estimated at 84 tpy, or an annual average of 0.009 lb/MMBtu. As a result of project implementation, PM and PM_{10} emissions have been estimated to decrease by 25 tpy and 42 tpy, respectively.

Sources of VOC emissions during project operation may include fuel oil storage tanks, equipment leaks (i.e., flanges, valves, pump and compressor seals), or incomplete combustion from the combustion turbine, TGI, or flare. Total estimated emissions of VOCs (not including methane or ethane) are 0.0026 lb/MMBtu on an average annual basis, or approximately 25 tpy. Overall, project implementation is estimated to increase VOC emissions by 19.9 tpy.

Lead emissions would be due to volatilization of lead species present in the coal, with the principal source of emissions being the HRSG stack. Lead emissions have been estimated at 0.07 tpy, a decrease of 0.02 tpy over the current lead emissions. The reduction occurs due to the operating characteristics of the gas cleanup system. The solvent used to remove H_2S from the gas requires the gas to be cooled to less than 200°F to be effective. As a result, volatilized lead is condensed and subsequently removed from the gas stream as well.

Gaseous fluoride emissions may be generated from the devolatilization of fluorine-containing species in the coal. Fluorides would be scrubbed out of the raw syngas prior to combustion in the combustion turbine. An overall decrease in fluoride emissions of 8.5 tpy would result from project implementation (see Table 3-5).

Emissions of H_2SO_4 mist may be generated as a result of SO_2 oxidation in combustion gas streams and subsequent condensation of the sulfuric acid. Emissions of H_2SO_4 from the flare would be relatively small (9.46 tpy) because the expected temperature of the combustion products would be greater than 1830 °F. The flare is designed to efficiently combust the hydrogen sulfide, organic sulfur, and a number of other organic compounds which may be present in the feed streams to the flare. Total H_2SO_4 emissions are estimated at 154.7 tpy, an increase of 91.2 tpy over current emission levels. There are no State or Federal ambient air quality standards for H_2SO_4 mist. Therefore, the maximum predicted concentration of this emission was evaluated relative to published toxicological data for sulfuric acid. This evaluation indicated that the maximum 8-hour concentration predicted under syngas firing would be 13.9 $\mu g/m^3$. Given that this is less than the long-term exposure levels that appear to be

safe for humans of $66-98 \mu\text{g}/\text{m}^3$, it is unlikely that H_2SO_4 mist emissions would pose a significant human health hazard.

Emissions of TRS may arise as a result of incomplete oxidation of reduced sulfur species in the TGI, flare, and combustion turbine, or from equipment leaks. TRS emissions resulting from project implementation are estimated at 8.54 tpy, an increase of 8.31 tpy over current emissions. Although this represents a significant increase over TRS emissions from current station operations, this relatively small annual emission level does not present a threat to human health or the environment.

Greenhouse gases (e.g., CO_2 and CH_4) are generated from fossil fuel combustion. Greenhouse gases are of concern on a global scale because of their potential contribution to global climate change (suspected greenhouse effect). With respect to the proposed project, CO_2 emissions would increase by a net total of 1.80 million tpy, a 64 percent increase over current emissions. Annual average CO_2 emissions are estimated at approximately 200 lb/MMBtu. CO_2 emissions are expected to be higher due to increased operating hours, increased annual coal consumption, and a higher annual capacity factor for the project. However, due to the increased coal-to-electricity efficiency resulting from the proposed project, CO_2 emissions would be reduced approximately 20 percent on the basis of mass per unit of energy produced over existing station performance. CH_4 emissions are estimated at 1.9 tpy, and would result from fuel oil combustion in the combustion turbine during periods when syngas was unavailable. The proposed project would reduce CH_4 emissions overall by 0.3 tpy.

Estimates were also made of CAAA hazardous air pollutants (i.e., trace metals, organics, polycyclic organic matter, reduced sulfur species, hydrogen chloride, hydrogen fluoride, radionuclides), and other pollutants such as the methyldiethanolamine (MDEA) used in the AGR system and ammonia that would be emitted as a result of project implementation. The estimated emissions indicate that emissions of metals, radionuclides, organics, hydrogen chloride, and hydrogen fluoride would decrease relative to current Station operations. Based upon the existing health effects literature, there is no indication that the levels at which these pollutants would be emitted present a threat to human health.

Indiana Air Pollution Control Regulations (326 IAC 14) incorporate by reference the National Emission Standards for Hazardous Air Pollutants identified at 40 CFR Part 61. These standards do not apply to the proposed CGCC project because the project does not include the construction or operation of any facilities subject to regulation by these standards.

Federal Prevention of Significant Air Quality Deterioration (PSD) regulations, administered in Indiana by the IDEM, require sources which undergo a major modification to perform a detailed evaluation of the impacts of the modification on ambient air quality. The PSD regulations specify (for each regulated

pollutant) the threshold quantity above which the pollutant emissions are considered significant. The PSD regulations also contain allowable air quality "increments" for NO_x, SO₂, and PM. Environmentally sensitive areas, such as National Parks, are referred to as Class I areas and have more stringent PSD increments than other areas (Class II and III areas). If the regulations apply for one of these pollutants, the source is required to demonstrate that the modification will not result in an exceedance of the allowable increment(s) for the particular pollutant. PSD significant impact levels and increments affecting the proposed project are shown in Table 4-1.

Table 4-1. Prevention of Significant Deterioration (PSD) significant impact levels and increments.

Pollutant	Averaging Period	PSD Significant Impact Level	Allowable PSD Increments	NAAQS
SO ₂	3-hour	25	512	1,300
	24-hour	5	91	365
PM ₁₀	24-hour	5	37	150
CO	1-hour	2,000	N/A	40,000
	8-hour	500	N/A	10,000
NO ₂	annual	N/A	25	100

(Units are $\mu\text{g}/\text{m}^3$)

The closest Class I (air quality) area is Mammoth Cave National Park in southwestern Kentucky approximately 322 kilometers (200 miles) south of Terre Haute. Because prevailing winds are from a southerly direction in the Terre Haute area, air emissions from the proposed project would be carried away from this area. Additionally, the U.S. EPA typically does not require Class I impact modeling beyond 100 km (62 miles) from the source, since emissions will not result in detectable changes in air quality at this distance.

In assessing the air quality impacts for regulatory purposes, the emissions associated with the project are first modeled without considering other nearby emission sources (e.g., other operating power generating units at the same plant) or ambient background concentrations. The resulting ambient air concentrations are then compared to PSD "significant impact" levels. If the ambient concentrations resulting from the project are below the PSD significant impact levels for a pollutant, the project is assumed

to have no significant impact for that pollutant and averaging period and no additional modelling is required. If the predicted concentrations exceed the PSD significant impact levels, it is typically necessary to perform additional modeling to evaluate the emissions from the proposed project together with other existing nearby sources and existing ambient background concentrations. The purpose of the additional modeling is to assess compliance with NAAQS.

The combined air quality impacts of the proposed project and existing Wabash Station combustion sources were evaluated using the U.S. EPA-approved Industrial Source Complex Short-Term (ISCST) dispersion model, version 90346. The ISCST model is a Gaussian plume model that requires three basic types of input: source data, meteorological data, and receptor data. Source data consist of information about the facility, including location, elevation, emission rate of the pollutant being modeled, physical stack height, stack gas exit velocity and temperature, inside stack diameter, and the dimensions of buildings which may interfere with the plume dispersion. Meteorological data consist of hourly surface weather data from a nearby representative weather station, including stability class (atmospheric turbulence affecting pollutant dispersion), wind direction, wind speed, temperature, and mixing height. Receptor data include the geographic coordinates and elevations of the ground locations where pollutant concentrations are to be calculated by the model. The calculated concentrations are based on an array of 991 receptors located around the Wabash Station.

After the proposed project is implemented, emissions from the existing Wabash Station stack (for Units 1-6) would decrease from current levels due to the removal of Unit 1 boiler from service and deletion of its exhaust from the stack. New emission sources from the proposed project include the HRSG stack, the TGI, the auxiliary boiler, and the flare. Emission stack dimensions for these sources are identified in Table 3-4, and their locations are shown in Figure 3-4. Annual and short-term modeling was based on operating scenarios that would yield conservative estimates of the upper limits of emissions for each pollutant (Table 4-2). Any other normal operating scenario would, therefore, produce equal or lower emissions and have a lesser impact than the previously described approach. The existing Wabash Station stack was modeled assuming the maximum allowable emission rates occurring continuously for the entire year. Modeling was conducted for SO_2 , NO_x , PM_{10} , and CO from each of the five emission points.

Annual SO_2 , NO_x , and PM_{10} concentrations were modeled based on the combustion turbine firing syngas 90 percent of the time at 100 percent load, and firing fuel oil 10 percent of the time at 100 percent load. The HRSG and TGI stacks emissions were calculated based on this firing scenario, while the flare was modeled for steady-state flaring for 336 hours per year at 70 percent load plus cold startup emissions. Steady-state flaring simulates the

upper limit on SO₂ emissions under upset conditions. Upset conditions exclude start-up and shutdown, and are created when the turbine is unavailable or when the syngas does not meet specifications (Radian Corp., 1992a).

Table 4-2. Modeled criteria pollutant emissions for syngas and fuel oil combustion source firing scenarios.

Gas Turbine Operating Condition	Emission Point	Emission Rate (g/sec)			
		SO ₂	PM ₁₀	CO	NO _x
100% load firing syngas	HRSG stack ⁶	45.3	--	--	--
	TGI ^a stack	66.4	--	--	--
	Flare ^b	0.003	--	--	--
	Aux. boiler	0.011	--	--	--
	Station stack	3,860.4	--	--	--
100% load firing fuel oil	HRSG stack	11.47	2.14	10.96	--
	TGI stack	66.4	0.43	7.056	--
	Flare ^c	90.53	1.02	1,398.5	--
	Aux. Boiler	0.011	0.09	0.726	--
	Station stack	3,860.4	127.900	58.3	--
Annual average ^d	HRSG stack	47.88	1.24	--	22.26
	TGI stack	27.16	0.39	--	0.96
	Flare	2.88	0.035	--	0.55
	Aux. boiler	0.011	0.09	--	--
	Station stack	3,860.4	127.9	--	807.4

^a TGI = Tail Gas Incinerator.

^b Flare is in pilot mode for this operating scenario.

^c Flare modeled at peak rate for PM₁₀.

^d Gas turbine firing syngas 90% of the time at 100% load, fuel oil 10% of the time at 100% load. Flare firing for 336 hours/year at 70% load plus cold startups.

Dashes (--) indicate that the pollutant was not modeled for this operating scenario.

Short-term SO₂ concentrations were modeled with the combustion turbine firing syngas at 100 percent load, which produces SO₂ emissions. Short-term SO₂ concentrations were also calculated for fuel oil firing in the combustion turbine at 100 percent load. CO and PM₁₀ short-term concentrations were modeled with the combustion turbine firing fuel oil at 100 percent load and all syngas being flared.

Reasonable upper limits on ambient air concentrations of selected criteria pollutants resulting from emissions from the proposed project combustion sources alone and the project and the existing station stack combined were predicted using the ISCST model. The predicted concentrations due to the project combustion sources exceed the PSD significance levels for some pollutants and averaging periods. PSD significance levels are used as a measure to determine whether additional air quality modeling is needed, and are not a measure of environmental impact in the context of a NEPA analysis. A comparison of proposed project emissions with NAAQS is used to determine environmental impacts from the proposed project emissions. Table 4-3 compares predicted upper limits of pollutant concentrations from the proposed project with PSD significance levels. The combined impacts of the project combustion sources and the existing Wabash Station stack are below all applicable NAAQS. Due to differences in location and stack parameters, interaction between these sources would be minor.

Emissions from non-combustion sources, such as fugitive emissions due to coal and slag handling, would be similar in nature and magnitude to those from the existing Wabash Station activities and are not expected to result in a noticeable difference in dust levels near the station.

Background pollutant concentrations were added to the combined impact of the proposed project combustion sources and the existing Wabash Station stack for the pollutants and averaging periods for which PSD significance levels were exceeded. Proposed project impacts were predicted to exceed significance levels for SO₂ for the 3-hour, 24-hour, and annual averaging periods. For all other regulated pollutants and averaging periods, the proposed project impacts were predicted to be below PSD significance levels. Therefore, background concentrations were added to the modeling results for SO₂ only. The IDEM has developed background concentrations for SO₂ for all meteorological periods over the past 5 years. These meteorological data are specified by the agency for use in the air quality analysis performed in support of the air permit application for the proposed CGCC project. To be conservative, the highest background concentration from the entire 5 years was added to the modeled maximum concentration to obtain an estimate of the total maximum ambient SO₂ concentration for each averaging period. This approach is conservative because the meteorological conditions which result in the maximum predicted concentration due to the modeled sources are not necessarily (in fact, are unlikely to be) the same as those which result in the highest background concentration.

The results of the modeling analysis for the short-term and annual standards represent maximum concentrations that are predicted by the model to occur once during the year at one of several hundred locations (receptors) at which concentrations were calculated. Concentrations vary with time owing to changes

in meteorological conditions and with location owing to differences in terrain elevation and direction from the emission sources. As such, all concentrations for the remainder of the year and for all receptors are predicted to be lower than the maximum values reported.

Table 4-3. Maximum predicted pollutant concentrations from the proposed project.

Pollutant	Averaging Period	PSD Significance Level ($\mu\text{g}/\text{m}^3$)	Concentration ($\mu\text{g}/\text{m}^3$)	Allowable PSD Increments ($\mu\text{g}/\text{m}^3$)	% of PSD Increment
CO	1 hour	2,000	506	N/A	N/A
	8 hour	500	228	N/A	N/A
PM ₁₀ *	24 hour	5	3.8	37	13
	Annual	1	0.12	19	1
SO ₂	3 hour	25	271	512	53
	24 hour	5	53	91	58
	Annual	1	1.4	20	7

* Project PM₁₀ values are for concentrations in the total suspended particulate non-attainment areas of Vigo and Vermillion Counties.

N/A = Not Applicable

Annual and short-term ambient SO₂ concentrations showing the combined effects of the proposed project plus background concentrations are compared to applicable NAAQS in Table 4-4. As

Table 4-4. Total ambient short-term and annual SO₂ concentrations compared to applicable NAAQS.

<u>Pollutant</u>	<u>Averaging Period</u>	<u>Project Impact (μg/m³)</u>	<u>Ambient Project/Station Impact^a (μg/m³)</u>	<u>NAAQS (μg/m³)</u>
<u>Short-term Modeling Results</u>				
SO ₂	3-hour	271	781	1,300
	24-hour	53	358	365
<u>Annual Average Modeling Results</u>				
SO ₂	annual	1.4	66	80

^a Ambient concentrations include SO₂ impacts from all nearby emission sources.

indicated previously (Table 4-3), the proposed project impacts were predicted to exceed PSD significance levels only for SO₂. Because SO₂ is the only criteria pollutant predicted to exceed PSD significance levels, it is the only pollutant where air permit modeling requires the use of background concentrations. In the refined modeling analysis for SO₂, background concentrations were added to the combined maximum predicted SO₂ concentrations produced by the proposed project and the existing Wabash Station combustion sources to estimate total ambient concentrations under predicted operating conditions of the project. The modeling analysis used background monitoring values compiled by IDEM over a 5-year period (1982-1986). The average annual background concentration values for the 3-hour period ranged from 42.8 to 103.9 μg/m³, the 24-hour background concentrations ranged from 17.2 to 35.2 μg/m³, and annual concentrations ranged from 11.2 to 12.5 μg/m³. The resulting analysis indicated that the maximum predicted 3-hour average SO₂ concentration, including background, would be 781 μg/m³, which is below (60 percent of) the 3-hour SO₂ NAAQS of 1,300 μg/m³. The maximum predicted 24-hour SO₂ concentration including background would be 358 μg/m³, which is below (98 percent of) the NAAQS of 365 μg/m³. Both the 3-hour and 24-hour maxima are predicted to occur while firing syngas in the gas turbine. The maximum predicted annual average SO₂ concentration including background would be 66 μg/m³, which is below (83 percent of) the NAAQS of 80 μg/m³.

Therefore, the combined impacts of air emissions from the proposed project combustion sources, the existing Wabash Station stack, and all other area sources of SO₂ emissions are below all

applicable NAAQS. Additionally, the 3,213 tpy and 268 tpy reductions in the total amount of SO₂ and NO_x, respectively, from implementation of the proposed project would improve existing conditions that contribute to the formation of "acid rain."

4.1.2 Water Quality and Usage

The main sources of groundwater in Vigo County are glacial outwash and gravel aquifers in the Wabash River Valley. Both unconfined and confined aquifers exist in this area and contain approximately 367,370 million gallons of water (Cable et al., 1971). Per 40 CFR 149, Vigo County has no federally protected sole-source aquifers. A number of non-community, community, and private wells supply water to Vigo County residents. Additionally, the City of Terre Haute utilizes groundwater for water supply, and the residents of Marion Heights are supplied by shallow wells located adjacent to the river and near the southern portion of the Wabash Station. The Wabash Station, however, maintains no wells for water supply or on-site groundwater monitoring. The proposed project would not utilize groundwater for any process or potable needs.

Groundwater quality is characterized by hardness values ranging from 200 to 400 ppm as calcium carbonate. The quality often exceeds the 0.3 ppm national aesthetic threshold for iron (Cable et al., 1971), and the mineral content increases rapidly at bedrock depths below 300 feet (Clark, 1980).

The primary surface water resource associated with the Wabash Station is the Wabash River. The Wabash Station is located adjacent to the river between river mile marks 219 and 220.5. At the USGS gaging station (#03341500) in Terre Haute, the river has an average annual flow of 6,700 mgd, and an average discharge rate of 10,790 cubic feet per second (cfs). The 7-day, 10-year (7Q-10) low flow at this site is 630 mgd (Clark, 1980). Near the Wabash Station, the river is wide, shallow, and navigable only by small boats. An additional surface water resource associated with the proposed project location is an unnamed creek located on the northernmost portion of the Peabody tract. The creek has been channelized over most of the tract and is routed under the northgate area before discharging to the river.

The Wabash River water quality does not meet the standards required by IDEM for recreational activity because of Escherichia coli bacteria concentrations, and only partially meets the fish-aquatic life criteria because of elevated ammonia concentrations (IDEM, 1988). This segment of the river is not a designated water toxics "hot spot" under the Clean Water Act section 304(1) list, but also is not of sufficient quality to be designated as an "exceptional use" waterbody by the State of Indiana.

The potable and process water needs of the Wabash Station, including ash sluice, boiler makeup, equipment cooling, and fire protection, are satisfied by surface water diversion from the

Wabash River. Potable water treatment for the Wabash River station includes separating and settling out solids in a clarifying unit, and the removal of harmful bacterial contaminants using a chlorinator. The clarification and chlorination units process the river water for use in a condition that complies with all sample and treatment requirements of the Safe Drinking Water Act (42 U.S.C. 300f et seq.). The plant has three intake structures on the river, and withdrew approximately 450 mgd in 1990. Implementation of the proposed project would result in a net increase in water withdrawal of 42.8 mgd. Table 4-5 depicts the current and projected (i.e., with proposed project) water withdrawal volumes and outfall volumes for the Wabash Station. A permit would not be required in association with surface water usage for the proposed project because the State of Indiana has not implemented a permitting program for surface or groundwater diversion and use. However, as a "significant water withdrawal facility" (i.e., facility capable of withdrawing more than 100,000 gallons per day (gpd) of surface and/or groundwater), Wabash Station is registered with the Indiana Department of Natural Resources (IDNR) and annually files a usage report pursuant to IAC 13-2-6.1-7. Water usage associated with the proposed project would be reflected in that report.

At a 90 percent capacity factor, the proposed project would withdraw an estimated 91 mgd of water and return approximately 90 mgd to the river (Table 4-5). Approximately 89 mgd of the 91 mgd withdrawn would be used for cooling purposes and would be returned to the river via Outfall 001 (see Figure 3-3). The proposed project's net consumption would be approximately 1 mgd. The volume, and possibly the characteristics, of the wastewaters discharged via NPDES Outfall 002 would be affected by the proposed project. Outfalls 003, 004, and 005 discharge the backwash from the intake screens and would not be affected by the proposed project. The total amount of wastewater streams, from the proposed project, to be discharged via Outfall 002 is 0.720 mgd.

The additional process wastewater streams produced as a result of proposed CGCC project implementation would be similar to those discharged by the existing Wabash River Station via the NPDES-permitted Outfall 002. The process wastewater streams would be collected and detained in a new process wastewater pond to be designed and constructed, in accordance with IDEM guidelines, on 1.2 acres of land in the northgate area of the station. This wastewater pond design would include the use of a natural or synthetic liner to protect groundwater quality. Following detainment, the wastewater would be conveyed, via pipe, to the Station's existing ash pond system before ultimate discharge via Outfall 002. Outfall 002 waste streams associated with the proposed CGCC project, and their estimated discharge rates, are listed below:

- Cooling tower blowdown (0.144 mgd)
- Coal pile runoff (0.014 mgd)
- Unrecycled coal slurry water (0.101 mgd)

Table 4-5. Current and projected water withdrawal and outfall volumes for the Wabash Station.

Factor	1990 Station Units 1-6	Unit 1 Decrease	Proposed Project	Station After Project Implementation	Net	
					(Decrease) or Increase	% Change ^a
Withdrawal (mgd)	450.10	(48.20)	91.00	492.90	42.80	9.5
Outfalls (mgd)						
001	443.20	(47.40)	89.20	485.00	41.80	9.4
002	5.30	(0.57)	0.72	5.45	0.15	2.8
Net Water Consumption	1.60	(0.23)	1.08	2.45	0.85	53.0

^a Percent change is based on the net increase in water withdrawal and outfall volumes from the entire Station divided by the existing 1990 Station withdrawal and outfall volumes.

- Oxygen unit condensate (0.00002 mgd)
- Steam losses (0.072 mgd)
- Demineralizer wastes (0.086 mgd)
- Boiler blowdown (0.014 mgd)
- Clarifier sludge (0.058 mgd)
- Filter backwash (0.065 mgd)
- Flushes and purges (0.144 mgd)
- Treated domestic sewage (0.022 mgd)

The "first flush" runoff from storm events and gasification plant wastewater would follow the same path as the above streams.

In removing Unit 1 from service, Outfall 002 would realize a decrease of 0.57 mgd in discharge (Table 4-5). This, coupled with the increase of 0.72 mgd resulting from project implementation, would result in a net increase of 0.15 mgd to Outfall 002 discharge. Therefore, the existing discharge via Outfall 002, 5.3 mgd, would be increased 2.8 percent. A modification to the station's existing wastewater discharge permit (NPDES permit No. 0002810), issued by the IDEM Office of Water Management, would be required to reflect the discharge of the proposed project's wastewater through Outfall 002. However, the overall quality of the effluent from Outfall 002 would not be adversely affected by the addition of the project's wastewater streams for two reasons: (1) the relatively small volume of project-related effluent that would be discharged (about 13.5 percent of the total for Outfall 002); and (2) treatment of the sour water stream (unrecycled coal slurry water) as noted in Section 3.1.3.2. Although there has been no indication that IDEM has any reservations about issuing a modified NPDES permit, DOE's decision to provide cost-shared financial assistance for this proposed project is predicated upon successful modification of the permit.

Implementation of the proposed project would result in higher operating rates of the repowered steam turbine, and an increase in heat rejection rate associated with Unit 1 that would result in an increase in the thermal load to the Wabash River via NPDES Outfall 001. The existing heat rejection rate into the river via Outfall 001 from Unit 1 is approximately 464 MMBtu/hr. Preliminary analyses for the project indicate that the heat rejection rate into the Wabash River would increase by approximately 34.3 percent, to a total of 623 MMBtu/hr. PSI Energy has estimated that this increase would remain within the current NPDES permit limits for thermal discharge to the river.

4.1.3 Geology and Soils

The Wabash Station is situated on a fairly level strip of land adjacent to the Wabash River. Ground elevations at the site range from approximately 450 to 490 feet mean sea level (msl). A bluff rising to approximately 550 feet msl runs along the entire western border of the station. The proposed project (except for coal storage and handling, slag storage, and the new stormwater and process wastewater ponds) would be located on a portion of

this elevated area. Topographically, the site would be modified by surface grading to facilitate siting of the structural components of the proposed project. Physical modification of the terrain would be contained within the proposed project site, and no material would be removed from the site. Construction activities occurring on the Peabody Tract would not extend as far north as the unnamed tributary.

The Vigo County soil survey identified 13 soil series within the proposed project study area. Eight of those soils were identified as hydric or containing hydric inclusions (Skelly and Loy, 1991). Much of the proposed project site (i.e., the Peabody Tract) is identified as the Made Land (M) soil series. This soil series is not hydric, but is reflective of the historical usage of this site (i.e., coal-mining operations and subsequent reclamation). Construction on these M soils would not change their characteristics or overall quality.

4.1.4 Solid and Hazardous Waste

Current solid waste generation at Wabash Station includes over 150,000 tpy of ash, 2,000 pounds per year (lbs/yr) of spent filters, and 120 cubic yards per month (yd³/month) of miscellaneous solid waste (e.g., scrap materials). In addition, there are 65,000 gpy of liquid maintenance wastes generated by the Wabash Station. Since all non-carbon materials in the coal end up as a potentially marketable slag, the proposed project implementation would reduce ash production by approximately 11 percent owing to deactivation of the Unit 1 boiler. Volume increases of miscellaneous solid waste (50 percent increase), liquid maintenance wastes (100 percent increase), and spent filters (155 percent increase) would result from project implementation. Spent sulfur recovery catalyst (8.2 tpy) and sludge from the biological oxidation plant (18 tpy) would be added to the wastes currently generated. Nonhazardous solid waste would be disposed of in an authorized off-site landfill. Nonhazardous industrial waste not deemed acceptable for municipal landfiling would be disposed of in a State-authorized industrial nonhazardous waste landfill. There are two such landfills within 35 miles of the Wabash Station: Laidlaw Waste System's Yawhill Landfill located 15 miles south of Terre Haute, and Rumpke Inc.'s Central Disposal facility located 35 miles southeast of Terre Haute in Worthington.

The largest volume solid waste streams produced by the proposed project would be the gasifier slag and elemental sulfur. At a 90 percent capacity factor, the proposed project would produce 93,838 tons of slag per year (dry weight) and 35,280 tons of elemental sulfur per year. The slag and process wastewater associated with this CGCC technology are currently exempted from the Federal and State hazardous waste program pursuant to 40 CFR section 261.4(b)(7) and 329 IAC 3-3-4(d)(7). Additionally, the U.S. EPA has confirmed that these two waste streams would not be regulated as Federal Resource Conservation and Recovery Act

(RCRA) hazardous wastes (56 Federal Register 27300 et seq., June 13, 1991).

If all of the gasifier slag or sulfur by-products were not immediately marketed, storage and disposal options would be available. Gasifier slag disposal utilizing the existing on-site ash pond system could accommodate up to 25 years of slag (i.e., the life of the project). The preferred use of the slag would be as an aggregate in road pavement, or incorporation into coal mining reclamation activities. Testing of the slag produced at the LGTI facility in May 1992 has demonstrated that this by-product is not a hazardous waste as defined under Federal and State rules. Comparison of IDEM's criteria for classifying nonhazardous industrial waste to the analytical data for the May 1992 LGTI slag indicates that the slag exhibits constituent concentrations below the least restrictive IDEM waste classification criteria. Therefore, the slag material could be managed in the on-site ash ponds without a solid waste operating permit (329 IAC 2-3-1(10)).

The sulfur by-product that would be produced by the proposed project would be essentially the same as the sulfur by-product produced at the LGTI facility. All of the sulfur produced by LGTI has been successfully marketed (Lessig, 1992). Destec has received letters of interest from potential buyers for the purchase of sulfur from the proposed Wabash CGCC project. Buyers have expressed interest in purchasing an amount greater than what the proposed project would be capable of producing. A maximum of 10 days of sulfur storage would be available in up to 20 rail tank cars on-site while sulfur awaits shipment to the buyer.

In the event that the sulfur was not sold before rail car storage capacity was exceeded, above-ground on-site storage is an option on a one-acre parcel of land adjacent to the proposed coal pile and stormwater pond. This site would be sufficient to store at least one year's sulfur product at maximum production rate. Storage of elemental sulfur is not directly regulated by the IDEM. The industrial stormwater from outdoor sulfur storage would be collected and routed to the project wastewater pond, along with the coal pile runoff. In the unlikely event that a year would pass without any sulfur sales, another option would include disposal of the unsold sulfur in any of the local municipal landfills, which would be able to accept the sulfur without any special provisions.

Hazardous waste generated at the Wabash Station would be subject to regulation under RCRA and the Indiana Hazardous Waste Act and implementing rules. The Wabash Station has been assigned U.S. EPA generator identification number IND00816009 for hazardous waste, and temporarily accumulates any hazardous waste generated for off-site disposal at an authorized facility. Destec would

also secure a U.S. EPA generator identification number for hazardous waste generated by the gasification plant. Hazardous waste generated by the proposed project would include maintenance degreasing solvents, laboratory wastes, waste lubricating oils, spent carbon filters from process wastewater treatment, spent catalysts, and AGR solvent. These wastes (65,000 gpy of solvents and oils, and 9.75 tpy of spent catalysts and filters) would also be temporarily stored on site, then disposed of off site at an authorized facility. There would be no long-term hazardous waste storage on site, and no hazardous waste facility permitting would be required for the project.

The Wabash Station currently has reportable quantities of various substances (e.g., ammonia, calcium hydroxide, chlorine, ethylene glycol, ferric sulfate, hydrazine, sodium hydroxide, sulfuric acid, hydrogen, No. 2 fuel oil, and sodium nitrite) that have been reported to the Terre Haute Local Emergency Planning Committee and the Indiana Emergency Response Commission in Indianapolis as required under the Superfund Amendment and Reauthorization Act (SARA) Title III (Emergency Planning and Community Right-To-Know). The proposed project would also use, process, and/or store a number of substances subject to these reporting requirements, including laboratory chemicals, maintenance chemicals such as oils and degreasers, water and wastewater treatment materials, sulfur recovery and AGR catalysts (including MDEA), and natural gas. Additional reportable by-products would include the gasifier slag and elemental sulfur.

4.1.5 Land Use

Currently, there are no local land use or zoning requirements applicable to the Wabash Station. Additionally, there are no designated Prime and Unique Farmlands in the vicinity of the proposed project site. The land surrounding the facility is primarily rural and used for agricultural purposes; corn and soybeans are the main crops. A few scattered houses are located within a half mile of the Wabash Station, and several coal-mining and quarry operations are located nearby. The former landfill at the corner of S.R. 63 and 62nd Avenue is currently being reclaimed.

Land use mapping of the Wabash Station was conducted in July 1991. Table 4-6 indicates the number of acres of each land use category located within the study area. The commercial and services land use type includes the Wabash Station power plant and associated coal storage and ash disposal areas, and constitutes 48 percent (188.7 acres) of the station property. Deciduous forest and herbaceous rangeland make up 27 percent and 16 percent, respectively, of the facility property (Skelly and Loy, 1991).

A total of 35.4 acres, located entirely within the Wabash Station property boundaries, would be directly affected by the proposed project. Construction of the proposed process structures, construction parking, and equipment laydown area would occur on

Table 4-6. Land use types at the Wabash Station.

Land Use Type	Acres at Wabash Station	Acres in Project Construction Area
Commercial and Services	188.7	0.0
Powerline Right-of-Way	16.5	0.0
Herbaceous Rangeland	62.6	18.9
Shrub and Brush Rangeland	0.3	0.0
Mixed Rangeland	1.0	0.0
Deciduous Forest Land	106.9	7.0
Palustrine Emergent Wetland	0.3	0.0
Palustrine Emergent/Forested Wetland	0.2	0.0
Palustrine Forested Wetland	14.2	0.0
Riverine Upper Perennial	1.0	0.0
Total Acreage	391.7	25.9

approximately 26 acres consisting of 18.9 acres of herbaceous rangeland, most of which is reclaimed mined land, and 7 acres of deciduous forest. Deciduous forest lands located within the Peabody tract are shown on Figure 3-2. The 26 acres required for the proposed project are contained within the 37-acre Peabody tract, and the land use type applicable to this acreage would be changed to commercial and services as a result of project implementation. The remaining 9.4 acres directly affected by the proposed project include 3.6 acres for the new coal storage pile, 1.6 acres for gasifier slag storage, 3 acres for the stormwater pond, and 1.2 acres for the process wastewater pond. The coal storage and handling facilities and gasifier slag storage would occur at the existing coal pile and ash pond, respectively. The stormwater and process wastewater ponds would be located in the northgate area, an area previously used for ash disposal. There would be no change in land use classification at these locations.

Overall, the proposed project is compatible with the existing use of PSI's property. The coal-handling and transport facilities adjacent to the Peabody tract can be used without major modification. However, minor modifications to the existing powerhouse would be necessary to provide openings for the steam and water line cross-ties between the steam turbine and the HRSG.

The proposed project would also require the construction of four new exhaust stacks, cooling towers, and a dual column air separator ranging in height from 31 to 310 feet. Specific information regarding these stacks, their locations, and stack height can be found in Section 3.1.3.1. All of the proposed new stack heights would be below the existing Wabash Station exhaust stack for units 1-6, which is 450 feet in height. Structure heights are of concern to low-flying aircraft, particularly during takeoff and landing. As two airports are located within a 6-mile radius of the station, and these stacks are of a height to

potentially affect aircraft, Federal Aviation Administration (FAA) rules (14 CFR part 77) relating to objects affecting navigable airspace could have been applicable to the project. The Industrial Participant submitted all required and necessary information to the FAA, who made a determination that the proposed new stacks would not be a hazard to air navigation, providing that TGI stack and HRSG stack be equipped with obstruction lighting.

Additional project-related off-site land use impacts are associated with construction of an approximately 1.5-mile-long, 8-inch-diameter, natural gas supply line (Figure 3-3). The pipeline would extend from an existing transmission line west of Wabash Station and run adjacent to Bolton Road. A 30-foot right-of-way would be used/disturbed for pipeline installation and maintenance. An analysis of the pipeline route was performed in November 1992 to determine the potential impacts associated with installation of the gas line (Skelly and Loy, 1992a). The investigation included a survey of all 1.5 miles of the proposed route, which runs adjacent to the north side of Bolton Road. The 30-foot-wide corridor that would encompass the proposed pipeline route includes approximately 5.5 acres, the majority (40 percent) of which is residential land. Cropland and pastureland account for approximately 28 percent of the corridor, with herbaceous rangeland and deciduous forest land making up the balance (20 percent and 12 percent, respectively). The available habitat for wildlife in the corridor is limited by the proximity to roads and disturbance from residential intrusion. The disruption of wildlife and vegetation during pipeline installation would be temporary, and the areas disturbed by ditching and installation activities would be restored to their natural condition upon project completion.

A wetland field survey of the proposed gas pipeline corridor was also conducted in accordance with the U.S. Army Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1). Dominant vegetation consisted of turf grass and upland grass species such as broom sedge and foxtail. Shrub species included greenbriar with tree species composed of red maple and locust. The soils surveyed were found to be predominantly disturbed because of their proximity to Bolton Road, residential areas, and/or farm fields. No potential jurisdictional wetland areas were identified within the study corridor (Skelly and Loy, 1992a).

The local gas utility (Indiana Gas Company, Inc.) would be responsible for pipeline installation and compliance with all applicable environmental regulations. No environmental permits (i.e., wetlands or floodplains) would be required for construction and installation of the proposed gas supply line.

4.1.6 Noise

An ambient noise survey was conducted in November 1991 at four outdoor monitoring sites in the vicinity of the Wabash Station. Survey results indicated that sound levels were within typical ranges for suburban and urban residential environments, with the day-night average (L_{dn}) sound level ranging from 49.6 decibels (dB) to 60.4 dB (U.S. EPA, 1974).

There would be a short-term increase in noise levels due to project construction. Vehicular traffic for equipment and supplies deliveries and the noise associated with off-loading would occur during the normal workday. Other construction noise such as drilling, pounding, and compressor and generator operation, would also add to short-term noise during the construction phase. This level of noise would be similar to other similar-scale construction projects and would stop when construction was completed.

Operation of the proposed project would cause a long-term increase in existing ambient noise levels at the Wabash Station. To the extent possible, equipment would be located within buildings and/or engineered to reduce sound levels. Initial noise mitigation measures that would be employed for the proposed project include equipping the combustion turbine inlet, the main air compressor inlet to the oxygen unit, and the startup steam blowing equipment with silencers. Additionally, acoustic enclosures would be provided for the combustion turbine generator, boiler feed pumps, service air compressors, coal rod mill, reciprocating slurry pumps, main air compressor, and oxygen and nitrogen compressors. The local terrain (low hills and trees) would also help reduce noise levels. To assess the potential impacts to adjacent residences from the proposed project operation, an approximation of the reasonable upper limit of potential noise levels was calculated (Wanielista et al., 1984). This approximation assumed that there were no sound barriers (e.g., trees, hills, other structures) between the noise source and the receptor (closest residence on Bolton Road approximately 1,300 feet from the project site). The sound level measured 90 dBA along the perimeter of the facility, and the resultant noise level calculated at the receptor was 62 dBA, a value that generally results in no disturbance of normal indoor conversation and moderate disturbance of normal outdoor conversation (U.S. EPA, 1982). This value (62 dBA) is higher than the range of values measured at the existing facility in November 1991. However, this value is likely overstated because the approximation did not account for the natural acoustic barrier provided by tree cover. Additionally, the prevailing winds at the Wabash Station are from a southwesterly direction and would tend to carry project-associated noise away from adjacent residences on Bolton Road.

After project startup, noise surveys would be conducted at the property limits and within the proposed project area to ascertain

any increases in noise levels and to identify the sources of those increases. Once identified, noise abatement measures would be instituted as necessary.

4.1.7 Ecosystems

4.1.7.1 Terrestrial Ecosystems

The majority of the northgate area of Wabash Station has been seeded with prairie grasses. Portions of the proposed project site, such as areas immediately adjacent to the railroad tracks and coal pile, consist of crushed stone and gravel having little or no vegetation. A forest habitat and grassland, seeded during reclamation, constitute the primary vegetation on the Peabody Tract. Adjacent to this site is a second forested area.

In general, mammalian wildlife in the immediate area of the Wabash Station consists of deer and small animals (e.g., raccoon, woodchuck, opossum, rabbit, ground squirrel, skunk, and fox). Commonly sighted avian species include swallow, cardinal, bluejay, dove, crow, pigeon, and hawk, as well as several types of ducks and geese (Skelly and Loy, 1991).

The vegetative habitat affected by project construction and implementation would include 18.9 acres of grassland and 7 acres of deciduous forest, displacing resident terrestrial wildlife species such as the woodchuck and eastern cottontail. Ground-nesting avian species (e.g., some species of sparrows and finches) would also be displaced. The deciduous forest area affected by the proposed project is an isolated pocket and is not large enough to support wildlife species requiring a large core area. However, the area does function as edge habitat and provides cover for terrestrial and avian species. Undisturbed portions of the Peabody Tract, and large adjacent forested areas that contain similar habitats, are capable of absorbing species displaced by the proposed project. Powerline and pipeline corridors adjacent to the proposed project site also provide large undisturbed areas of edge habitat and cover for any species that may be displaced from the proposed project site (Skelly and Loy, 1991).

4.1.7.2 Aquatic Ecosystems

The fish species commonly found in the Wabash River include flathead and channel catfish, bullhead minnow, emerald shiner, spotted bass, and carp (Gammon, 1989). These species are common warmwater fish capable of moving upstream or downstream to locate preferred water temperatures. Thermal discharges from the proposed project would not exceed those permitted in the NPDES permit and would not prevent movements of these warmwater fish species. During the colder months of the year, the power plant thermal discharges may actually attract warmwater fish species that are attempting to locate in preferred water temperatures. In accordance with the Wabash Station's NPDES permit, PSI prepared a thermal impact demonstration study plan to monitor

macroinvertebrates and fish communities in the Wabash River. Per NPDES requirements, these studies are conducted annually to ensure the integrity of macroinvertebrate and fish communities in the river.

A small unnamed tributary on the northernmost portion of the Peabody Tract flows toward the Wabash River. This tributary has been channelized over most of the tract and is routed under the northgate area before discharging into the river. A macroinvertebrate and fish survey conducted on this tributary in August 1991 indicated that aquatic insects and minnows were predominant in this aquatic system. Proposed project construction on the Peabody Tract would not alter the stream channel or vegetation adjacent to the unnamed tributary. Proposed project stormwater discharges to this stream would be regulated under an NPDES permit and would occur near the confluence with the Wabash River, which would not affect the natural channel adjacent to the Peabody Tract. The proposed project would not promote the deterioration of water quality, which could affect the fishery in this unnamed tributary.

4.1.7.3 Threatened and Endangered Species

Federally listed and State listed threatened and endangered species, and species of special concern in Vigo County, are presented in Table 4-7. The U.S. Fish and Wildlife Service and

Table 4-7. Threatened and endangered species occurring in Vigo County, Indiana.

Common Name	Scientific Name	Status
Indiana myotis bat	<i>Myotis sodalis</i>	Endangered-F,S
Evening bat	<i>Nycticeius humeralis</i>	Threatened-S
Badger	<i>Taxidea taxus</i>	Threatened-S
Bald eagle	<i>Haliaeetus leucocephalus</i>	Endangered-F,S
Peregrine falcon	<i>Falco peregrinus</i>	Endangered-F,S
Upland sandpiper	<i>Bartramia longicauda</i>	Endangered-S
Great egret	<i>Casmerodius albus</i>	Endangered-S
Yellow-crowned night heron	<i>Nycticorax violaceus</i>	Threatened-S
Popeye shiner	<i>Notropis ariommus</i>	Endangered-S
Blue sucker	<i>Cycleptus elongatus</i>	Special Concern-S
Eastern sand darter	<i>Ammocrypta pellucida</i>	Special Concern-S

F = Federal.

S = State.

Source: Whitaker and Gammon, 1988.

the IDNR Division of Nature Preserves-Heritage Program have indicated that there are no documented occurrences of rare, threatened, and endangered species or natural areas within the

proposed project site (Appendix A). Additionally, field investigations performed at the project site in July 1991 did not identify any State listed or Federally listed rare, threatened, or endangered species.

4.1.8 Floodplains and Wetlands

Because of its proximity to the Wabash River, portions of the Wabash Station's property are within, or have previously been within, the Wabash River floodplain. Wetlands have also been identified within the property boundaries of the station (Skelly and Loy, 1992). The following sections describe the floodplains and wetlands affected by the proposed CGCC project.

4.1.8.1 Floodplain Assessment

The 100-year flood elevation of the Wabash River at the Wabash Station is identified as 476 feet msl by the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM). At this elevation, the 100-year floodplain is confined to a narrow strip of land between a plant dike in the northgate area of the station and the river, the narrow area between the powerhouse and the river, and the southern portion of the station including the ash ponds (Figure 4-1). The powerhouse, coal-handling area, and the proposed project construction site are above the 100-year floodplain as identified on the FIRM. In 1983, PSI constructed a flood protection levee with a crest of 483.5 feet msl, 7.5 feet higher than the 100-year flood elevation, along the southern portion of the facility. The levee was constructed, after a Certificate of Approval for Construction in a Floodway was granted by the IDNR Natural Resources Commission, to prevent inundation of the station's ash ponds. PSI has not pursued a revision of the FEMA FIRM to reflect the protection afforded by this levee. Construction of facilities associated with the proposed project at the north end of the Wabash Station would be sited to avoid the FEMA-designated 100-year floodplain. However, the slag storage area that would be located within the current station's ash disposal area at the southern end of the facility would be within the 100-year floodplain as currently shown on the FEMA FIRM. As indicated previously, if the FEMA FIRM were revised to reflect the protection afforded by the levee, the slag storage area would be outside the 100-year floodplain. Nevertheless, a Notice of Floodplain Involvement for the proposed project was published in the Federal Register (58 FR 9153, February 19, 1993) providing the public the opportunity to make comments or raise questions through March 8, 1993. No comments were received in response to this notice.

4.1.8.2 Wetlands

A review of the U.S. Fish and Wildlife Service National Wetlands Inventory System maps, and a field survey conducted in July 1991, identified several wetland habitats at Wabash Station. All wetland habitats identified within the station property are located outside the proposed project construction areas.

Therefore, construction of the proposed facility would not disturb any of the identified wetland habitats.

4.1.9 Historic, Archaeological, Cultural, and Aesthetic Resources

No historic buildings are located within the proposed project boundaries. The nearest historic building is located 4 miles east of Wabash Station in Terre Haute, and the closest State historic sites are located in Old Vincennes, approximately 60 miles south of Wabash Station (Taylor, 1989).

No recorded archaeological sites are located in the immediate proposed project area; however, 5 archaeological sites have been identified within a 1-mile radius, and 19 others are located within a 2-mile radius (Anslinger, 1991). In July 1991, an on-site evaluation of the proposed project area was conducted. The conclusion of this evaluation was that little potential exists for the presence of archaeological sites within the proposed project boundaries. The IDNR Division of Historic Preservation and Archaeology reviewed the report of this archaeological evaluation and concurred with the findings. Correspondence with the State Historic Preservation Officer has confirmed that there are no historical, architectural, or archaeological sites listed on or eligible for inclusion in the National Register of Historic Places that would be affected by the proposed project (Appendix A).

There are no State-designated scenic highways in the Terre Haute area, and no local programs exist for designating scenic areas or vistas in this area. The nearest State park is located approximately 20 miles southwest of the Wabash Station in Illinois. The Wabash River is not listed on the National Wild and Scenic River System.

The most immediate public vantage points of the station are from State Highway 63 to the west, and from the eastern side of the station, across the Wabash River. Public view of the proposed project would be mostly shielded by surrounding terrain and trees, and the existing station structures. Additionally, to the extent the proposed structures would be seen from residential areas, they would be similar to the existing Wabash Station structures.

4.1.10 Socioeconomics

The Wabash Station currently employs approximately 250 persons, which is approximately 0.5 percent of the total number of persons employed in Vigo County. The 1990 average unemployment rate in Vigo County was 5.2 percent. Peak construction labor requirements associated with the proposed project have been estimated at 450 persons; however, the labor requirement would vary over the construction period. Operation and maintenance of the facility would require up to 107 new employees. Approximately 70 percent of the new employees are expected to be

from the Terre Haute area, with the remainder permanently relocating to the area. Moreover, the additional coal required for project operation would come from local mines, supporting up to 200 miners. This new creation of jobs would have a positive but relatively small impact on employment in the region.

Over the 30-month procurement, construction, and startup phase, a total of approximately \$30 million would be paid in direct wages to labor. To the extent that the newly employed are derived from the ranks of the unemployed or have relocated to the Terre Haute area, and assuming a multiplier of 2 as recommended by the U.S. Chamber of Commerce for urban areas, the total income of the Terre Haute region would rise by \$60 million during the construction phase. The annual payroll associated with the operation phase of the proposed project is estimated at approximately \$4.3 million. Applying the multiplier of 2, an annual regional benefit of \$8.6 million would accrue.

In 1990, the Terre Haute area housing supply totaled 24,077 units, 2,589 of which were unoccupied, for an overall vacancy rate of 10.7 percent. The 1990 rental vacancy rate was 9.3 percent. Based on the housing, apartment, and rental unit vacancy data, there would not be a housing shortage due to the influx of new residents associated with project construction and operation.

Current medical care, emergency services, and schools available in the Terre Haute area are capable of handling the influx of people (workers and their families) associated with the construction and operation of the proposed project facility.

Three rail lines service Terre Haute: Conrail, CSXT (CSX Transportation Corporation), and SOO (SOO Line Corporation). The SOO line serves the Wabash Station (currently, one train per day for coal delivery). The operational phase of the project would require additional rail traffic to the site for coal delivery. A net increase of 20 cars per day is estimated, a 33 percent increase over the current level of 60 rail cars per day. No grade-level crossings of the SOO line are located near the Terre Haute area; therefore, the additional rail traffic would not impair traffic flow or create traffic congestion on frequently used roadways in the vicinity of Terre Haute.

Increased traffic associated with construction would consist of passenger vehicles, and equipment and supply trucks. An estimated 375 passenger vehicles and 20 heavy-duty trucks would be traveling to and from Wabash Station for a period of up to one year during the peak construction period. Construction traffic moving to and from the site from SR 63 would be accommodated primarily by 62nd Avenue, which would be improved by the Industrial Participants (PSI and Destec) to facilitate access to the site by large semi tractor trailers. There are no residences or businesses along 62nd Avenue that would be affected by the construction traffic. Traffic associated with the operational phase of the project would be accommodated by either 62nd Avenue

or Bolton Road. These two roads are adequate to handle the added traffic of the workers and deliveries associated with the project operation. Additionally, the Terre Haute Planning Department has confirmed that the volume of construction traffic at peak traffic periods would not result in severe congestion of Highway 41 or SR 63.

4.1.11 Occupational Safety and Health

The current safety and health requirements applicable to Wabash Station are the general industry standards of the Indiana Occupational Safety and Health Administration (IOSHA). Wabash Station employees are also instructed in worker protection and safety procedures as a component of the existing plant safety program. Implementation of existing health and safety programs at PSI and Destec would continue during the proposed project.

The proposed project would require normal construction activities that, in some cases, may lead to injury. Compliance with the Federal OSHA standards (29 CFR part 1910), as adopted by Indiana, would be the responsibility of the construction contractor for the project. Because of the generally accepted construction practices during the Wabash Station boiler house construction, it is likely that the thermal insulation around steam piping contains asbestos. As a result, it is expected that this material would be encountered during installation of the steam line cross-tie for the HRSG. Should asbestos be encountered, the contractor would follow standard industry practice (OSHA standards) for asbestos abatement and associated worker protection. Asbestos removal and disposal would comply with all applicable regulations.

During the operation of the proposed project, accidental releases of syngas, acid gas stream, and acidic water stripper column gases could potentially impact the health and safety of on-site employees as well as nearby residents. The flare, which is an integral part of the project design, would be utilized as a relief device for venting and destroying any gases during emergency conditions. As described in Section 4.1.1, air quality impacts of flare emissions were modeled for steady-state flaring and flaring during gasifier startups. The estimates of flare emissions, combined with other sources, did not exceed applicable NAAQS. Additionally, elevated levels of H_2S , CO , and/or NH_3 , recorded by in-plant monitoring, would automatically trigger high-level alarms within the control room and immediately initiate appropriate response measures. Design and operation of the oxygen unit would adhere to the standard industry codes and practices to preclude the creation of a hazardous condition. To prepare for emergencies, routine safety, emergency response, and emergency evacuation drills would be conducted among the proposed project workers. These measures would prevent the occurrence of situations that could adversely impact worker and nearby residents' health and safety.

4.1.12 Cumulative Impacts

The cumulative impacts of air emissions from the existing Wabash Station and the proposed project are central to the project's implementation. As noted in Section 2 of this EA, the CAAA of 1990 targeted the Wabash Station for clean-up of SO₂ emissions. As noted in Section 4.1.1 and in Table 3-5, by implementing the proposed project, SO₂ emissions would be reduced by more than 3,000 tons annually. At the same time, conditions in Vigo County have improved to the point where reclassifying the area in the vicinity of the Wabash Station as attainment for SO₂ has been proposed. Portions of Vigo County have also been classified as nonattainment for PM. A variety of activities may contribute to the levels of PM in the vicinity of the Wabash Station, although this portion of Vigo County is in attainment for PM. By implementing the proposed project, PM emissions from the Wabash Station would be reduced by approximately 25 tons annually. Unrelated to the proposed CGCC project, the Wabash Station has undertaken a multimillion dollar project to install, among other items, large-scale electrostatic precipitators to replace those currently in place at the station. This new equipment would further reduce PM emissions from the station. Cumulatively, therefore, the impact to air quality in Vigo County as related to SO₂ and PM (and other pollutants identified in Table 3-5) would be an improvement over current conditions. Other than the effects of the proposed project previously discussed in this EA, there are no other known factors that would cumulatively lead to adverse impacts on water quality or any of the physical, biological, or sociocultural resources described in this EA. Therefore, significant cumulative impacts are not expected to occur.

4.1.13 Summary of Impacts

There would be limited impacts to air quality as a result of project implementation. Modeling performed for pollutant emissions from the proposed project indicate that none of the pollutants emitted would be found in concentrations that would adversely affect public health or welfare. Additionally, none of the criteria pollutants modeled exceeded allowable PSD increments. The greatest percentage of PSD increments consumed by the proposed project were for SO₂ during the 24-hour averaging period (Table 4-3). In summary, modeled air emissions for the proposed Wabash River CGCC Repowering Project, including flare emissions associated with syngas flaring during start-up, shutdown, and upset conditions, indicate that regulated pollutant concentrations would be below applicable State and Federal air quality standards that are based on the protection of public health and welfare. Additionally, project emissions would not exceed adverse toxicological concentrations (H₂SO₄) that could affect human health and safety.

Water requirements for the proposed project could be met utilizing existing sources (Wabash River). Wastewater discharges

including thermal discharges into the Wabash River would comply with limitations established in the station's NPDES permits, intended to prevent adverse effects on aquatic ecosystem communities.

Surface grading of the Peabody Tract would be required for construction of the proposed project facilities. Because the majority of the Peabody Tract was disturbed during previous mining activities, project construction would not adversely affect the geology or soils of this area.

Land uses associated with the proposed project are consistent with the current use of the Wabash Station property.

Noise levels for the proposed project were modeled to determine the levels at the nearest residence on Bolton Road. The resultant noise level calculated was 62 dBA, a value that generally results in no disturbance of normal indoor conversation and moderate disturbance of normal outdoor conversation.

No historic or archaeological resources, floodplains or wetlands, unique terrestrial and aquatic ecosystems, or threatened and endangered species would be adversely affected by the proposed project.

Based on an economic income multiplier of 2, total income of the Terre Haute region would rise by \$60 million during the construction phase of the proposed project. During the operational phase, an annual regional income benefit of \$8.6 million would accrue. Construction and operational workers would be drawn primarily from the local populations, which would have a positive impact on the area's work force.

Worker health and safety emergency response training, and inherent project design and operation procedures would reduce the risk of exposure or harm to project workers or nearby residences from potential releases of the syngas, acid gas stream, and acidic water treatment process gases. The flare would be utilized as a relief device for venting and destroying any gases from an emergency condition, thereby protecting the health and safety of workers and nearby residences.

4.2 NO ACTION ALTERNATIVE

Under the No Action alternative, DOE would not fund the proposed project. The Industrial Participants could proceed with the proposed project without DOE funding, in which case impacts would be as described in this EA, or the project could be canceled. If the proposed project is canceled, the impacts described herein would not occur. Under the No Action alternative, environmental impacts would be equivalent to existing conditions. Additionally, if canceled, the project would not contribute to the objective of the CCT program, which is to make available to the U.S. energy marketplace a number of advanced, more efficient,

economically feasible, and environmentally acceptable coal technologies.

5. LIST OF AGENCIES AND PERSONS CONSULTED AND PERMITS REQUIRED

Mr. David Hudak, Supervisor
U.S. Fish and Wildlife Service
Bloomington Field Office (ES)
718 North Walnut Street
Bloomington, IN 47404

Ms. Michelle Martin
Division of Nature Preserves
Indiana Department of Natural Resources
Room W267
402 W. Washington Street
Indianapolis, IN 46204

Ms. Terri Moreland
Director
State of Illinois Office, Suite 240
444 North Capital Street, NW
Washington, DC 20001

Mr. Patrick R. Ralston
State Historic Preservation Officer
Indiana Department of Natural Resources
Division of Historic Preservation and Archaeology
402 West Washington Street, Room 74
Indianapolis, IN 46204

Ms. Catherine Gremillion-Smith
Nongame and Endangered Wildlife Supervisor
Division of Fish and Wildlife
Indiana Department of Natural Resources
402 West Washington Street, Room W273
Indianapolis, IN 46204

Mr. Frank Sullivan
Indiana Budget Director
State Budget Agency
Room 212 State House
Indianapolis, IN 46204

In addition to those persons and agencies contacted in support of this project, Table 5-1 documents the environmental permits and approvals necessary for the project to go forward.

Table 5-1. List of environmental permits and approvals for the Wabash River CGCC Repowering Project.

	TOPIC	PERMIT/APPROVAL	REGULATORY BASIS	APPROVING AGENCY	EXPECTED ACTION
1.	General Environmental	NEPA Approval	40 CFR 1500-1508	DOE	DOE issuance of EA/FONSI.
2.	Air Quality	Construction & Operation Permit, including PSD & NSPS	326 IAC 2 40 CFR 52 40 CFR 60 CAA, as amended	IDEM	IDEM issued draft permits for turbine and gasification plant for public comment. Public comment period ended 2/8/93.
3.	Water Quality	NPDES permit modification	Federal Water Pollution Control Act (33 U.S.C. 1251 et seq) IC 13-7	IDEM	The 30-day public comment period ended on 4/5/93. IDEM is expected to issue a modified NPDES permit.
4.	Water Quality	Wastewater Treatment Control Device Construction Permit	327 IAC 3	IDEM	Issued 12/18/92.
5.	Stormwater	Construction Stormwater Notification	327 IAC 15 40 CFR 122	IDEM	Notification submitted 7/2/92, revised 1/6/93.
6.	Aircraft Navigation	Stack height approval	FAR Part 77	FAA	Public comment period ended on 2/25/93. FAA made the determination on 3/9/93 that the new stacks would not be a hazard to air navigation.

	TOPIC	PERMIT/APPROVAL	REGULATORY BASIS	APPROVING AGENCY	EXPECTED ACTION
7.	Floodplain	Floodplain Notice in <u>Federal Register</u>		DOE	Floodplain Notice: FEMA map has not been updated to show the effect of flood control levee which was constructed under permit from IDNR (1983). Floodplain Notice in <u>Federal Register</u> (58 FR 9153) on 2/19/93. Public comment period ended 3/8/93. No comments were received.
8.	Wetlands	None	Section 404 of Clean Water Act	US Army Corps of Engineers	Not applicable. No wetlands impacted by this project.
9.	Solid Waste	None	329 IAC 2	IDEM	Not applicable. No new on-site solid waste disposal facilities will be required.
10.	Hazardous Waste	None	40 CFR 262	U.S. EPA IDEM	No RCRA hazardous waste permitting will be required. Project must obtain USEPA and IDEM hazardous waste generator ID numbers.
11.	Water Supply	None	13 IAC 2	IDNR	No permit is required to withdraw water.
12.	Land Use	None	None	Vigo County	There are no land use or zoning requirements applicable to the project.

	TOPIC	PERMIT/APPROVAL	REGULATORY BASIS	APPROVING AGENCY	EXPECTED ACTION
13.	Cultural Resources	Letter from IDNR that there is no impact by project.	National Historic Preservation Act IC-14	IDNR	There are no archaeological, historic, Native American, or recreational resources impacted by the project. Letter from IDNR Division of Historic Preservation and Archaeology received 10/4/91.
14.	Farmland Protection	None	Farmland Protection Policy Act	U.S. Dept. of Agriculture	There are no prime farmland soils affected by the project.
15.	Wild & Scenic Rivers	None	Wild & Scenic Rivers Act	U.S. Dept. of Interior	No designated wild & scenic rivers are impacted by the project.
16.	Fish & Wildlife	Letter from U.S. FWS that there is no impact by project.	Federal Fish & Wildlife Coordination Act	U.S. Fish & Wildlife Service	The project will not impact wetlands or affect endangered species. Letter from U.S. FWS received 8/2/91.
17.	Endangered Species	Letter from U.S. FWS & IDNR that there is no impact by project.	Endangered Species Act	U.S. FWS IDNR	The project will not affect endangered species. Letter from U.S. FWS received 8/2/91. Letter from IDNR received 7/16/91.

6. REFERENCES

Unless referenced otherwise, the principal information source for this EA is a Draft Environmental Information Volume (Radian, 1992) prepared for this proposed project. Full bibliographic citations for documents cited in the text are listed below.

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APPENDIX

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Historic Preservation
and Archaeology
402 W. Washington St., Rm. 274
Indianapolis, Indiana 46204
317-232-1646

ENVIRONMENTAL
OCT 08 1991
RECEIVED

October 4, 1991

James Rogers
President and Chief
Executive Officer
PSI Energy
1000 East Main Street
Plainfield, Indiana 46168

Dear Jim:

We have reviewed the archaeological evaluation of the Wabash River Coal Gasification Repowering Project Site located at the Wabash River Generating Station in Vigo County, Indiana.

No known historical, architectural, or archaeological sites listed on or eligible for inclusion in the National Register of Historic Places will be affected by this project.

If any archaeological artifacts are uncovered during construction, federal law and regulations (16 USC 470, et seq.; 36 CFR 800.11, et al.) and, additionally, state law (Indiana Code 14-3-3.4), require that work must stop and that the discovery must be reported to the Division of Historic Preservation and Archaeology within two (2) business days.

We appreciate the opportunity to be of service.

Very truly yours,

Patrick R. Ralston
State Historic Preservation Officer

PRR:SBG:vk

cc: Mike A. Judd ✓

September 26, 1991

Mr. Patrick R. Ralston
State Historic Preservation Officer
Indiana Department of Natural Resources
Division of Historic Preservation and Archaeology
402 West Washington Street, Room 74
Indianapolis, IN 46204

Re: Archaeological Evaluation of the Wabash River Coal
Gasification Repowering Project Site

Dear Mr. Ralston:

PSI Energy contracted Dr. Russell Stafford from Indiana State University, department of Anthropology to conduct a preliminary archaeological evaluation and recommendation for the proposed PSI/Destec Wabash River Coal Gasification Repowering Project Site.

The results of this investigation (attached) have revealed that because of the extensive historical disturbance to the project site, it is very unlikely that any intact archaeological sites remain within the limits of the proposed project boundary.

Therefore, based on Dr. Stafford's recommendations, PSI is requesting the IDNR waive any further investigations of the project area in terms of archaeological resources.

Please provide your written response to this request at your earliest convenience. Thank you for your assistance in this matter and if you have any questions please contact Mr. Timothy A. Hayes at 317/838-1725.

Sincerely,

Mike A. Judd

TAH:jh

cc: J. U. Bott
C. R. Stafford (ISU)
Marvin Linger (Skelly & Loy)
T. A. Hayes

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

Division of Nature Preserves
508 State Office Building
Indianapolis, Indiana 46204
(317) 232-4052

July 16, 1991

Chris A. Klinedinst
Skelly and Loy, Inc.
2601 North Front Street
Harrisburg, PA 17110

Dear Ms. Klinedinst:

I am responding to your request for information on the endangered, threatened, or rare (ETR) species and high quality natural communities and natural areas documented from a site located in Fayette Township, Vigo County, Indiana. The Indiana Natural Heritage Program's databank has been checked for the New Goshen U.S.G.S. 7.5' quadrangle and we have no documented occurrences of ETR species or natural areas within the vicinity of the site.

The information I am providing does not preclude the requirement for further consultation with the U.S. Fish and Wildlife Service as required under Section 7 of the Endangered Species Act of 1973. You should contact the Service at their Bloomington, Indiana office.

U.S. Fish and Wildlife Service
718 North Walnut
Bloomington, Indiana 47401
(812) 334-4261

At some point, you may need to contact the Department of Natural Resources' Environmental Review Coordinator so that other divisions within the department have the opportunity to review your proposal. For more information, please contact:

Patrick R. Ralston, Director
Department of Natural Resources
attn: Steve Jose
Environmental Review Coordinator
402 W. Washington Street, Room 271
Indianapolis, IN 46204
(317) 232-4070

"EQUAL OPPORTUNITY EMPLOYER"

July 16, 1991

Please note that the Indiana Natural Heritage Program relies on the observations of many individuals for our data. In most cases, the information is not the result of comprehensive field surveys conducted at particular sites. Therefore, our statement that there are no documented significant natural features at a site should not be interpreted to mean that the site does not support special plants or animals.

Due to the dynamic nature and sensitivity of the data, this information should not be used for any project other than that for which it was originally intended. It may be necessary for you to request updated material from us in order to base your planning decisions on the most current information.

I have enclosed an invoice for \$30.00 to cover the cost of the request.

Thank you for contacting the Indiana Natural Heritage Program. You may reach me at (317)232-4052 if you have any questions or need additional information.

Sincerely,

Michelle L. Martin
Indiana Natural Heritage Program

enclosure: invoice

SKELLY AND LOY, INC.
ENGINEERS-CONSULTANTS

2501 NORTH FRONT STREET

HARRISBURG PENNSYLVANIA 17110

FAX 717 232 1733

TEL 717 232 0593

July 8, 1991

Ms. Katie Smith
Non-Game and Endangered Wildlife Program
Division of Fish and Wildlife
607 State Office Building
Indianapolis, Indiana 46204

Dear Ms. Smith:

Skelly and Loy, Inc. has been retained by Public Service Indiana (PSI) to conduct environmental studies associated with a site development in Fayette Township, Vigo County. As part of the study, we will be requesting file reviews with State and Federal agencies regarding the potential for the presence of endangered, threatened, rare, species of State special concern, or other unique State natural resources.

Any information you can forward to us concerning the possible presence of any species under the jurisdiction of the Division of Fish and Wildlife will be appreciated. The enclosed project location map (New Goshen U.S.G.S. 7.5' quadrangle) outlines the project study area.

Thank you for your time and consideration given to this project. If you have any questions or concerns, please do not hesitate to call.

Sincerely yours,

SKELLY and LOY, Inc.

Chris A. Klinedinst

Chris A. Klinedinst
Biologist/Ecologist

CAK/veb
Enclosure
cc: REM/E910148

JUL 13 1991

INDIANA DEPARTMENT OF NATURAL RESOURCES

PATRICK R. RALSTON, DIRECTOR

12 July 1991

Division of Fish and Wildlife
Indiana Government Center South
Room W273
402 West Washington Street
Indianapolis, IN 46204

Chris A. Klinedinst
Biologist/Ecologist
Skelly and Loy, Inc.
2601 North Front Street
Harrisburg Pennsylvania 17110

Dear Ms. Klinedinst,

I am writing in regard to your request for information on federal and state listed rare, threatened or endangered species in the PSI project area. Information request of this nature are handled by the Division of Nature Preserves - Heritage Program, Indiana Government Center South, Room W268, 402 West Washington Street, Indianapolis, IN 46204. The heritage program charges for data searches (\$30.00/hr). For more information contact Michelle Martin, Division of Nature Preserves (317)232-4052.

Sincerely,

Catherine Gremillion-Smith, Ph.D.
Nongame Supervisor

"EQUAL OPPORTUNITY EMPLOYER"

SKELLY AND LOY, INC.
ENGINEERS-CONSULTANTS

2601 NORTH FRONT STREET

HARRISBURG PENNSYLVANIA 17110

FAX 717 232 1799

TEL 717 232 0593

July 11, 1991

Mr. David Hudak
U.S. Fish and Wildlife Service
718 North Walnut
Bloomington, Indiana 47401

Dear Mr. Hudak:

Skelly and Loy, Inc. has been retained by Public Service Indiana (PSI) to conduct environmental studies associated with a site development in Fayette Township, Vigo County. As part of the study, we will be requesting file reviews with State and Federal agencies regarding the potential for the presence of endangered, threatened, rare, species of State special concern, or other unique State natural resources.

On July 5, 1991, I spoke with Mr. Scott Pruet of your office concerning species under the jurisdiction of the U.S. Fish and Wildlife Service that may occur within the project area. He mentioned two endangered species, the Indiana bat (*Myotis sodalis*) and the bald eagle (*Haliaeetus leucocephalus*), as possible species. Preferred habitat for the Indiana bat is mature woods adjacent to streams and rivers. The bald eagle nests on rock bluffs along the river.

Habitat within the project area includes wooded floodplain along the river, grassland which is a reclaimed mine site, and woods. The area around the site is a steam-powered electricity generating station. If you can provide any additional information about these or other species likely to occur in this area, we would appreciate it.

Enclosed for your use is a project location map (U.S.G.S. Quad - New Goshen) and a Xerox copy of an aerial with the project area outlined. Thank you for your time and attention to this project.

Sincerely yours.

SKELLY and LOY, Inc.

Chris A. Klinedinst

Chris A. Klinedinst
Biologist/Ecologist

CAK/veb
Enclosures
cc: REM/E910148

ENVIRONMENTAL

CIVIL

ENERGY/MINING

ENGINEERING

PLANNING

DESIGN

RESEARCH

United States Department of the Interior

FISH AND WILDLIFE SERVICE
BLOOMINGTON FIELD OFFICE (ES)
718 North Walnut Street
Bloomington, Indiana 47404
(812) 334-4261 FAX 334-4273

IN REPLY REFER TO:

August 2, 1991

Mr. Chris A. Klinedinst
Skelly and Loy, Inc.
2601 North Front Street
Harrisburg, PA 17110

Project: Site development, Fayette Township
County: Vigo

Dear Mr. Klinedinst:

This responds to your letter dated July 11, 1991, requesting our comments on the aforementioned project.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

The proposed project will have no significant effect on wetlands and will not affect any Federally endangered species. Other project impacts will be minor in nature. Based on a review of the information you provided, the U.S. Fish and Wildlife Service has no objections to the project as currently proposed.

We appreciate the opportunity to comment at this early stage of project planning. If project plans change such that fish and wildlife habitat may be affected, please recoordinate with our office as soon as possible. If you have any questions about our recommendations, please call (812) 334-4261.

Sincerely yours,

for David C. Hudak,
Supervisor

cc: Director, Indiana Div. of Fish and Wildlife, Indianapolis, IN
Indiana Dept. Environmental Management, Bradbury, Indianapolis, IN
Indiana Div. Outdoor Recreation, Indianapolis, IN

SKELLY AND LOY, INC.
ENGINEERS-CONSULTANTS

2601 NORTH FRONT STREET

HARRISBURG PENNSYLVANIA 17110

FAX 717 232 1799

TEL 717 232 0593

July 8, 1991

Ms. Michelle Martin
Division of Nature Preserves
Indiana Department of Natural Resources
Room W267
402 West Washington Street
Indianapolis, Indiana 46204

Dear Ms. Martin:

Skelly and Loy, Inc. has been retained by Public Service Indiana (PSI) to conduct environmental studies associated with a site development in Fayette Township, Vigo County. As part of the study, we will be requesting file reviews with State and Federal agencies regarding the potential for the presence of endangered, threatened, rare, species of State special concern, or other unique State natural resources.

As a follow-up to my telephone conversation with Mr. Cloyce Hedge on July 3, 1991, I would like to request a formal reply stating the findings of the file search. According to Cloyce, there are no occurrences recorded within the project area. The enclosed project location map (New Goshen U.S.G.S. 7.5' quadrangle) outlines the project study area.

Thank you for your time and consideration given to this project. If you have any questions or concerns, please do not hesitate to call.

Sincerely yours,

SKELLY and LOY, Inc.

Chris A. Klinedinst

Chris A. Klinedinst
Biologist/Ecologist

CAK/veb
Enclosure
cc: REM/E910148

FINDING OF NO SIGNIFICANT IMPACT

Wabash River Coal Gasification Combined Cycle (CGCC) Repowering Project

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: DOE has prepared an Environmental Assessment (EA) (DOE/EA-0853) for a project that has been proposed by PSI Energy, Inc. (PSI), and Destec Energy, Inc. (Destec), for the cost-shared design, construction, and demonstration of a Coal Gasification Combined Cycle (CGCC) repowering project. The project would be located at PSI's Wabash River Generating Station (Wabash Station) in West Terre Haute, Vigo County, Indiana. The proposed federal action is to provide cost-shared financial assistance to the project. Based on the analysis in the EA, DOE has determined that the proposed action is not a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an Environmental Impact Statement is not required, and the Department is issuing this Finding of No Significant Impact (FONSI).

COPIES OF THIS EA ARE AVAILABLE FROM:

Mr. Bruce J. Buvinger, Environmental Project Manager
Environmental, Safety & Health Division
U.S. Department of Energy
Morgantown Energy Technology Center
P.O. Box 880
Morgantown, WV 26507-0880
Tel: (304) 291-4379

FOR FURTHER INFORMATION CONTACT:

Ms. Carol M. Borgstrom, Director
Office of NEPA Oversight (EH-25)
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585
Tel: (202) 586-4600 or (800) 472-2756

BACKGROUND: Under Public Law No. 101-121, 103 Stat. 728 (1989), \$600 million was provided in funding to the Department of Energy (DOE) to conduct cost-shared Clean Coal Technology (CCT) projects under the fourth round of the Clean Coal Technology Demonstration Program (CCT-IV). The Act included funding appropriations for the design, construction, and operation of cost-shared clean coal projects to demonstrate technologies capable of replacing, retrofitting, or repowering existing power generating facilities. These technologies were to be capable of (1) achieving significant reductions in the emissions of sulfur dioxide (SO₂) and/or oxides of nitrogen (NO_x) from existing facilities to minimize environmental impacts such as transboundary and interstate pollution and/or (2) providing for future energy needs in an environmentally acceptable manner.

A Program Opportunity Notice (PON) was issued by the Department of Energy (DOE) in January 1991, soliciting proposals to conduct cost-shared CCT projects demonstrating innovative, energy efficient, technologies capable of being commercialized in the 1990s. In May 1991, DOE received 33 proposals in response to the PON, nine of which were selected for award. The Wabash River Coal Gasification Repowering Project, proposed by the Wabash River Coal Gasification Repowering Project Joint Venture, was one of these nine. The Joint Venture partners are PSI Energy, Inc. (PSI), of Plainfield, Indiana, and Destec Energy, Inc. (Destec), of Houston, Texas. The Joint Venture has requested financial assistance from DOE for the design, construction, and operation of a nominal 2,600 ton-per-day (tpd), 268 Megawatt-electric (MWe) Coal Gasification Combined Cycle (CGCC) repowering demonstration project. The proposed project would involve repowering one (Unit 1) of the six boilers at PSI's Wabash Station with the CGCC process technology developed by Dow Chemical Company and owned by Destec. The CGCC project is based on an entrained-flow gasifier capable of utilizing high sulfur bituminous coal. The proposed federal action is to provide cost-shared financial assistance to the project. The project, including the demonstration phase, would last 71 months at a total proposed cost of \$396 million. DOE's share of the project cost would be 50 percent, or \$198 million. The repowering project is scheduled to remain in operation for approximately 25 years, with the proposed DOE-assisted commercial demonstration component covering the first 3 years of operation.

DESCRIPTION OF THE PROPOSED PROJECT: The Wabash River CGCC Repowering Project would be located at PSI's Wabash Station in West Terre Haute, Vigo County, Indiana. The Wabash Station is located on approximately 400 acres, west of the municipal limits of Terre Haute, and is bounded by the Wabash River on the east. The facility is accessed from the west from State Route 63 via 62nd Avenue or Bolton Road. The proposed project would be constructed entirely within the property boundaries of the Wabash Station with the exception of an 8-inch diameter, approximately 1.5-mile long, natural gas pipeline, which would run parallel to Bolton Road from an existing gas transmission main west of Wabash Station. A 37-acre tract of land donated to PSI by the Peabody Coal Company would be used as part of the proposed project area.

The existing Wabash Station facility utilizes six pulverized coal-fired electrical generating units, each fitted with an electrostatic precipitator for control of particulate matter. The boilers for all six units utilize a common exhaust stack, and each unit is fueled by pulverized bituminous coal, with No. 2 fuel oil used for boiler start-up.

The proposed project would repower the existing Unit 1 steam turbine. This unit is currently permitted to operate at 99 MWe, but is limited to 90 MWe during routine operations as set forth under the Wabash Station's State air quality permit. Units 2 through 4 are similar to Unit 1 in design and operating features, and are also permitted at 99 MWe, but limited to 90 MWe during routine operation. Unit 5 is permitted at 121 MWe and limited to 103 MWe during routine operations, and Unit 6 is permitted at 354 MWe and limited to 342 MWe during routine operations. The existing total permitted electrical generating capacity of the Wabash Station is 871 MWe.

The Wabash Station currently burns bituminous coal, consuming approximately 1,456,900 tons in 1990. Unit 1 alone, the unit to be repowered, consumed about 164,900 tons in 1990. The sole water source for the Wabash Station is the Wabash River. The facility has three intake structures on the river, and operates under a National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit (Permit No. IN0002810) issued by the Indiana Department of Environmental Management (IDEM) for five outfalls to the river.

Outfall 001 discharges untreated once-through condenser cooling water and boiler blowdown. Outfall 002 discharges ash sluice water and intermittent flow that have been settled in a series of on-site ash ponds. Outfalls 003 through 005 discharge the backwash of the plant intake screens. Ash production at the Wabash Station totaled 152,700 tons in 1990, with Unit 1 alone producing approximately 17,300 tons of ash.

The proposed project is an alternative to the conventional coal-fired electric power generation with post-combustion emission controls. Because of the overall CGCC system design, emissions of sulfur dioxide, oxides of nitrogen, and particulates are projected to be lower than those from conventional pulverized coal-fired boiler units. In general, a CGCC facility would be expected to produce approximately 40 percent of the solid waste generated by a comparable conventional pulverized coal-fired power generation plant. Additionally, the process by-products (elemental sulfur and solidified slag particles) can be recovered and are considered marketable.

The Wabash Station CGCC facilities would be installed adjacent to the existing power plant. A 37-acre tract of land donated to PSI by the Peabody Coal Company would contain the process area. This tract of land would contain the gasification plant, oxygen unit, gas combustion turbine and heat recovery steam generator (HRSG), as well as part of the construction lay down and parking areas, and supporting structures for the CGCC system. The supporting structures would include the power delivery system, auxiliary boiler, feedwater demineralizer system, cooling water system, wastewater and sanitary sewage systems, fire and service water system, instrument air system, and ancillary buildings.

The proposed CGCC process would utilize locally mined, high-sulfur, coal ground with water to form a coal slurry. The slurry would be pumped into the on-site gasification unit where oxygen would be added to form a hot raw gas through partial combustion. During this gasification process, the non-carbon materials in the coal would melt and flow out of the gasification unit producing the gasifier slag by-product. The hot raw gas would then be cooled in a heat exchanger to generate high-pressure steam. Impurities such as

sulfur and particulate matter would be removed from the raw gas prior to combustion to make the gas an acceptable "syngas" for turbine fuel. A continuous water-quench slag removal system would be utilized to prevent the escape of raw gasification products to the atmosphere during gasifier slag removal. The cleaned syngas would then be piped to a combustion turbine generator, producing approximately 191 MWe of electricity. Exhaust from the combustion turbine would be recovered in the HRSG and would produce additional high-pressure steam. This steam, in combination with the steam generated in the gasification process, would be piped to the existing Unit 1 steam turbine generator to produce an additional 111 MWe of electricity. Approximately 34 MWe would be required for CGCC auxiliary equipment operation. Hence, the net power output from the CGCC system (steam and combustion turbines) would be 268 MWe, and the total net increase in power output for the Wabash Station from implementation of the CGCC demonstration project would be approximately 174 MWe.

To protect against the uncontrolled release of syngas, a flare system is proposed to combust process stream components during cold start-ups, shut down, and during upset conditions when the combustion turbine is unavailable. Additionally, a tail gas incinerator would be installed to destroy contaminants in the sulfur recovery system tail gas and process vent streams.

By-products of the proposed CGCC process would include elemental sulfur and gasifier slag. Both by-products are considered usable and would be actively marketed.

The performance of the Wabash Station proposed CGCC demonstration project was assessed based on a 90 percent annual capacity factor (as analyzed in the EA). At this capacity, approximately 861,000 tons of coal would be consumed annually by the process components, generating a net power output of 268 MWe from the steam and combustion turbines. The total net increase in power output for the Wabash Station from implementation of the proposed project would be approximately 174 MWe, which represents an increase of approximately 23 percent over the existing gross permitted electrical generating capacity of

the entire Wabash Station (871 MWe), and a 185 percent increase over the previous net capacity of Unit 1 (94 MWe).

ENVIRONMENTAL IMPACTS: Potential environmental impacts of the proposed project were analyzed for both construction activities and plant operations. Air emissions, wastewater discharges, and other physical and environmental modifications associated with the demonstration plant construction and operation were compared with existing baseline conditions of the Wabash Station to determine potential environmental impacts.

Construction Impacts

The CGCC Repowering Project is anticipated to take approximately 30 months for procurement, construction, and start-up. Detailed engineering design of the proposed project is scheduled to be completed by the end of 1993, and the on-site construction completed by mid-1995.

No previously undisturbed land areas would be used for the proposed Wabash River CGCC Repowering project. All construction activities would be within the property boundaries of the existing Wabash Station with the exception of the natural gas pipeline which would be installed along Bolton Road for approximately 1.5 miles. No wetlands, floodplains, unique terrestrial and aquatic ecosystems, or threatened and endangered species would be affected during construction. Additionally, there are no historic or archaeological sites located in the immediate proposed project area. The Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology, has confirmed that, due to the disturbed nature of the site, little potential exists for the presence of archaeological and historic resources within the proposed project boundaries.

Increases in air emissions from construction are anticipated to be limited to fugitive dust and vehicular exhaust. Areas within the Wabash Station subject to fugitive particle emissions during and after construction would be wetted as necessary to limit these emissions. To reduce dust on 62nd Avenue, the primary route for construction traffic, a chip and seal coat (pavement) would be applied.

No surface water impacts are anticipated during construction because standard sedimentation and erosion control practices would be employed. No aquatic habitat would be altered during construction, and no impacts to aquatic biota are expected.

Grading of the proposed project area would be required for project construction. As the majority of this land was disturbed during previous mining activity, project construction would not adversely affect the geology or soils of this area.

Waste materials generated from construction are anticipated to be those normally associated with construction activities. Materials such as concrete, steel, lumber, etc., would be disposed of in an off-site landfill.

Construction labor requirements would vary over the construction period, with a peak labor demand of 450 persons; construction labor would be drawn primarily from the local area. Based on an economic income multiplier of 2, the resultant total income of the Terre Haute region would rise by \$60 million during the construction phase of the proposed project.

Increased traffic associated with construction would consist of approximately 375 passenger vehicles and 20 heavy-duty trucks per day during the peak construction period. This traffic increase is within the capacity of existing roadways, and would not result in severe congestion. Worker health and safety would be protected by the applicable Federal and State of Indiana Occupational Safety and Health Administration's industry standards.

Operation Impacts

The CGCC repowering project is scheduled to be in operation for approximately 25 years. The proposed federal action, i.e., the DOE-assisted demonstration component, covers the first 3 years of operation, beginning with system start-up planned for mid-1995. Commercial operation of the plant is then slated to continue through the year 2020.

Air emissions from the proposed facility during the operational phase would result in reductions from the Wabash Station in the total amounts of sulfur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matter, particulate matter less than 10 microns in diameter, lead, fluorides, and methane; and increases in carbon monoxide, volatile organic compounds, sulfuric acid mist, total reduced sulfur, and carbon dioxide.

The combined air quality impacts of the proposed project and existing Wabash Station combustion sources were evaluated using the U.S. Environmental Protection Agency-approved Industrial Source Complex Short-Term Dispersion Model, version 90346. Modeled air emissions for the proposed Wabash River CGCC Repowering Project indicate that regulated pollutant concentrations, during the operational phase, would be below applicable state and federal air quality standards. Additionally, reductions in the total amount of SO_2 and NO_x from proposed project implementation would improve existing conditions that contribute to the formation of "acid rain."

Water requirements for operation of the proposed project could be met utilizing existing sources (Wabash River). The total volume of wastewater from the proposed project, 0.720 million gallons per day, would be discharged into the Wabash River via Outfall 002 following detention in a new process wastewater pond to be constructed in the northern portion of the station property. A modification to the Station's existing wastewater discharge permit would be required to reflect this discharge of the proposed project's wastewater. However, the overall quality of the effluent from Outfall 002 would not be adversely affected by the addition of the project's wastewater streams due to the small volume of project-related effluent to be discharged, and the water stream treatment (steam stripping, carbon adsorption, and biological oxidation) prior to discharge. Wastewater discharges, including thermal discharges, into the Wabash River would comply with the limitations established in the Station's NPDES permits, which would prevent adverse effects on aquatic ecosystem communities.

Land uses associated with operation of the proposed project are consistent with the current use of the facility property. Noise levels for the proposed

project operation were modeled to determine the levels at the nearest residence on Bolton Road. The resultant noise level calculated was 62 decibels, a value that generally results in no disturbance of normal indoor conversation and moderate disturbance of normal outdoor conversation. After project start-up, noise surveys would be conducted at the property limits and within the proposed project area to ascertain any increases in noise levels and identify the sources of those increases. Once identified, noise abatement measures would be instituted as necessary.

The project would have no adverse impact on wetlands, or threatened and endangered species. The project would not cause damage to local flora from air pollution.

Because of its proximity to the Wabash River, portions of the Wabash Station's property are within, or have previously been within, the Wabash River's 100-year floodplain. In 1983, PSI constructed a flood protection levee with a crest of 483.5 feet mean sea level (msl), 7.5 feet higher than the 100-year flood elevation (476 feet msl), along the southern portion of the facility. PSI has not pursued a revision of the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) to reflect the protection afforded by this levee. As a result, the proposed slag storage area, that would be located within the current Station's ash disposal area at the southern end of the facility, would be within the 100-year floodplain as currently shown on the FEMA FIRM. If the FEMA FIRM were revised to reflect the protection afforded by the levee, the proposed slag storage area would be outside the 100-year floodplain. In accordance with DOE regulations for compliance with floodplain environmental review requirements (10 CFR Part 1022), a Notice of Floodplain Involvement for the proposed project was published in the Federal Register on February 19, 1993 (58 FR 9153), providing the public the opportunity to make comments or raise questions through March 8, 1993. No comments were received in response to this notice.

Plant operating personnel would be drawn primarily from local populations and would produce an annual income benefit of \$8.6 million to the local community during the operational phase of the project.

No health and safety hazards other than those normally associated with operation of power plants are anticipated. Worker health and safety emergency response training, and inherent project design and operation procedures, would reduce any risk of exposure or harm to project workers or nearby residences from potential releases of the syngas, acid gas stream, or water treatment process gases. The flare would be utilized as a relief device for venting and destroying any gases that might result from an emergency condition, thereby protecting the health and safety of workers and nearby residences.

No significant cumulative impacts are expected from the proposed construction and operation of the Wabash River CGCC Repowering Project.

ALTERNATIVES CONSIDERED: In addition to the proposed action, the no action alternative was considered. Under the no action alternative, DOE would not provide cost-shared funding for the Wabash River CGCC Repowering Project. The industrial participant may elect to complete the project without DOE participation or cancel the project. Project cancellation would result in the project not contributing to the objective of the CCT program, which is to make a number of advanced, more efficient, economically feasible, and environmentally acceptable coal technologies available to the U.S. energy marketplace. If the applicant canceled the project, the incremental power would likely be provided by conventional (potentially less efficient and less environmentally desirable) coal-fired technologies, with flue gas desulfurization and nitrogen oxides controls to meet New Source Performance Standards. Without DOE funding, the Industrial Participants (Destec and PSI) have indicated that it is unlikely that the proposed CGCC project would be constructed. Also, alternative technologies and alternative sites were discussed in the EA, and eliminated from further consideration.

PUBLIC AVAILABILITY: Copies of the final EA and FONSI will be distributed to all persons and agencies known to be interested in or affected by the proposed action or alternatives including appropriate agencies within the State of Indiana and the State of Illinois. Additional copies of the final EA and FONSI are available on request from the Morgantown Energy Technology Center at the address given above.

DETERMINATION: The proposed Federal action, to provide cost-shared financial assistance for a demonstration project involving the repowering of an existing boiler at the Wabash River Electrical Generating Station with CGCC technology, does not constitute a major Federal action that would significantly affect the quality of the human environment within the meaning of the National Environmental Policy Act. This conclusion is based on the information and analysis in the EA. Therefore, an Environmental Impact Statement is not required and DOE is issuing this FONSI.

ISSUED IN WASHINGTON, D.C., this 20th day of May 1993.

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

**DATE
FILMED**

10 / 19 / 93

END

10/10/10