EA1091; Calderon Cobemaking Process/Demonstration Project

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CO - Carbon Monoxide
DOE - U.S. Department of Energy
EA - Environmental Assessment
EPA - U.S. Environmental Protection Agency
ft - feet
HAPS - Hazardous Air Pollutant(s)-
H2S - Hydrogen Sulfide
lbs - pounds
lbs/hr - pounds per hour
mph - miles per hour
MWh - Megawatt hour
NOx - Oxides of Nitrogen
NO2 - Nitrogen Dioxide
PDU - Process Development Unit
PM10 - Particulate Matter (less than 10 microns)
RCRA - Resource Conservation and Recovery Act
SO2 - Sulfur Dioxide
TSP - Total Suspended Particulates
VOC - Volatile Organic Carbon

1.0 PURPOSE AND NEED

U.S. Department of Energy's (DOE's) Purpose

The Clean Air Act Amendments of 1990 set new emission standards for hazardous air pollutants from coke ovens. Congress, recognizing that the coke industry faces technological and financial difficulties in meeting these new, stringent emission standards, required the U.S. Environmental Protection Agency and DOE to conduct a joint six-year research and development program to assist the industry in developing and commercializing new technologies and work practices that would significantly reduce hazardous coke oven emissions.

DOE's purpose for sponsoring the proposed demonstration project is to provide the coke industry with a new option for the economical production of high quality coke that significantly reduces the quantity of pollutants entering the environment.

Project Purpose

The proposed Calderon Cokemaking Process demonstration project, to be conducted at the Calderon Energy Company test facility in Alliance, Ohio, would evaluate a new design that allows coke production to occur in a completely closed system, thus eliminating emissions of hazardous air pollutants that occur in conventional cokemaking. This new approach is designed to collect the sulfur released from the coal for sale as a byproduct, significantly reducing emissions of sulfur dioxide to the air.

The purpose of the proposed project is to demonstrate, on a commercial scale, a novel approach to the construction of coke ovens that could significantly reduce pollution. Conventional coke ovens are constructed of refractory brick and work by loading coal into the oven, heating it for a length of time, opening a door at one end, and pushing the finished coke out of the oven. This process has many openings to the environment that are difficult to keep sealed with repeated operation and allow coke oven gases to escape. Instead of processing the coal in batches using a conventional oven, this demonstration project would utilize a modular, tubular steel reactor to produce high quality coke, in a continuous manner, and in a completely sealed system.

Application of the innovative coke making process developed by the Calderon Energy Company would enable coke producers to meet strict new emission standards set by the 1990 Clean Air Act Amendments. Coke, a product of coal, is used as a fuel to produce the heat and chemical reactions needed to reduce iron ore to molten iron in the blast furnace method of iron production, the primary method of iron-making used worldwide by integrated steel mills. The operation of one commercial-size reactor proposed for this project would provide the information needed to design a commercial-size installation and confirm the environmental performance and commercial value of the approach.

DOE's Need for Action

The proposed demonstration of an approach to coke production that significantly reduces pollution would fill an important need by assisting the coke industry in economically meeting the requirements of the Clean Air Act.

DOE's Decision

The decision to be made by DOE is whether to provide cost-shared support for the demonstration of the Calderon Cokemaking Process.

Public Participation

Information describing the proposed action and opportunities to comment were provided to the public by placing both an informative article and a public notice requesting comments on the draft Environmental Assessment (EA) in the local newspaper (*The Alliance Review*). A copy of the draft EA was placed in the Rodman Public Library and the

interested public were invited to attend an open house at the proposed site (the Calderon Energy Company test facility located on Mahoning Avenue). The EA was also circulated to the State of Ohio's Single Point of Contact and various other government contacts for comment.

Scope of Environmental Assessment

The parameters to be examined include: air emissions; noise level during operation; potential for soil and groundwater contamination; fugitive emissions; accidental releases; truck traffic; solid waste generation and disposal; production and use of hazardous materials; pollution prevention; threatened and endangered species; historical and cultural resources; floodplain and wetlands concerns; water resources; energy and material resources; health and safety; environmental justice and socioeconomics; and long-term and cumulative impacts.

2.0 PROPOSED ACTION AND NO-ACTION ALTERNATIVE

This section describes the proposed action, the no-action alternative, and other alternatives, focusing on how their environmental impacts differ.

Proposed Action

The proposed action is the establishment of a cooperative agreement between the U.S. Department of Energy (DOE) and the Calderon Energy Company of Bowling Green, Ohio, to provide partial funding for the design, fabrication, installation, and operation of a modular reactor capable of producing 48 tons of coke per day. Installation and operation of this commercial-size reactor module would occur at an existing Calderon Energy Company test facility located on Mahoning Avenue in Alliance, Ohio, in an area zoned for industrial use (see map, site plan and photograph -- Figures 1, 2, and 3).

Figure 1. Map Locating the Project Site

Figure 2. Site Plan of the Project Area.

Figure 3. Photograph of the Existing PDU.

The proposed cooperative agreement would extend over 18 months and include nine periods of operation over a nine-month period. Each period of operation would last approximately two to three weeks. Modifications to the existing facilities would begin in August 1995 with operation beginning in March 1996.

As part of the proposed action, modifications would be made to an existing test unit to accommodate one commercial-scale coking tube. This test unit was built for an earlier project funded by the Department of Energy, the State of Ohio's Coal Development Office (Ohio Department of Development), and Calderon Energy Company.

When operational, the unit would produce coke using blended coal shipped from the LTV Steel Company. Coke produced during the facility tests would be delivered to LTV Steel for product quality testing.

During the proposed tests of the Calderon Cokemaking Process, gases produced from the coking process would be thermally cracked (broken down) and sulfur in the gases would be removed using a hot gas cleaning system developed by Calderon (see Figure 4). The system produces a clean-burning fuel gas. During the nine month operation of the demonstration project, the fuel gases would be flared. Future commercialization, however, is expected to allow use of the gas produced by the Calderon technology as fuel.

The hot gas cleaning system would use an inexpensive material (sorbent) to capture sulfur, and the sorbent would be used repeatedly (recycled) to avoid creating solid waste. This system would produce a solid sulfur product (elemental sulfur) that can be sold.

Data collected during the 9-month testing period would be used for the conceptual design and cost estimation of a 500,000-ton-per-year commercial cokemaking facility. A commercial coking facility would employ an assembly of coking tubes, with each tube being the same size as proposed for testing at the Alliance facility. The number of tubes in the assembly would vary according to the coke facility's production capacity. Calderon anticipates that the modular construction of its technology--and its capital cost savings--would aid in the domestic manufacture and export of process equipment, and the construction of facilities in the United States and abroad.

No-action Alternative

Under the no-action alternative, DOE would not provide funding for the proposed project. To compare the impacts of the proposed project, the current level of activity at the site (that is, no activity), was assumed to continue facilities in the United States and abroad.

Alternative Sites

There are no other practical alternative sites for the proposed demonstration project as suitable as the one proposed. An existing facility located at a previously disturbed, abandoned industrial Figure 4. Schematic of the Calderon Cokemaking Process.

site would be used. Relocating this existing facility would involve unnecessary and excessive monetary expenditures. Constructing the facility at an undisturbed site would be expected to produce far greater impacts to the natural and human environment than use of the proposed location.

Summary of Impacts

The construction activities required to modify the Calderon test unit would involve a 25-foot by 80-foot extension of the existing process structure to the south and fabrication of a 24-foot by 30-foot bay that would be attached to an existing building (located on the site plan, Figure 2) and serve as an on-site testing laboratory.

During the nine periods of operation, coal would be delivered to the site and sulfur and coke would be removed. Storage piles of both coke and coal would accumulate at designated (permitted) locations on the site. Sulfur generated as a byproduct would be stored in a vessel. Air emissions would result from (1) dust created by coal and coke handling and truck traffic; and (2) operation of a flare to burn the fuel gases produced.

Increased truck traffic would result from the proposed action. A maximum increase of seven trucks per day, with an average increase of two trucks per day, would result from the delivery and removal of material. The no-action alternative would result in current average traffic volumes of 4,200 vehicles per day on Mahoning Avenue and 15,400 vehicles per day on State Street remaining unchanged.

A summary of the major wastes, air emissions, and products to be generated during the nine months of operation of the proposed demonstration project is provided in Table 1. None of the emissions listed in Table 1 would be produced by the no-action alternative.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Affected Environment

The purpose of this project is to test a commercial-scale tube to process coal into coke at Calderon's facilities in Alliance, Ohio. At the existing facilities, a Process Development Unit (PDU) is available for modification to accommodate the testing. The PDU was constructed by Calderon for tests in an earlier project funded by DOE, the State of Ohio's Coal Development Office, and Calderon, which ceased testing in 1993. Prior to the PDU construction,

the site housed a steel foundry that was abandoned in 1955; it was completely razed in 1962. The site was vacant until 1988 when Calderon purchased the property.

The project area is situated in the southwest corner of Mahoning County, east of Stark County, and north of Columbiana County. The closest bodies of water are a pond area, about 1,000 feet to the south, and the Mahoning River, about 1.25 miles to the northeast. The Calderon facility is in a heavy industrial area of the city of Alliance that is zoned for industrial activity. It is located on a parcel of 7.959 acres; the western boundary is set back from Mahoning Avenue, a moderate traffic area, by a distance of 122.5 feet. To the south of the Calderon facility is a brick manufacturing plant, to the east is the Penn Central Railroad line, and to the north are abandoned industrial sites.

Region V of the U.S. Environmental Protection Agency (EPA) does not have any record of CERCLA or RCRA concerns at the project site. This has been confirmed through coordination with the Ohio EPA office.

Table 1. Major Wastes, Air Emissions, and Products to be Generated by the Proposed Action

Parameter	Proposed Action
Wastewater	198,750 gallons
Solid Waste	312 cubic yards
Air Emissions	
Suspended Particulate	7,367 pounds
SO2	16,057 pounds
NOx	41,041 pounds
CO	9,284 pounds
Volatile Organic	812 pounds
Products	
Coke	13,248 tons
Sulfur	57.6 tons

Alternative 1 - No-Action Alternative

The no-action alternative assumes that the current level of activity at the site (that is, no activity) will continue unchanged. As a result, no impacts to the existing environment are anticipated from the no-action alternative.

Alternative 2 - The Proposed Action

Air Emissions

The existing ambient air quality is classified as being in marginal non-attainment for ozone, attainment for SO2, but is unclassified for PM10, CO, and NO2.

Emissions resulting from testing the Calderon system would be due to combustion of the cleaned process gas in the elevated flare on the PDU tower. The estimated emissions that would be produced during the 9-month operation period are listed in Table 2. (Further information on how the emissions were estimated by LTV Corporation, the assumption and calculations used, can be found in Appendix C.) These air emission estimates will be verified by conducting stack testing for particulates, SO2, NOx, and H2S during testing of the PDU.[1]

As shown in Table 2, the most significant type of air emission would be NOx. Modeling calculations of this pollutant have been performed to determine its environmental impact. It was assumed that all the NOx would be converted to NO2 because the rate of conversion of NO to NO2 is fast in the presence of ozone. The calculated maximum ground level concentration of NO2 would be 3.3 microgram/cubic meter, annual average. This concentration would occur 900 feet from the tower under very unstable (stability Class A) conditions and a wind speed of 2.2 mph. Most of the assumptions for the modeling are very conservative. Therefore, this concentration is far below the National Ambient Air Quality Standard for NO2 of 100 microgram/cubic meter, annual average. The other emissions noted in the table are expected to have even less negative effect on air quality in the area.

Table 2. Total Air Emissions for the 9-Month Period of Process Operation

	TSP (lbs)	SO2 (lbs)	NOx (lbs)	CO (lbs)	VOC (lbs)	H2S (lbs)	HAPs (lbs)
PROCESS							
Coal Handling	75.6	0	0	0	0	0	0
Coke Handling	2,380.2	0	0	0	0	0	0
Limestone Handling	0.62	0	0	0	0	0	0
Truck Traffic	1,975.7	0	0	0	0	0	0
COMBUSTION							
Flare	2,780.0	16,025.5	35,871.4	8,250.4	538.1	0	0
Natural Gas	155.1	31.0	5,169.9	1,034.0	274.0	0	0
Total	7,367.22	16,056.50	41,041.30	9,284.40	812.10	0.00	0.00

In the event of a process upset, additional emissions could result, due to flaring of the process gas remaining in the system. In this instance, the rate of SO2 emissions would increase due to the sulfur in the coke oven gas. However, the emissions increase would only occur over the short period of time it would take to burn out the coke oven gas in the system.

Noise

Noise sources during operation of the project would be due to operation of hydraulic pumps and air compressors; operation of the loader that transports coal from the storage pile to the process unit and coke from the unit to the storage pile; general operation of the plant; and truck traffic delivering coal and limestone and removing coke and sulfur. Because the hydraulic pumps and compressors would be housed in a building on the far east side of the plant away from any residence, they would not be expected to affect the ambient noise level. Loader operation could be of concern because of high noise levels when operated at maximum power and also because of around the clock operation. However, because the loader would be operated for only brief periods of the time to transport coal and coke the short distance from the storage piles to the PDU and the attenuation of the noise with distance to the nearby residences, the overall increase in noise level is expected to be negligible. The other sources of noise due to general operation of the plant would not be expected to increase the ambient level.

Noise from the 4 to 5 trucks per day would be on an intermittent basis and be confined to the daytime hours (Monday through Friday). Therefore, the noise level would differ very little from that of existing truck traffic.

Fugitive Emissions

The estimated total air emissions during the project are listed in Table 2. Only a small portion of the total would be due to fugitive emissions resulting from coal delivery and storage, coke handling and storage, traffic on the road accessing the PDU from Mahoning Avenue, construction emissions, and emissions leaking from process equipment during PDU operation. The most significant fugitive emissions over the nine-month test period would be the particulate matter. Of the 7,367 lbs of total suspended particulates (TSP), on the average 65% would be less than 10

microns (PM10). Coke handling and storage would result in 2,380.2 lbs of TSP, while truck traffic would result in 1,975.7 lbs of TSP. (The remainder of the TSP emissions would be due to the flare, natural gas combustion, and coal handling and storage.) Because ambient air quality in the project area is labeled as unclassified for PM10, no comparisons can be made with existing conditions.

Truck Traffic

The truck traffic during the 18-month project would result from four activities: (a) coal delivery and removal of product coke; (b) delivery of limestone; (c) solid waste disposal; and (d) removal of elemental sulfur.

Construction and Post-operational Periods

Non-recyclable municipal solid wastes would be hauled away by BFI, a contracted disposal company, for disposal in compliance with applicable regulatory requirements. Over the 18-month project it is anticipated that a rate of one truck per week or 72 trips (truck loads) would be made.

Operational Period

Coal would be delivered at a rate of 400-500 tons per week with the possibility of up to 1,000 tons being stored at one time. Each coal truck can deliver approximately 20 tons of coal. Thus, the volume of coal delivery would amount to 4 to 5 trucks per day over the estimated 188 days of delivery. The maximum number of trucks would be 940. The product coke would be loaded into the empty trucks and delivered to LTV Steel. Therefore, no extra trucks would be utilized for coke delivery.

Approximately 120 lbs/hr of limestone would be circulated in the regeneration reactor. A 3% loss of limestone, which would result from attrition of particles, would result in fresh limestone requirements of 86 lbs/day or 1 ton in 23 days. Over the course of the PDU operation, two truck deliveries of limestone would be required.

Elemental sulfur would be accumulated in a steam lined tank. Once 5,000 lbs are stored, a dealer would pick up the sulfur and delivery it to a refinery in Toledo, OH. It is estimated that 3 truck shipments would be required.

Therefore, the maximum number of trucks entering the site over the 18-month period would be 940 (coal + coke) + 2 (limestone) + 72 (solid waste removal) + 3 (sulfur) = 1017 trucks. The average daily truck traffic over the 18 month period would be 1017/540 = 1.9 or about 2 trucks per day. For the 9-month operational period the average daily truck traffic would be 3.6 trucks or about 4 trucks per day. This volume of traffic is very low when compared to the daily average vehicle traffic for Mahoning Avenue and State Street. In a 1993 Stark County Area Transportation Study, the Ohio Department of Transportation, the City of Canton and the Stark County Engineers, using mechanical and manual counters, determined the average daily traffic volumes for Mahoning Avenue and State Street to be 4,200 and 15,400, respectively. Assuming that truck traffic would be 10% of total traffic, daily truck traffic along Mahoning Avenue and State Street would be 420 and 1,540, respectively. The additional truck traffic for the Calderon Project would thus have a negligible effect on the existing traffic on Mahoning Avenue and State Street.

Accidental Releases

Unique characteristics of the Calderon process that could lead to potential accidental releases are associated with the design of the cokemaking unit. This unit would contain an interior tube into which coal is pushed, indirectly heated, and converted into coke. Gases and volatile organic matter produced from the coal would be contained in this interior tube. Hot combustion gases would be passed through an outer tube to indirectly provide the heat required for coking the coal.

Two potential process malfunctions that could result in accidental releases were considered. The first malfunction considered was development of a blockage or stoppage of flow in the interior tube containing the coal, coke, and coal products. The second malfunction considered was development of a leak or opening between the interior tube containing the coal, coke, and coal products, and the outer tube containing hot combustion gases.

Flow stoppage in the coking tube would result in a process control action to rapidly reduce the temperature in the reactor. The heating gases would be turned off, and as the coking tube cooled, the production rate of gases and volatile organic matter generated from the coal would decrease. The capacity of the sorbent bed used to process the coal gases would be sufficient to handle at least 5 times the coal gases that would be generated during the cooldown period. Thus, sulfur-containing gases and volatile matter generated under this malfunction scenario would be controlled and contained.

The Calderon process employs a low-pressure cokemaking operation. Any malfunction that results in leakage through the interior tube would be automatically or manually controlled by balancing the pressure between the combustion gases and the coal gases, in order to prevent their migration (co-mingling). The potential for this type of malfunction would also be minimized through construction of the interior tube with a nitride-bonded silicon carbide, which is capable of maintaining its integrity at temperatures well above the maximum temperature of the flue gas in the outer tube. Furthermore, the abrasion resistant properties of this construction material are similar to those of grinding wheels, which would be adequate for protection from excessive wear associated with coal processing. Thus the potential for releases resulting from this type of accident would be minimal.

The potential impact from failure of a storage vessel containing hazardous materials was also considered. The largest storage vessel that would be used in the proposed project would have a 55-gallon capacity. Two such vessels, one containing a sodium hydroxide solution and the other containing a sodium sulfite solution, would be used. Both of these vessels would be stored on site with proper secondary containment to ensure that no material is released if their total volume should accidently discharge. These two materials are also compatible liquids, so that their accidental contact with one another would not result in any adverse condition.

Soil and Groundwater

The geology of the project site can be characterized as being composed of a substrata glacial till and a layer of sand, with some topsoil. The site is located within an area where Mississippian and Pennsylvania sandstones produce 10 to 25 gallons per minute of groundwater. The bedrock is covered with up to 40 feet of unconsolidated deposits and the water supply could support farm or domestic use.[3] While there are no water wells in the immediate area, measurements taken from five EPA monitoring wells on the north edge of the Calderon property determined that groundwater is present at a depth of 23 feet below the surface.

The Calderon property lies within the Bogart-Chili-Jimtown soil association, which is characterized by gently sloping to sloping, well-drained to somewhat poorly drained soils, having gravelly subsoils. The general project area is classified as "made land" due to past industrialization. About 1.3 percent of Mahoning County is made land, having been filled with various materials, including mixed or unmixed brick, masonry material, cinders, and other industrial refuse.[4]

As noted above, prior to the construction of the Calderon PDU, the EPA positioned five monitoring wells on the north edge of the Calderon property (as well as additional wells on adjacent properties) to determine if the groundwater had been contaminated as a result of the disposal activities of the previous owner, a steel foundry. Measurements are taken periodically; however, to date, no groundwater contamination has been reported. The only possible source of contamination under the proposed action would be any runoff (containing particulate matter) from the exposed coal and coke storage pile entering the storm sewer. As a result, the coal and coke would be stored north of the PDU tower on level or slightly declined terrain so as to eliminate any point source discharges to the storm sewer. As an extra precaution, a low earthen barrier would be constructed to further ensure water runoff containment.

Solid Waste

Solid wastes would be generated during both the construction and operation phases of the proposed project.

During operations, approximately 312 cubic yards (8,424 cubic ft) of municipal solid waste, consisting of paper, plastic, etc., would be generated. After separation of recyclable materials, the waste would be transported by a

commercial waste hauler from the project site to the American Landfill, State Route 43, Waynesburg, Ohio, which is a permitted landfill for disposal of these solid wastes.

For other solid waste materials generated during construction and operation of the process development unit, each discrete material would be sampled and analyzed using methods established by the U. S. Environmental Protection Agency. The waste materials would be characterized as hazardous or non-hazardous, and this information would be used to develop waste profile reports on the materials to establish proper disposal methods.

Construction-Related Wastes

Construction-related wastes would result from two activities: (1) dismantling or renovation of existing test equipment and facilities and (2) installation of new experimental and operational facilities.

During renovation of Calderon's current facilities to accommodate the cokemaking unit, the following types of activities would be performed:

Removal of coal and char from a reaction tube used during prior operations. These materials would be recycled and blended with the coal planned for use in the cokemaking process.

Removal of hot gas piping

Removal of the existing coal charging tube assembly, which would be maintained at the Calderon site

Replacement of refractory material in the hot gas cleanup vessel, which would require removal of approximately 4,000 pounds (40 cubic feet) of refractory material.

Replacement of electrical, mechanical (e.g., valves), and analytical components (e.g., thermocouples) and hydraulic fluids

During facility renovation, all removed components identified as having potential for presence of hazardous or asbestos-containing materials would be sampled to determine the existence of regulated materials. If regulated asbestos-containing materials are found, regulatory authority and personnel notifications would be provided, and monitoring, protective work practices, and appropriate disposal procedures would be identified prior to further material handling and processing. If renovation wastes contaminated with other hazardous materials are identified, they would be separated and transported for disposal using disposal facilities licensed for processing the waste materials.

New facilities required to test the cokemaking process would be installed within the Calderon property, which is zoned for industrial use and was the site of a former steel foundry. The facilities required for the proposed project would be constructed in previously disturbed areas of the property, and minimal excavation would be required.

The 52 ft length of Calderon's existing structural steel tower, which is 25 ft in width, would be extended by 80 ft to support the new coking reactor and associated coke discharge chute. Two 8 ft by 8 ft by 10 ft deep footers resulting in the removal of 1,280 cubic ft of soil would be required to provide foundation support for the extension. The removed soil would be applied to the disturbed surface area at the test site and graded to maintain surface contours.

An existing 52 ft long single story maintenance building, which is 24 ft wide, would be extended by 30 ft to provide laboratory facilities for coke testing. Eight small footers requiring minimal soil removal would be needed for construction of the building extension. Removed soil would be applied to the disturbed ground surface at the test site.

Operational- and Post-Operational-Related Wastes

During tests of the cokemaking process, solid product streams of coke and sulfur would be generated. Over the life of this project, a maximum of 13,248 tons of coke, 552 tons of coke breeze (smaller-size coke particles), and 57.6 tons of sulfur would be produced.

Product coke and coke breeze would be characterized at the Calderon site, and coke meeting desired product specifications would be transported to a steel company for quality testing. Coke products that are determined to be outside the specifications for use in steel-making operations would be sold as fuel to a coke reclaimer.

Product sulfur would be commercially marketed to a sulfur reclaim facility. If characterization tests on the product sulfur indicate that it is not acceptable for commercial markets, the sulfur would be transported to a commercial cokemaking facility and blended with feed coal.

During process operations, fine-size lime particles from the recirculating sorbent stream would be collected in a filter bag. This material would be recycled by blending with the coal feed to the cokemaking operation.

Upon completion of all tests, spent sorbent would be removed from the hot gas cleanup vessel. This material would be characterized to determine its hazard characteristics and would undergo disposal as a solid waste consistent would be constructed to further ensure water runoff containment.

Hazardous Materials

Management of hazardous or potentially hazardous materials would be required during both the construction and operation stages of the proposed project. Plans for hazardous material management would be documented in a hazardous substance usage and disposition plan, which would be used to identify and quantify all hazardous substances associated with the project and procedures for their handling, characterization, and disposition.

Construction-Related Hazardous Materials

Hydraulic fluids in existing equipment would be replaced. Fluids and oils suspected of containing polychlorinated biphenyls would be sampled and analyzed prior to making decisions regarding their disposal. Materials determined to contain polychlorinated biphenyls would be segregated for disposal in accordance with accepted practices and requirements for their disposal.

The existing tower structure would be repainted using non-lead-based paint. The existing paint on the structure is not lead-based, and thus surface preparation for painting would not result in generation of lead-based particles or wastes.

Operational- and Post-Operational-Related Hazardous Materials

During operational and post-operational activities, all process products would be planned for commercial marketing or process recycle. Materials that would not be commercially marketed or recycled to the cokemaking process would be sampled, analyzed, and characterized. Materials determined to be hazardous or to have hazardous characteristics would be segregated, assigned waste profile reports, and undergo disposal in accordance with requirements specific to the waste characteristics.

Two materials with hazardous characteristics, sodium sulfite and sodium hydroxide, would be purchased and used for boiler water conditioning during process operations. These materials are routinely used in industry for this purpose. Material Safety Data Sheets would be obtained for these materials, and both reporting and communication of their presence and use would be provided to employees, the Ohio Emergency Response Commission, and local emergency response organizations.

Threatened and Endangered Species

DOE has coordinated with the Reynoldsburg Office of the U.S. Fish and Wildlife Service to ensure compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act. This project would not impound, divert, deepen, control or otherwise modify any stream or other body of water. There would be no negative impacts to fish, plant, or wildlife species as a result of this project.

Historical/Cultural Resources

Consultation with the State of Ohio's Office of Historic Preservation under the National Historic Preservation Act has concluded that there would be no effect on cultural resources or historic properties listed in or eligible for listing in the National Register of Historic Places, based on the recent date of construction (1988) for the existing Calderon facilities. In addition, there is little likelihood that any undisturbed archaeological remains are present at the existing facilities. The project would not impact Native American tribal or other religious practices or sites.

Floodplains

No flood hazard studies are available for the Alliance, Ohio, area. However, the project site is sufficiently elevated and far enough distanced from the nearest body of water that the site should not be affected by reasonable flood hazards such as the 100-year flood.

Wetlands

In view of the previous land use, it is anticipated that the proposed project would not impact any federally regulated wetlands or other waters of the United States. However, if any of the area subject to impact is identified as meeting the definition of a wetland in terms of the presence of hydrophytic vegetation, wetland hydrology and hydric soils (Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, January 1987), the wetlands would be identified to determine the applicability of any Section 404 Permit or other authorization, if required.

Pollution Prevention

Pollution prevention and waste minimization focus on reducing or eliminating the amount or toxicity of pollutants generated by industrial processes. While pollution prevention is based on controlling pollutants at their source, waste minimization also controls pollutants by process changes, feed material substitution, reuse, and recycling.

The objective of the Calderon process is to produce coke that meets all specifications currently required for its use in steelmaking plants. The operational plans for the proposed process development unit would maximize achievement of that objective by minimizing the amount of time needed for start-up and shut-down of operations and by halting operations immediately upon identification that off-specification products are being generated. Operations would not be resumed until a remedy for the production problem is identified.

Except for coal feeding and product recovery, the Calderon cokemaking process would be designed and constructed as an entirely closed processing operation, with no open transfer points, to achieve emission source reduction. This cokemaking concept would eliminate emissions from the coal charging, coke pushing, and coke quenching associated with cokemaking technology.

The design of the proposed facility, which would consist of one cokemaking tube, would represent the smallest possible operating size commensurate with development of commercially useful data. Facility operations would be conducted to maximize the recycle or marketing of products. Market opportunities for process products have been identified.

Materials volatized and gases produced during the cokemaking tests (e.g., coal tars, benzene, toluene, ammonia, etc.) would be cracked in the process, and the resultant raw gas would be reacted with calcined limestone to produce a clean gas stream containing hydrogen, carbon monoxide, and methane. This design concept for the cokemaking process would eliminate the need for either a wastewater treatment facility or a byproduct chemical recovery operation. The spent limestone sorbent would be regenerated to produce a marketable sulfur product and sorbent for recycle.

Water Resources

The project would consume an estimated 4,491,750 gallons of water from the City of Alliance's Municipal Water Department. The majority of the water would be utilized to produce steam and fuel gas through the steam and carbon

reactions at various stages of the process.

The amount of wastewater produced during this project is estimated to be 198,750 gallons (or 750 gallons/day) which would be discharged into the municipal sewer system. This wastewater would be generated from on-site toilets, lavatories and from water blown-down from a 700 lb/hr boiler. The proposer would undertake a voluntary water sampling and testing program of the discharged water.

The closest body of water is the Mahoning River which is located approximately 1.25 miles from the PDU.

Because there is no surface water in the near proximity of the site and the minimal amount of wastewater to be generated, impacts to water resource would be negligible.

Energy and Material Resources

The proposed test program would require 52 million cubic feet of natural gas, 2615 MWh of electricity, 18,400 tons of coal, and 37 tons of limestone. Adequate supplies of these materials are available for the proposed project and to the proposed site. No adverse effects would be expected to result from the proposed project's use of these resources.

Health and Safety

Potential health and safety impacts to on-site workers and the surrounding community resulting from construction and operation of the PDU would be minimized through use of standard industrial practices. Prior to construction, process hazard review would be performed to identify potential hazards, and to incorporate safety engineering design features into the system. In addition, for both construction and operation activities, safety programs would be written and implemented to reduce the risk of accidents. Written hazard communication programs would be established to inform workers of potentially hazardous chemicals. On-going training of personnel would further reduce the risk of accidents and exposure to hazardous substances. Federal regulations would serve as the foundation for the site's health and safety practices.

Environmental Justice and Socioeconomics

Environmental Justice, as described in Executive Order No. 12898, means the fair treatment and meaningful involvement of all people, regardless of race, ethnicity, culture, income or education level with respect to the development, implementation and enforcement of environmental laws, regulations and policies. In order to make all pertinent information about the project available to the public and to assess any environmental justice concerns, the DOE has conducted internal scoping, met with the City of Alliance Director of Planning and Development, provided notice in a local newspaper, and conducted an open house at the Calderon facility.

From information obtained from a 1990 Census, it was determined that the City of Alliance has a population of 23,367. The work force in the area is predominantly blue collar; 50% comes from the steel industry and the remainder of the work force is from a variety of diversified companies. Unemployment is at approximately 8%; however, a positive impact of the project would be a temporary employment increase for skilled construction workers and operations and maintenance personnel (approximately 20 people).

In addition, discussions with Environmental Justice personnel in EPA's Region V confirm that no Environmental Justice cases or investigations are active in the Alliance, Ohio area. Furthermore, no reports of Environmental Justice concerns in Alliance have been filed with EPA. The proposed action would take place in an area currently zoned for industrial activity. No disproportionately high or adverse impact on minority or low-income communities is expected to result from this proposed project.

Long-Term and Cumulative Impacts

The proposed Department of Energy action would result in testing of the Calderon Cokemaking system for a period of

9 months, after which the experimental facilities would be shut down and purged of feed materials and products. No longer term or subsequent cokemaking operations are planned after completion of the 9-month test program. In addition, no other actions are proposed to be performed at the Calderon site, and there are no other large-scale projects proposed that, in conjunction with the Calderon Cokemaking Project, would create adverse cumulative impacts.

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5.0 REFERENCES

1. Statement of Work, "Calderon Cokemaking Process/Demonstration Project," Cooperative Agreement No. DE-AC22-95FC92638, May 25, 1995.

2. Environmental Volume, Calderon Energy Company, April 10, 1995.

3. Soil Survey of Mahoning County, Ohio, U.S. Department of Natural Resources, Division of Lands and Soil, and Ohio Agriculture Research and Development Center, October 1971.

4. Crowell, Katie Shafer, Ground-Water Resources of Mahoning County, Ohio Department of Natural Resources, Division of Water, 1979.

6.0 APPENDICES

Appendix A - Letter from the U.S. Fish and Wildlife Service

Appendix B - Letter from the State Historic Preservation Office

Appendix C - Summary of Assumptions and Calculations Used for Air Emission Estimates