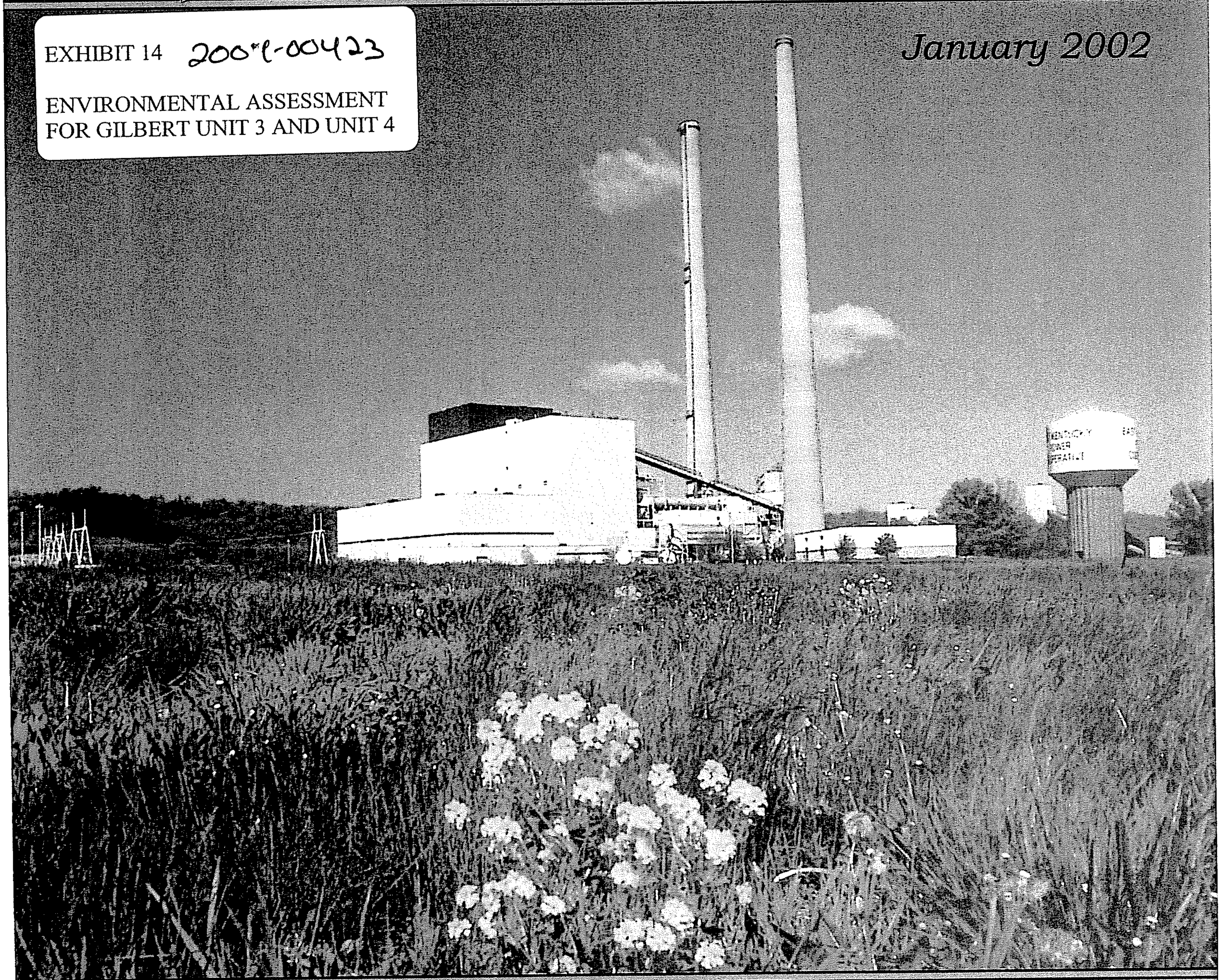
Environmental Assessment for Gilbert Unit 3 and Unit 4 East Kentucky Power Cooperative Spurlock Station Maysville, Kentucky

January 2002



Submitted to:
East Kentucky Power Cooperative
4775 Lexington Road
Winchester, KY 40392

Submitted by:
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FINDING OF NO SIGNIFICANT IMPACT

Two, 268 Megawatt Coal Fired Generating Units
(Gilbert Units 3 and 4)

RURAL UTILITIES SERVICE

related to possible financing to:

East Kentucky Power Cooperative
Kentucky 59

Prepared by:

Engineering and Environmental Staff
Rural Utilities Service

February 2002

The Rural Utilities Service (RUS) may provide financing assistance to East Kentucky Power Cooperative to finance the construction of two, 268-megawatt coal-fired electric generating units.

East Kentucky Power Cooperative proposes to construct two, 268-megawatt coal fired electric generation units at its Spurlock Station in Maysville, Kentucky. Maysville is located in Mason County along the Ohio River. The two new generation units are to be named Gilbert Units 3 and 4. The units would consist of two circulating fluidized bed boilers, two turbine-generators, two baghouses, two sulfur dioxide removal systems, two selective non-catalytic reduction units, and two 720-foot stacks. The project would also include a double-circuit 345-kilovolt transmission line form the Spurlock Station to an existing 345-kV transmission line in Brown County, Ohio. The length of the transmission line would be approximately 3.5 miles and would parallel an existing 138 kV transmission line that crosses the Ohio River. Further details of the project are provided in the environmental assessment.

Alternatives considered by RUS and East Kentucky Power Cooperative include: (a) no action, (b) purchased power, (c) combustion turbine generation, (d) combined cycle generation, (e) run-of-the river hydro, and (f) various site locations.

East Kentucky Power Cooperative submitted an environmental report to RUS which addresses the potential environmental impacts of the project. RUS conducted an independent evaluation of the environmental report and concurs with its scope and content. In accordance with RUS' Environmental Policies and Procedures at 7 CFR § 1794.41, RUS has accepted East Kentucky Power Cooperative's environmental report as its environmental assessment of the proposed project.

The availability of the environmental assessment for public review was announced via an advertisement and a legal notice in *The Morehead News* and *The Winchester Sun* on January 8, 2002, *The Menifee County News, Grayson Journal, and The Ledger Independent* on January 9, 2002, and *The News Democrat,* and *The Ripley*

Bee on January 10, 2002. A 30-day comment period was announced. The environmental assessment was available for public review at the headquarters of RUS in Washington, DC, the headquarters of East Kentucky Power Cooperative in Winchester, Kentucky, the Clark County Public Library in Winchester, Kentucky, the Mason County Public Library in Maysville, Kentucky, the Rowan County Public Library in Morehead, Kentucky, and the Brown County Public Library in Georgetown, Ohio. No comments were received by RUS on the assessment.

Based on its environmental assessment, RUS has concluded that the project would have no significant impact to the air quality, ground or surface water, the 100-year floodplain, prime farmland, transportation, or ambient noise levels. The project will have no effect to wetlands. The construction of the two units and associated facilities at the Spurlock Station will not have an effect on resources listed or eligible for listing on the National Register of Historic Places. Once the centerline of the transmission line has been determined, an assessment will be conducted to determine if the proposed transmission line could have an effect of resources eligible for listing on the National Register of Historic Places. If eligible resources are identified that could be adversely affected by the transmission line, the resources will either be avoided or mitigative measures will be taken to ameliorate adverse impacts thereto. RUS will fulfill its compliance obligations pursuant to Section 106 of the National Historic Preservation Act prior to East Kentucky Power Cooperative initiating construction of the transmission line. RUS has also concluded that the proposed project is not likely to affect Federally listed threatened and endangered species or designated critical habitat thereof. The project would not disproportionately affect minority and low-income populations.

No other potential significant impacts resulting from the project have been identified. Therefore, RUS has determined that this finding of no significant impact fulfills its obligations under the National Environmental Policy Act, as amended (42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality Regulations (40 CFR §§

1500-1508), and RUS' Environmental Policies and Procedures (7 CFR Part 1794) for its action related to the project.

RUS is satisfied that the environmental impacts of the proposed project have been adequately addressed and, therefore, finds no reason why a request from East Kentucky Power Cooperative for RUS assistance to finance the cost of the project should not be considered.

Since RUS' Federal action would not result in significant impacts to the quality of the human environment, it will not prepare an environmental impact statement for its action related to the project.

Dated: MAR 4 2002

Blaine D. Stockton

Assistant Administrator, Electric

Rural Utilities Service

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LIST OF ACRONYMS

ACSR	Aluminum Core Steel Reinforced
BACT	Best Available Control Technology
CFB	circulating fluidized bed
CO	carbon monoxide
CO_2	carbon dioxide
dB	decibel
dBA	A-weighted decibels
EKPC	East Kentucky Power Cooperative
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
lpm	liters per minute
HAP	Hazardous Air Pollutant
ISCST3	Industrial Source Complex Short Term air quality dispersion model
KAR	Kentucky Administration Regulation
KPDES	Kentucky Pollutant Discharge Elimination System
KV	kilovolt
KW	kilowatt
MCM	1000 cubic millimeters
MGD	million gallons per day
MLD	million liters per day
msl	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPP	National Environmental Policy Act
NO_x	nitorgen oxides
PM_{10}	particulate matter
PSD	Prevention of Significant Deterioration
Psig	per square inch gauge
SO_2	sulfur dioxide

1.0 INTRODUCTION

1.1 BACKGROUND/OVERVIEW

The Rural Utilities Service is a Federal Government Agency within the U.S. Department of Agriculture. Its purpose is to provide financing assistance in the form of direct loans, loan guarantees, and grants to rural cooperatives and municipalities to construct, upgrade, and expand, rural electrical, telecommunication, water, and wastewater infrastructure. Financing assistance to these cooperatives and municipalities is subject to review pursuant to Rural Utilities Service Environmental Policies and Procedures, 7 Code of Federal Regulations 1794. These policies and procedures have been established to comply with the *National Environmental Policy Act* (NEPA) of 1969 as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations Parts 1500-1508.

East Kentucky Power Cooperative (EKPC) is a wholesale power supplier for 17 rural electric cooperatives in Kentucky. Its board of directors is made up of one director and one alternate director from each of the 17 member cooperatives. It provides wholesale power to its members through approximately 2,600 miles (4,184 kilometers) of transmission lines and approximately 270 electric substations. EKPC has a net electric generating capacity of over 1,800 megawatts (MW) from its four generation stations (Dale Station, 198 MW; Cooper Station, 341 MW; Spurlock Station, 850 MW; and Smith Station, 440 MW). All of its generation stations are coal-fired except for the Smith Station that is gas-fired with fuel oil backup. EKPC also has access to 170 MW of hydro-electric generation from the Southeastern Power Administration.

EKPC has submitted an application to RUS for a loan guarantee to add one nominal 268 MW coal-fired electric generation unit at its Spurlock Station located adjacent to the Ohio River near Maysville, in Mason County, Kentucky (see Figure 1.1–1). This environmental assessment will cover an additional nominal 268-MW unit that EKPC may request Rural Utilities Service financing for in the future. The units would consist of two circulating fluidized bed (CFB) boilers, two turbine-generators, two baghouses, two sulfur dioxide removal systems, two selective non-catalytic reduction units, and two 720-foot (219-meter) stacks. EKPC also proposes to construct a double-circuit 345-kilovolt (kV) transmission line from the Spurlock Station that would cross the Ohio River adjacent to Spurlock Station and inter-tie to an existing 345-kV transmission line in Brown County, Ohio. The length of the line would be approximately 3.5 miles (5.6 kilometers) with a 150-foot (46-meter) wide right-of-way. This transmission line would parallel, on either its west or east side, the existing Kentucky Utilities 138-kv Transmission Line that crosses the Ohio River from Mason County, Kentucky to Brown County, Ohio.

1.2 DESCRIPTION OF EXISTING FACILITY

The Spurlock Station consists of two coal-fired generation units that currently produce up to 850 MW of power. Units 1 and 2 were completed in 1977 and 1981, respectively. The entire property is approximately 2,500 acres (1,011 hectares), including an onsite state-permitted special waste landfill that is approximately 190 acres (77 hectares) (see Figure 1.2–1). Fly ash generated by the combustion of coal is disposed of at the special waste landfill. Coal is transported to the site via barge and railroad.

FIGURE 1.1–1.—Location of Project Area.

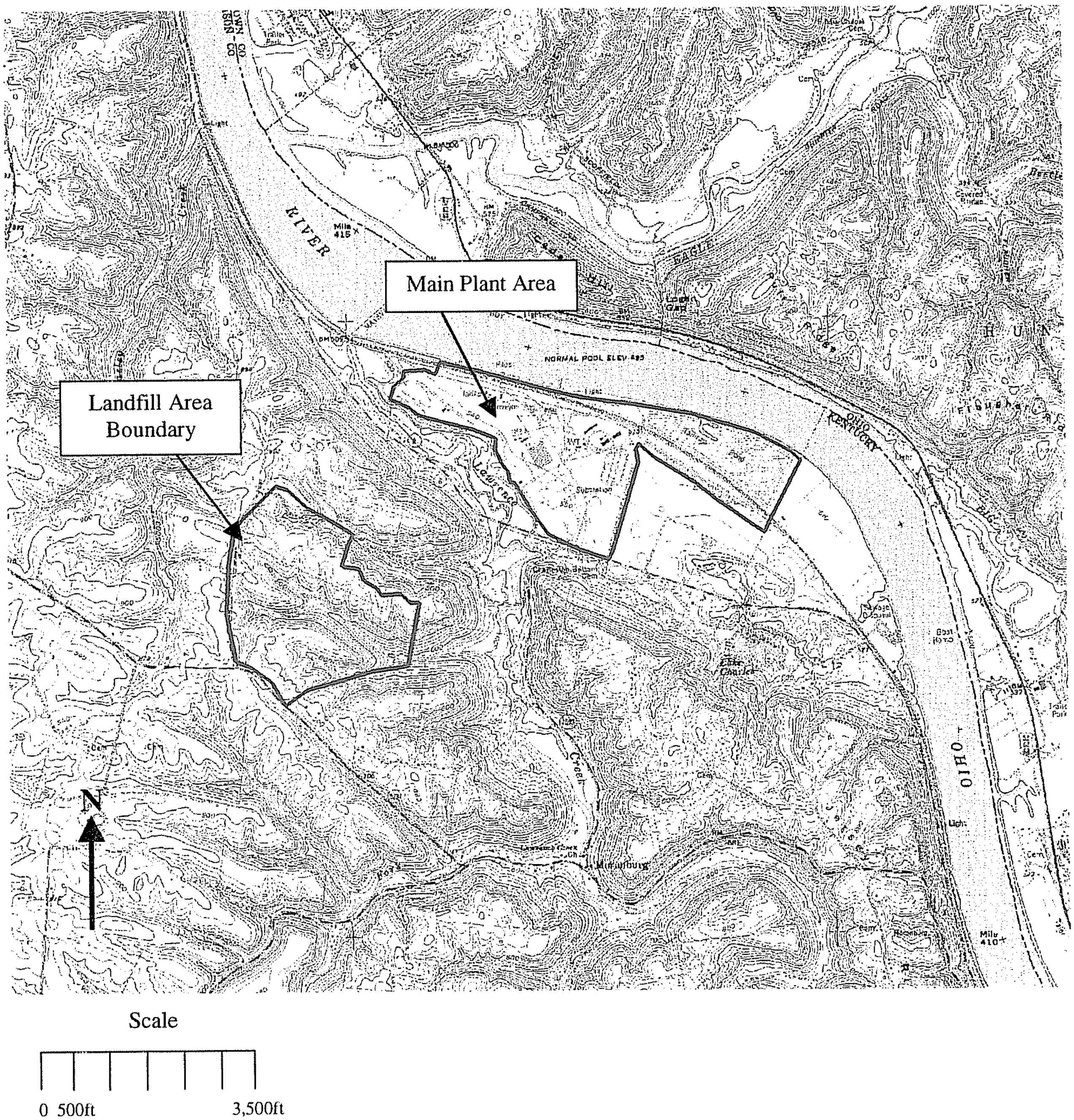


FIGURE 1.2–1.—Spurlock Station Site Layout.

The major features at Spurlock Station is the building housing Units 1 and 2, two 805-foot (245-meter) tall stacks and cooling towers for each unit, coal storage piles (two piles, each containing approximately 200,000 tons [181,436 metric tons] of coal), coal rail and barge unloading and conveyor system, a 50-acre (20-hectare) pond where the bottom ash is disposed of, and two 350,000-gallon (1,324,890-liters) above-ground storage tanks that contain No. 2 fuel oil used for boiler startup. Figure 1.2–2 shows the layout of the main plant area at Spurlock Station and photos of the site are provided in Appendix A.

A more detailed description of the facilities at Spurlock Station is presented in Section 3.10, Infrastructure.

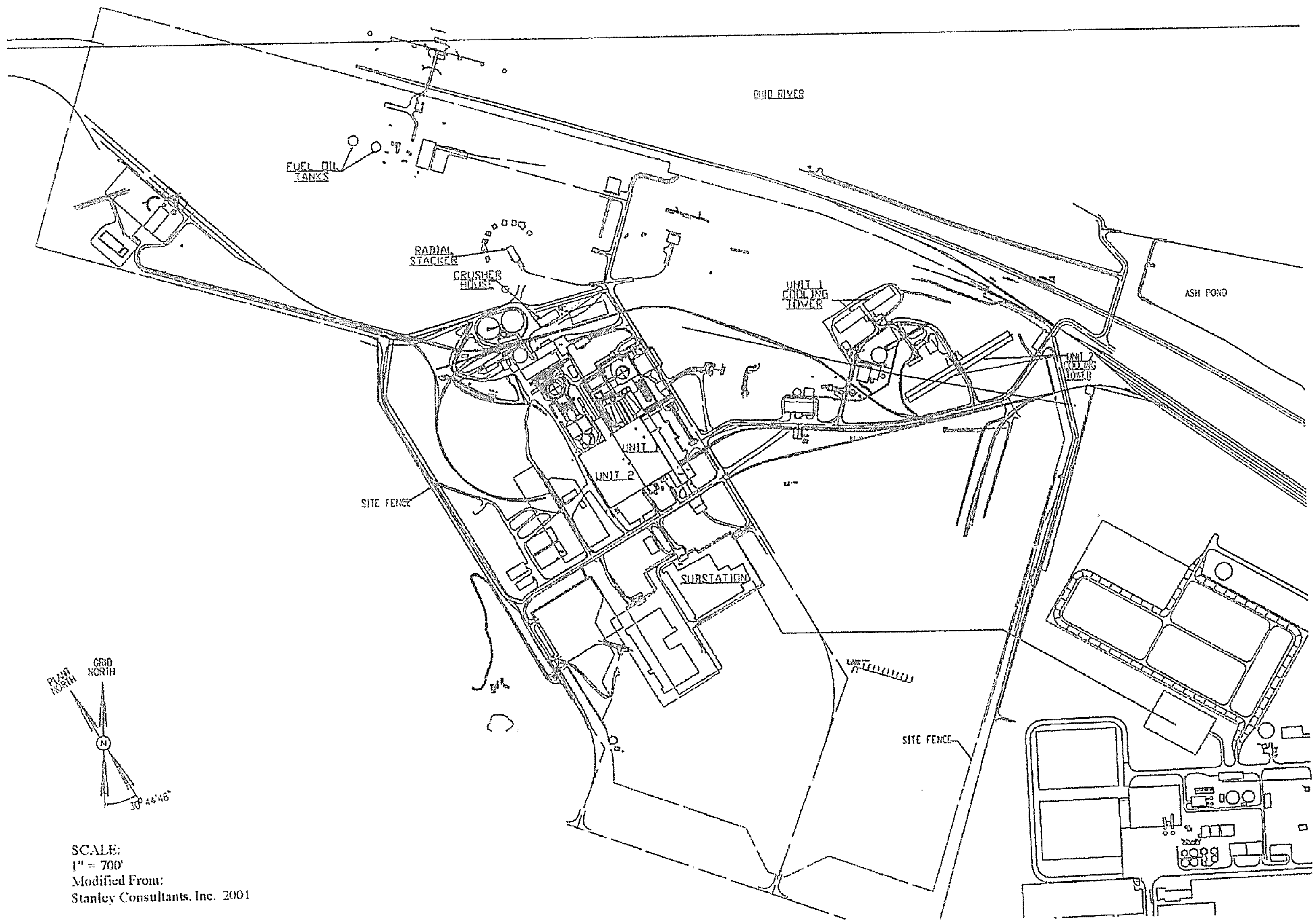


FIGURE 1.2–2.—Main Plant Site Layout.

1.3 PURPOSE AND NEED

Need for Project

The primary need for this project concerns projected shortages of electricity in the project region and the resulting potential impacts to the electrical system reliability. The project area is located within the region covered by the East Central Area Reliability Council. This area includes Kentucky, Ohio, Indiana, Michigan, West Virginia, and parts of Pennsylvania, Maryland, and Virginia. The East Central Area Reliability Council is one of the ten Regional Reliability Councils of the North American Electric Reliability Council.

East Central Area Reliability Council was established in 1967 to augment the reliability of its members' electricity supply systems through coordination of the planning and operation of the members' generation and transmission facilities. East Central Area Reliability Council's membership includes 29 major electricity suppliers located in 9 east-central states serving more than 36 million people.

The East Central Area Reliability Council's Coordination Agreement projections indicate that current capacity plans in the region will not keep up with load growth, therefore, lower reliability in the electric system can be expected in the region. This fact will also support higher prices in the region, given that there is limited supply available to serve the load. East Central Area Reliability Council reports that reserves are at an all time low and units will have to operate more reliably than ever to maintain an acceptable reliability level.

Other factors cited by East Central Area Reliability Council as contributing to lack of confidence in the reliability of the system include aging generating units, increased risk of decreasing availability, reduced maintenance program funding, maintenance scheduling problems, and nitrogen oxide (NO_X) retrofit outages.

EKPC continually evaluates power supply alternatives based on the most recent Power Requirements Study and current cost and financial data. Alternatives for supplying future resource needs are evaluated on a present worth of revenue requirements basis, as well as a cash flow basis. Various alternatives such as self-build options, capacity purchases, and unit participation proposals are evaluated at least once a year and recently have been evaluated on an ongoing basis.

Based on the 2000 Load Forecast, EKPC will require an additional 400 to 500 MW of capacity by the summer of 2006, or within the next 5 years. With the anticipated loss of 150 MW of low cost contract power in that time period, and EKPC's native load growth projections, at least 50 percent of this capacity will need to be provided by a low cost energy resource or a baseload facility.

Purpose of Project

Based on the needs described above, the purposes of EKPC's project include:

- Providing reliable and reasonably priced wholesale power to its 17 system members
- Contributing to the reliability of the regional electrical system
- Limiting air emissions by utilizing CFB technology
- Providing an option to use alternative fuels at Spurlock Station
- Minimizing environmental impacts by using existing infrastructure and brownfield lands at Spurlock Station
- Minimizing impacts of the proposed 345-kV transmission line by running it parallel to an existing transmission line that crosses the Ohio River from Kentucky to Ohio near Spurlock Station

1.4 PURPOSE OF THIS ENVIRONMENTAL ASSESSMENT

The purpose of this environmental assessment is to provide the public with a clear description of the additional electric generation units and associated 345-kV transmission line that are proposed for construction at Spurlock Station and nearby areas, and to assess the related potential environmental impacts. This environmental assessment will be available for public review for 30 days. Rural Utilities Service will take into consideration comments received during the comment period and will factor these comments into its assessment of the environmental impacts associated with the project prior to making its decision related to EKPC request for financing assistance.

2.0 PROPOSED ACTION AND NO ACTION ALTERNATIVE

The Proposed Action considered in this environmental assessment is the construction and operation of the facilities described below.

2.1 PROPOSED FACILITIES

For this project, EKPC proposes to construct and operate the following facilities, described in detail in the following subsections: two electric power generation facilities at their existing Spurlock Station generation facility located near Maysville, Kentucky; and a 345-kV transmission line connecting the new units to the existing Stuart-Zimmer 345-kV line in Brown County, Ohio. Figure 2.1–1 shows the locations of the proposed facilities at Spurlock Station and Figure 2.1–2 shows the location of the proposed transmission line.

Generating Units and Supporting Facilities

The proposed additions to Spurlock Station's generating capacity are two nominal 268 MW coal-powered generator units located adjacent to Unit 2. The units would consist of two CFB boilers, two turbine-generators, two baghouses, two sulfur dioxide removal systems, two selective non-catalytic reduction units, two 720-foot (219-meter) stacks, and associated balance of plant equipment. The balance of plant equipment includes the turbine-generator power cycle equipment. A distributed control system is provided for responsive load changes, reliable operation, and improved thermal performance.

The power generating facility consists of two boilers and two turbines.

Boiler Unit

- Each boiler is a CFB type, designed to deliver 1,922,000 pounds per hour of steam at 2,535 pounds per square inch gauge (psig) and 1,005°F (544°C). The minimum steam flow rate for each boiler is 35 percent of the boiler maximum continuous rating without auxiliary fuel support.

- The boiler and auxiliaries are designed for operation when burning a wide range of specified fuel. Currently, EKPC envisions that coal will be the primary fuel. However, the CFB technology allows for alternative fuels including shredded automobile tires and biomass.

- No. 2 Fuel Oil is used for boiler startup.

Turbine/Generator Unit

- Steam from each boiler is fed to a single-reheat condensing turbine-generator. The turbine is designed for a net output of 310 MW, based on throttle steam conditions of 2,415 psig and 1,000°F (542°C) and condenser exhaust pressure of 2.5 inches of mercury operating at the average annual wet bulb temperature. The continuous turbine-generator unit output is approximately 298 MW gross based on the design fuel.

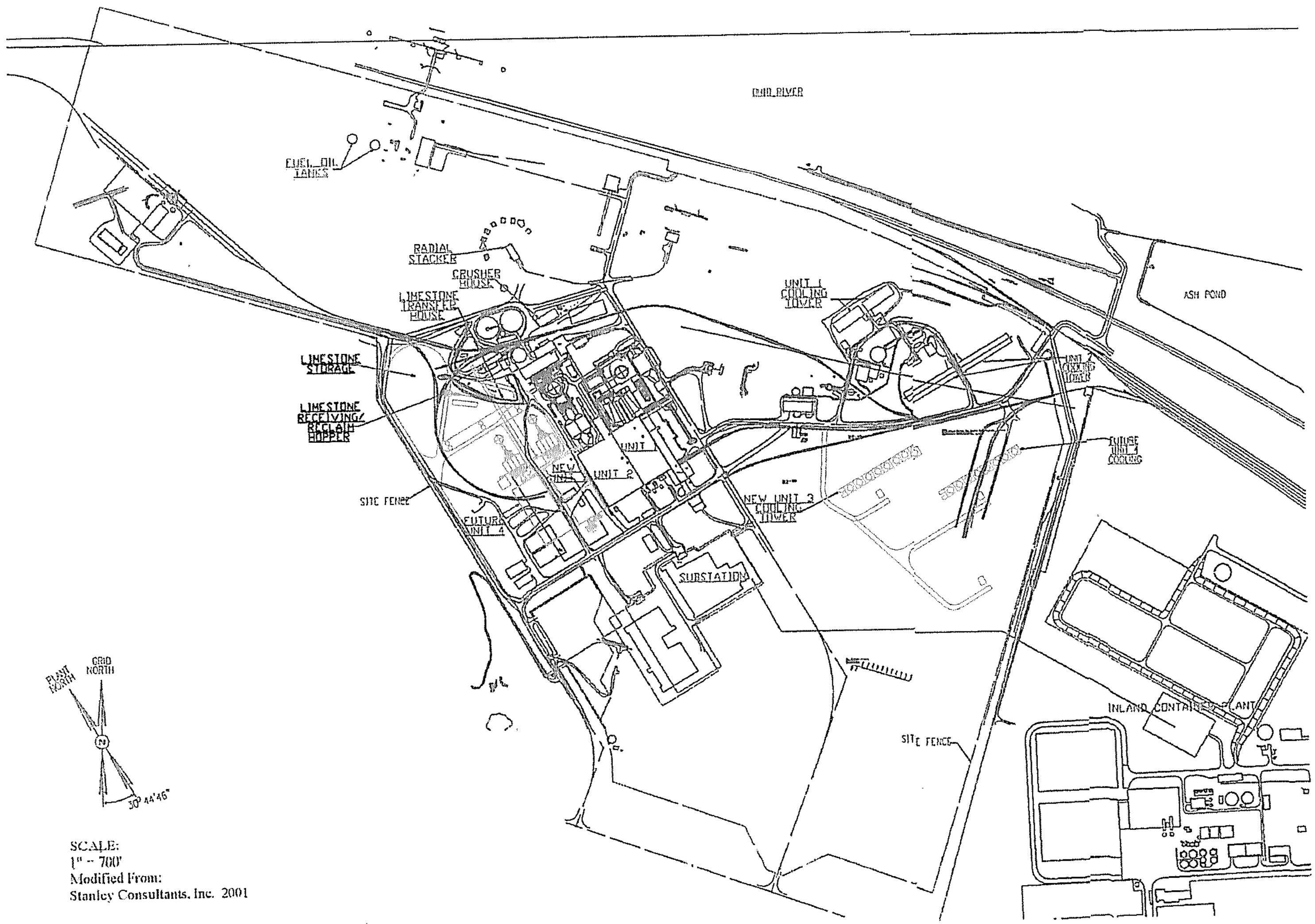


FIGURE 2.1-1.—Location of Proposed Facilities at the Spurlock Station.

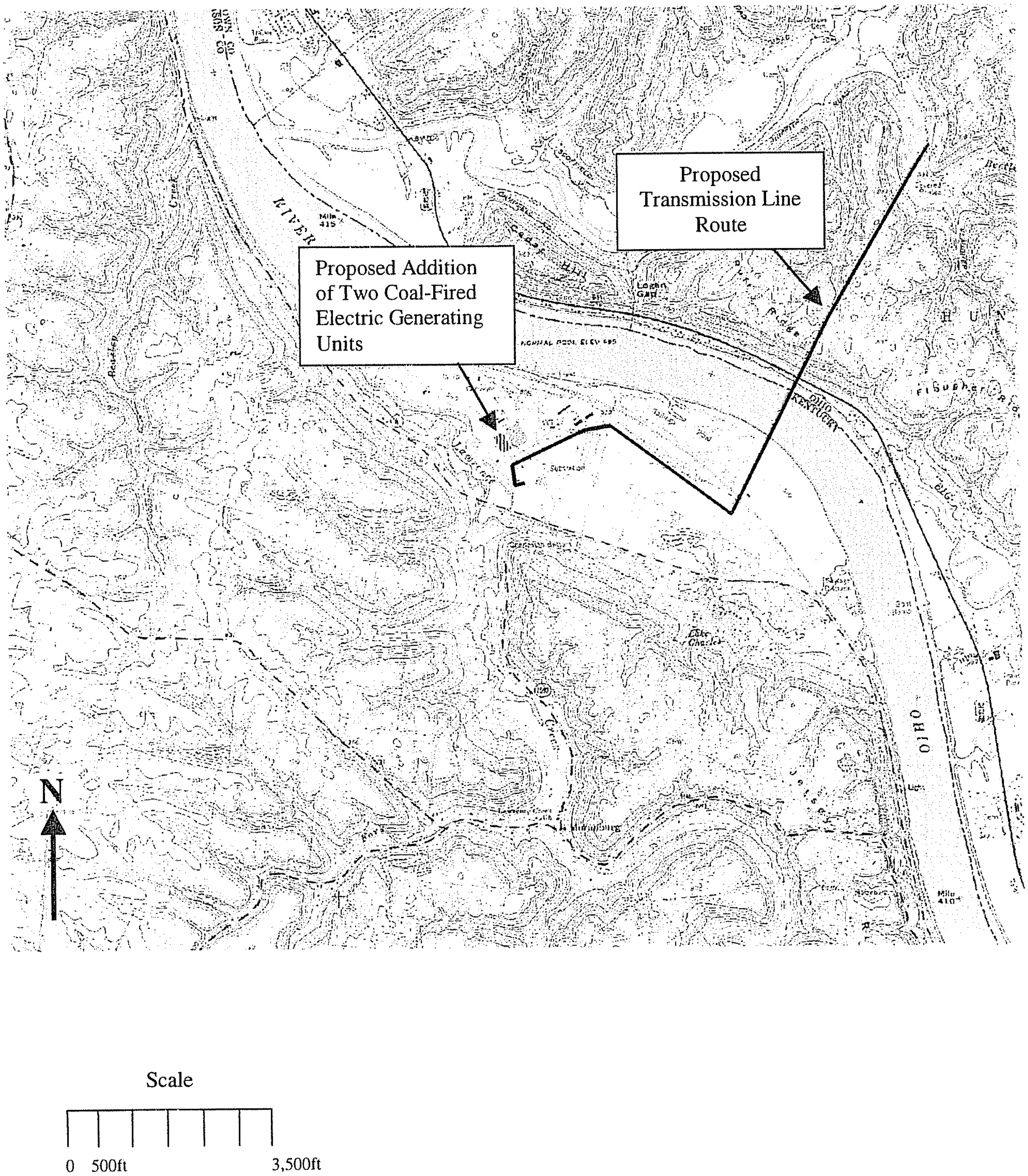


FIGURE 2.1–2.—Location of Proposed Transmission Line.

Facility Design

Each unit, composed of boiler and turbine, is designed to provide 268 MW (net capacity) under the design conditions. The facility is designed to be capable of operating with a high equivalent availability factor and operated for a minimum of 30 years with downtime for periodic inspections and maintenance. Facility electrical output and power factor may vary hourly in response to system loading demands. The facility's electrical output is controlled from 35 percent to 100 percent of net electrical unit capacity. The facility is designed, procured, constructed, checked out, commissioned, and tested in accordance with practices typically applied in other similar electric utility production facilities. Units 3 and 4 together are designed to provide up to 550 MW net electrical output to the local power grid at 0.85 power factor as measured at the high side of the main step up transformer. Units 3 and 4 will be known as Gilbert Unit 3, in honor of the former long-term EKPC Chairman E.A. Gilbert, and Unit 4.

Other Details

The footprint of the two units as designed is approximately 90,000 square feet (8,361 square meters). All facilities will be constructed in the immediate area of the existing plant on land that has been disturbed by activities at the plant. The Spurlock Station has unrestricted access for delivery of large and/or heavy equipment by road, railroad, or barge. The site has adequate soil conditions for equipment and building foundations, available fuel supply, water supply, sewage, and waste treatment, transmission lines, and substation.

As currently planned, the construction of each unit should take 29 months to complete. Construction of Unit 4 should begin approximately 1 year after beginning Gilbert Unit 3. Once construction is complete, a testing phase lasting 3 months will be conducted for each unit.

For Gilbert Unit 3, existing infrastructure will be utilized to the maximum extent possible. The plant will simply increase throughput using the existing infrastructure. The coal unloading and conveying system, water intake structure and piping, and the ash handling system will require only minor modifications. The existing coal storage piles will not be expanded but will be segregated into two piles, one for Units 1 and 2, and one for Units 3 and 4.

For Unit 4, some expansion of the supporting infrastructure will be necessary. An additional coal unloading and conveying system will be required for Unit 4.

Operation and Maintenance

Except for scheduled maintenance operations and equipment breakdowns, Units 3 and 4 would operate 24 hours per day, 365 days per year. The additional units would necessitate the hiring of 25 full-time personnel per unit. Water will be withdrawn from the Ohio River through the existing intake structure (an additional pump would be the only change) and treated at the existing water treatment plant. An additional 5,000 gallons per minute (18,925 liters per minute) clarifier would be installed to provide adequate treatment capacity. Expected water use is 4.32 million gallons per day (MGD) (16,351 cubic meters per day) for each unit at a rate of 3,000 gallons per minute (11,355 liters per minute).

Process wastewater generation is estimated at 1.1 MGD (4,164 cubic meters/day). This waste would be discharged to the Ohio River under Spurlock Station's existing Kentucky Pollutant Discharge Elimination System (KPDES) permit. The existing sanitary wastewater system discharges to the Maysville publicly owned treatment plant, which has capacity for the additional personnel associated with Units 3 and 4.

Maintenance activities for the additional facilities would be similar to those ongoing at Spurlock Station and would be considered routine. Because many of these activities typically generate small quantities of waste products, they are discussed in detail in Section 3.11, Waste Management.

Transmission Line

The project will include the construction of transmission lines radiating out of the facility, along with existing transmission lines, sufficient to carry the electrical output of the facility. The transmission line proposed as part of this project consists of a double-circuit 345-kV line with a conductor size of 2-954 MCM ASCR. Both circuits will be supported by H-frame wood pole and steel lattice transmission line structures. The line will be designed to meet or exceed the requirements of the National Electrical Safety Code. Substation additions are included to connect the proposed transmission line into the current electrical system.

The proposed transmission line will extend an estimated 3.5 miles (5.6 kilometers) from the Spurlock Substation until it meets the existing Kentucky Utilities 138-kV Transmission Line. It will then parallel the 138-kV line on either its west or east side from Mason County, Kentucky, across the Ohio River, and into Brown County, Ohio where it will terminate at the intersection point of the existing Stuart-Zimmer 345-kV Transmission Line. The width of the proposed right-of-way will be 150 feet (46 meters).

2.2 ALTERNATIVES

In this section, the alternatives to supply power that were considered by EKPC and eliminated as feasible sources are described. In considering options for additional power generation facilities, including the location of such facilities, EKPC followed a detailed screening process. This section also provides a brief summary of that process. The full evaluation conducted by EKPC can be found in their *Alternative Evaluation and Site Study for Additional Coal-Fired Baseload Report*, dated August 6, 2001.

In addition, as required by NEPA, the No Action Alternative as it applies to this project is also described.

2.2.1 Alternatives Considered

The primary power generation alternatives considered were combustion turbines for peaking capacity; combined cycle units and pumped storage hydro for intermediate capacity; coal-fired units including an Integrated Gasified Combined Cycle and CFB for baseload capacity; and renewable resources, including hydropower, biomass, geothermal, wind, and solar; fuel cells; cogeneration; and small and independent power producers.

Peaking Capacity

Peaking units generally run on natural gas or fuel oil, as compared to coal or nuclear fuels used in baseload units. Peaking units are used to follow peak loads and can be turned on or off quickly. Combustion turbines are an example of peaking capacity. EKPC currently has a five-unit combustion turbine facility at the Smith Station.

Intermediate Capacity

Intermediate capacity can be used to follow short-term load fluctuations in a more cost effective manner than committing baseload units for needs not met by peaking capacity. Combined cycle and pumped storage hydro storage are two good examples of intermediate capacity and were initially included as potential alternatives in EKPC's screening study.

Combined cycle units are a combination of combustion turbine peaking capacity with a heat recovery boiler and an additional steam turbine generator. A combined cycle plant is a very flexible alternative for locations with a natural gas supply nearby.

A pumped storage hydro unit utilizes upper and lower reservoirs. Water is released from the upper reservoir to turn a reversible hydraulic turbine generator thus producing electric energy. The water is captured in the lower reservoir, and then pumped back to the upper reservoir with off-peak base load energy. The energy cost is the off-peak baseload cost to pump plus losses. Due to losses, the additional use of coal fired baseload plants for pumping could impact compliance plans for meeting emissions limits due to sulfur dioxide emissions from the coal-fired plants.

A preliminary study by the U.S. Army Corps of Engineers indicated there could be economic benefits for having pumped storage hydro capacity on the EKPC system. Since there is a viable, potential pumped storage hydro site in EKPC's service territory, EKPC contracted with a consultant in 1996 to perform a feasibility study of the potential for development of a pumped storage project. The project would need to be jointly developed by EKPC and another utility due to the project's potential capacity and capital requirements. Based on the consultant's study, the pumped storage project would have a lead time of approximately 10 years.

Additional Base Load Capacity Alternatives

EKPC has extensive experience with coal-fired baseload generating units and EKPC's location near the eastern Kentucky coalfields facilitates the use of high quality, low cost coal. Coal-fired alternatives considered in EKPC's study were an Integrated Gasified Combined Cycle unit, and a nominal 268 MW CFB Boiler at Spurlock Station.

Integrated Gasified Combined Cycle Unit

One baseload alternative considered was an Integrated Gasified Combined Cycle unit, a combined cycle facility that produces synthetic gas from coal as its fuel. An Integrated Gasified Combined Cycle unit has a lower heat rate and lower sulfur dioxide emissions than a coal-fired plant with a scrubber.

Spurlock 3 Circulating Fluidized Bed Boiler

EKPC's best self-build alternative for baseload capacity is construction of a third unit at the Spurlock Station site. EKPC evaluated Spurlock 3 as an alternative in a study conducted in 1997; however, it did not appear to be one of the better economic alternatives at that time for the base expansion plan. It was evaluated as a conventional pulverized coal fired unit in 1997.

Since that time, EKPC has been evaluating alternatives for developing CFB boiler plants. This technology appears to be environmentally and economically superior to conventional pulverized coal plants. Fuel costs would be competitive with other EKPC coal-fired units.

Renewable Resources and Energy Storage Technologies

Renewable energy includes any source that is regenerative or virtually inexhaustible. Thus, sources the Energy Information Administration classifies as renewable are: hydropower, biomass, geothermal, wind, and solar. In the State of Kentucky, all renewable generation is currently from conventional hydroelectric sources.

Hydroelectric Power

Hydroelectric plants are classified as storage, run-of-river, or diversion projects. EKPC considered two specific hydro projects in their study. The timing, cost, and operating data were provided by a developer and EKPC hired a consultant for independent review. Both projects considered were 80-MW run-of-river plants, which could supply approximately 352 and 366 gigawatt-hours, respectfully, of energy annually. The projects were proposed based on one module being fabricated, installed, and then tested for one full year with installation scheduled for late summer of 2002. Upon the first module passing performance and capability testing, release for fabrication of the remaining modules would be initiated. It was envisioned that either project would be composed of five modules of approximately 16 MW each. The possibility of a future sixth module was also evaluated in the study.

Biomass

Biomass energy, the energy contained in plants and organic matter, is one of humanity's earliest sources of energy. According to the Energy Information Administration, the majority of biomass energy is produced from wood and wood wastes (64 percent), followed by municipal solid waste (24 percent), agricultural waste (5 percent), and landfill gases (5 percent). Dedicated energy crops, fast-growing grasses, and trees grown specifically for energy production are also expected to make a significant contribution in the next few years.

EKPC will evaluate any project involving biomass on an individual basis for feasibility and economic merit.

Geothermal Power Production

According to the Energy Information Administration, geothermal energy accounts for 5 percent of all renewable energy consumed in the United States in 1997. Except for a single plant in Nevada and a small amount of production in Hawaii, all domestic geothermal energy is produced in California.

Wind and Solar Power Production

Wind energy consumption is smaller than any of the other renewable energy sources measured by Energy Information Administration. Three wind farms in California produce more than 90 percent of the wind power in the United States. In recent years wind energy facilities have begun to appear in other states such as Texas, Minnesota, Vermont, Hawaii, and Iowa. Of these additional states, Texas had the most capacity with 43 megawatts in 1997.

According to the Wind Energy Resource Atlas of the United States done for the U.S. Department of Energy by Pacific Northwest National Laboratory, areas that are potentially suitable for wind energy applications (wind power class 3 and above) are dispersed throughout much of the United States. Kentucky is considered to have little wind energy potential except for the exposed mountains and ridges of the Appalachians at Pine Mountain (rated 3) in extreme Southeastern Kentucky. Kentucky has no U.S. Department of Energy candidate wind turbine sites. The closest site is in Boone, North Carolina.

Solar energy systems use either solar cells or some form of solar collector to generate electricity, heat homes and buildings, and destroy hazardous contaminants. The most promising areas for solar development are in the southwestern part of the United States. In most cases solar energy systems currently are not economical for grid-interactive applications.

Fuel Cells

To date, fuel cells have not been used extensively. With their relatively recent development and only one major manufacturer worldwide, there are only 160 medium sized (200 kilowatt [kW]) units in use. Smaller units have been tested in the space program and in the automobile industry, but the first unit designed for the residential market was not built until 1998.

Fuel cells are a promising technology for the residential sector, but their current high costs do not favor extensive market penetration. EKPC, however, is presently negotiating to test a 3 kW fuel cell with batteries that take it up to 10 kW. EKPC's Research & Development Process is looking at several applications of fuel cells to rural customers.

Cogeneration

Prospective Qualifying Facilities may request EKPC's avoided capacity and energy costs to evaluate the financial feasibility of either locating within the EKPC system or adding a Qualifying Facility at their existing site within EKPC's service area. These rates and the methodology used to develop them are on file with the Kentucky Public Service Commission. EKPC will continue to provide updated rates for Qualifying Facilities and will incorporate their impacts into the planning process as needed.

Small and Independent Power Production

Small and Independent Power Producers are evaluated similar to the Qualifying Facilities as they are considered on an as available basis. The effects of such facilities are incorporated into EKPC's planning scenarios as they arise.

Summary of Capacity Options

Of the alternatives discussed above, wind power, solar power, and geothermal power were not considered for further evaluation because they are not feasible for the project area, or they are not sufficiently developed technologies to be cost competitive in the near future. The pumped hydro project would need a partner to be feasible, would take 10 years, and would involve a considerable amount of risk. It was therefore not included for further evaluation. The run-of-river hydro projects discussed above were considered for further evaluation. Fuel cell projects are being tested and evaluated by EKPC's Research & Development Process.

The remaining capacity options evaluated to determine the best combination of resources to supply EKPC's future needs were:

- Combustion Turbines
- Combined Cycles
- Fluidized Bed Boiler Unit at Spurlock Station
- Run-of-River Hydro

Screening Analysis

The remaining capacity options or alternatives were further analyzed to come up with feasible financial characteristics, such as (1) capital costs and escalation, (2) fixed operating and maintenance costs and escalation, and (3) variable operating and maintenance costs and escalation.

Next, the fuel costs of the feasible alternatives were researched along with their escalation rates. The environmental characteristics of each technology and unit considered were also carefully studied. Finally, maintenance schedules were researched on the feasible units considered. All of this information was then carefully checked, documented, and entered into a database that also contains the most current information on existing EKPC units. Screening curves were created based on the best options for baseload, intermediate, and peaking capacity.

Requests for Proposals

As an electric cooperative financed by the Rural Utilities Service, EKPC must request proposals from other utilities and entities for power and energy to compare with any self-build options proposed by EKPC. Rural Utilities Service will normally limit financing to self-build options if such options are evaluated as the lowest cost alternatives and they are viable.

EKPC has used the Request for Proposal process since it was first implemented in 1990 to meet EKPC's growing capacity needs. The Request for Proposals issued since 1990 have resulted in the construction of EKPC-owned peaking units and power purchase agreements with utilities and power marketers. The most recent Request for Proposal results were received February 2001 and have shown the current plan to add generation at Spurlock Station is the best alternative.

Site Selection

The purpose of the site selection investigation was to determine the suitability of alternate existing EKPC sites, or new greenfield sites, as possible locations for the installation of new generating units on the EKPC system. EKPC's Cooper Station in Pulaski County, Spurlock Station in Mason County, and Smith Station in Clark County were evaluated, as were five new sites within Estill, Lee, and Breathitt Counties near the Kentucky River. A summary of the conclusions of that investigation is presented below.

- The Spurlock site can easily accommodate two units with minor modifications to the existing facility. The ability to utilize the existing station staffing, clean water, wastewater, coal storage and unloading facilities, ash handling facility, and substation area make this site overwhelmingly the most economical site.

- The Cooper Station site cannot accommodate any additional units without high cost. Although it might be possible to acquire contiguous property, topography would severely restrict additional development. Also, foundation conditions would be very unfavorable.

- Three of the potential new station sites, Sites 1 and 2 in Lee County and Site 5 in Estill County were judged somewhat advantageous for development. However, it is expected that environmental regulatory approvals could not be obtained for these sites in a timely manner. Decisively important considerations for these sites would have to be resolved for final site selection.

- Site 3 might be acceptable if crucial considerations are favorably resolved, but it is inferior to Sites 1, 2, and 5.

- Site 4 is substantially inferior to the other sites, and it has no reasonable prospects for development.

The overall conclusion of the report was that the Spurlock site is by far the best choice for two main reasons: it has room for the new units and has existing infrastructure that can be utilized for the new units. The ability to utilize the existing station staffing, water, wastewater, coal storage and unloading facilities, ash-handling facility, and substation area make this site overwhelmingly the most economical site. In addition, because of the use of the existing infrastructure, potential environmental impacts can be minimized.

2.2.2 No Action Alternative

The no action alternative is derived from the premise that EKPC would not add Units 3 and 4 to Spurlock Station. Current environmental impacts from operation of the plant would continue without change, except that air emissions would be lessened through operation of the selective catalytic reduction units currently under construction (see Section 4.1). Environmental impacts associated with the construction and operation of Units 3 and 4, as discussed in Chapters 4 and 5 of this assessment, would not occur as anticipated. However, under the no action alternative the opportunity to utilize the existing infrastructure at Spurlock Station would not be realized. Under the Proposed Action, EKPC has the advantage of limiting the two new units and associated facilities to within the existing fenced boundary of Spurlock Station, except for the proposed double circuit electric transmission line that will be needed to connect the output of the units to the transmission grid in Ohio.

The no action alternative would force EKPC to choose another alternative, as discussed earlier in this section, to meet its need for an additional 400 to 500 MW of capacity by the summer of 2006 to provide reliable and reasonably priced wholesale power to its 17 system members and contribute its share to the reliability of the regional electrical system. Any potential environmental impacts associated with this scenario are, however, outside the scope of this environmental assessment.

3.0 AFFECTED ENVIRONMENT

The environment that is potentially affected by the Proposed Action is described in this section.

3.1 AIR QUALITY AND NOISE

This section discusses the existing air quality and noise levels in the vicinity of the proposed project. The discussion includes climate patterns, existing air quality, existing air emission sources, and background information on air quality regulations as applicable to the proposed project.

3.1.1 Climate and Meteorology

The climate in the proposed project area is temperate. Winters are moderately cold and summers are warm and humid, which is characteristic of mid-continent climate. During spring, winter, and late fall, there is considerable variability in the day-to-day weather due to frequent passage of weather fronts and associated high and low pressure centers. Generally, precipitation will accompany the passage of these weather fronts. Often during the summer and early fall, high pressure centers become stationary along the east coast. This produces warm, moist southerly winds that result in afternoon showers. This weather pattern can often persist for several days.

Table 3.1–1 presents the climatological data collected at the Maysville Water Treatment Plant, approximately 1.6 miles (2.5 kilometers) from the proposed project, normalized over a period of 30 years. The data show an average daily temperature of 53.4°F (11.9°C) with average maximum temperatures ranging from 39.3°F (4.06°C) in January to 86.9°F (30.5°C) in July. The average annual precipitation for the period of record is 44.61 inches (113.3 centimeters), with the driest months being February and October. The average annual total snowfall is 6.9 inches (17 centimeters), occurring between November and March. Normally there will be 80 days each year with 0.1 inches (0.3 centimeters) or more of precipitation.

TABLE 3.1–1.—Climate Data for Maysville, Kentucky

Month	Average Daily Maximum Temperature (° F)	Average Daily Temperature (° F)	Average Daily Minimum Temperature (° F)	Average Precipitation (Inches)	Average Total Snowfall (Inches)
January	39.3	29.3	19.3	3.13	2.7
February	43.3	32.3	21.3	3.02	2.7
March	54.6	42.7	30.8	4.20	0.6
April	65.5	52.5	39.6	4.20	0.0
May	75.0	61.9	48.8	4.81	0.0
June	83.4	70.7	58.1	3.49	0.0
July	86.9	74.9	62.9	4.57	0.0
August	85.8	73.7	61.6	4.00	0.0
September	79.8	67.4	54.9	3.18	0.0
October	68.5	55.4	42.4	2.77	0.0
November	55.9	44.9	33.8	3.49	0.4
December	44.3	34.4	24.6	3.75	0.4
Annual Average/Total	**65.2**	**53.4**	**41.5**	**44.61**	**6.9**

Source: NRCS 1999.

Figure 3.1–1 depicts a 5-year wind rose from 1988 to 1992 for the Cincinnati/Northern Kentucky surface station, approximately 50 miles (82 kilometers) from the proposed project site. The prevailing or most frequently observed wind direction in the project area is northeast. The persistent winds are the result of a predominant area of high pressure, which remains near the southeastern United States for most of the year. However, when cold fronts move across this area, the wind will shift, often for a short duration. The winter and early spring months typically have the strongest winds.

3.1.2 Air Quality

Air Quality Regulations

The U.S. Environmental Protection Agency (EPA) has established air quality guidelines for several different pollutants, referred to as criteria pollutants, based on the protection of public health and the environment. These air quality guidelines, the National Ambient Air Quality Standards (NAAQS), set limits for ambient (outdoor) levels of the following criteria pollutants: nitrogen oxides (NO_x), carbon monoxide (CO), ozone, sulfur dioxide (SO_2), lead, and inhalable particulate matter (PM_{10}). Table 3.1–2 summarizes the NAAQS for each criteria pollutant. Kentucky Division for Air Quality has adopted the NAAQS for implementation in the state, as established in Kentucky Administration Regulation (KAR) 53:010. The Primary Standards are designed to protect public health, including asthmatics, children, and the elderly, and the Secondary Standards are designed to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and property.

TABLE 3.1–2.—Kentucky State and National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	Primary Standard ppm / µg/m³	Secondary Standard ppm / µg/m³
Nitrogen Dioxide (NO_2)	Annual	0.05 / 100	0.05 / 100
Particulate Matter (PM_{10})	24-Hour	NA / 150	NA / 150
	Annual	NA / 50	NA / 50
Carbon Monoxide (CO)	1-Hour	35 / 40,000	--
	8-Hour	9 / 10,000	--
Sulfur Dioxide (SO_2)	Annual	0.03 / 80	--
	24-hour	0.14 / 365	--
	3-hour	--	0.5 / 1,300
Ozone (O_3)	1-Hour	0.12 / 235	0.12 / 235
Lead (Pb)	Calendar Quarter	NA / 1.5	NA / 1.5
Hydrogen Sulfide (H_2S)[1]	1-hour	--	0.01/14
Gaseous Flourides (expressed as HF)[1]	Annual	--	1.00 ppb /0.82
	1-month	--	2.00 ppb/1.64
	1-week	1.0/800	3.50 ppb/2.86
	24-hour	--	4.50 ppb/3.68

Source: KDAQ 2001.
NA – Not Applicable.
[1] KDAQ standard only, not included in the NAAQS.

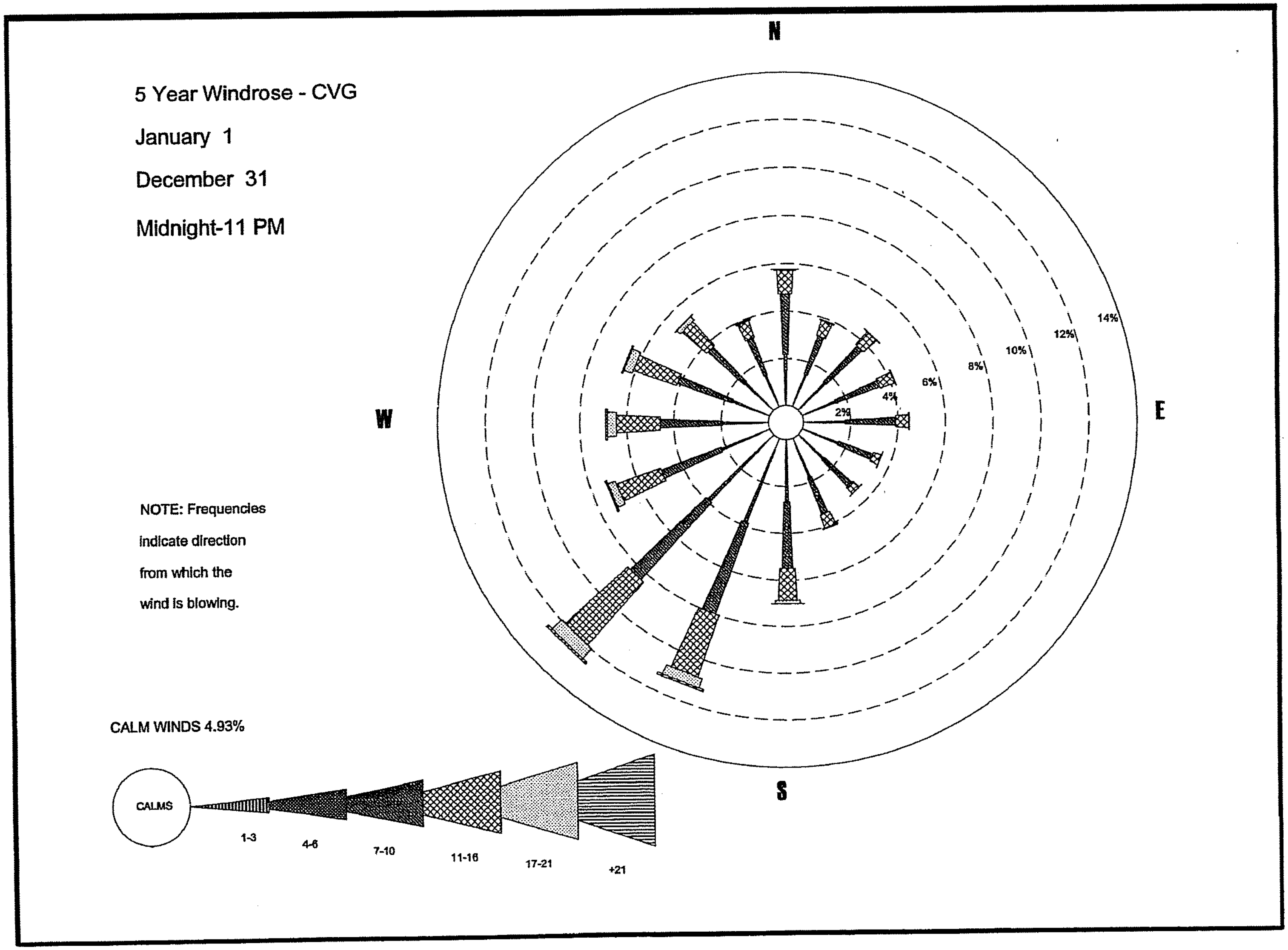


FIGURE 3.1–1.—Five-Year Wind Rose (1998-1992) for Cincinnati/Northern Kentucky.

Based on monitoring the ambient levels of criteria pollutants, EPA evaluates individual Air Quality Control Regions to establish whether or not they meet the NAAQS. Areas that meet the NAAQS are classified as attainment areas, and areas that exceed the NAAQS are classified as non-attainment areas. Air quality records are maintained by Kentucky Division for Air Quality for the purposes of evaluating air quality trends throughout the state. Kentucky has several counties which are designated as non-attainment areas. However, there are no non-attainment areas in Mason County (the location of the proposed project), or in any of the counties in Kentucky or Ohio adjacent to Mason County including Brown County, Ohio, where the proposed transmission line will extend. The nearest non-attainment areas to the proposed project are Louisville, Kentucky (ozone non-attainment area), Chicago and Pittsburgh (PM_{10} non-attainment areas), and part of Boyd County, Kentucky (SO_2 non-attainment area) located approximately 70 miles (115 kilometers) east of Maysville.

Under the *Clean Air Act*, as amended, major new sources and modifications are evaluated through the New Source Review Program, administered by each state and overseen by EPA. Specifically, in attainment areas such as the proposed project location, a Prevention of Significant Deterioration (PSD) permit is required for the proposed modification. The PSD permit would contain emission limits and other operating, monitoring, record keeping, and reporting requirements based on air quality modeling. The air quality modeling includes emissions from the proposed modification and other sources in the area to ensure protection of the NAAQS and to prevent emission increases beyond a specified amount, called an increment. The emission limits contained in the PSD permit are required to represent the Best Available Control Technology, which is determined on a case-by-case basis, taking into account energy, environmental, and economic impacts and costs. PSD regulations also provide special protection for visibility and other air quality related values in specially designated areas such as National Parks and Wilderness Areas, designated as "Class I" areas. The nearest Class I areas to the proposed project are Mammoth Caves National Park, 150 miles (250 kilometers) southwest of the proposed project, and Great Smoky Mountains National Park, 198 miles (325 kilometers) south of the proposed project.

Similar to the regulation of criteria pollutants under the PSD program, hazardous air pollutants (pollutants known or suspected to cause cancer or other serious health effects) are regulated under Section 112 of the *Clean Air Act*. Section 112 requires new major sources of hazardous air pollutants to have emission limits that represent the Maximum Achievable Control Technology; these levels are based on emissions levels that are already being achieved by the better-controlled and lower-emitting sources in an industry.

Title IV of the *Clean Air Act* establishes EPA's Acid Rain Program. This program aims to achieve significant environmental and public health benefits through reductions in emissions of SO_2 and NO_x, the primary causes of acid rain. Sources subject to this program must comply with restrictions on SO_2 and NO_x emissions.

Existing Air Emissions Sources

Spurlock Station. There are currently two coal-fired utility boilers, Units 1 and 2, at the Spurlock Station. Unit 1 is a pulverized coal-fired, dry bottom wall-fired unit with a maximum continuous heat input rating of 3,500 mmBTU per hour. An electrostatic precipitator controls emissions of particulate matter from this source, while low-NO_x burners control emissions of NO_x. The Spurlock Station Phase II Acid Rain Permit (A-98-010) places emission limits and monitoring requirements on SO_2 and NO_x from Unit 1. Unit 1 predates the requirement to obtain a PSD permit regulating criteria pollutants from this source.

Unit 2 is a pulverized coal-fired, dry bottom, tangentially fired unit with a maximum continuous heat input rating of 4,850 mmBTU per hour. The boiler is equipped with an electrostatic precipitators for particulate matter emissions control, low-NO_x burners for NO_x control, and a flue gas desulfurization system for SO_2 emissions control. Unit 2 was constructed in 1981 and is subject to emission limits in its PSD permit and the Spurlock Station Phase II Acid Rain Permit. The amount of SO_2 released from Units 1 and 2 is regulated by the permit emission limits rather than by control of the coal type (low or high sulfur) permitted to be used as fuel.

The Spurlock Station also currently contains controlled emission points associated with the coal, limestone, and ash handling and the cooling towers. Table 3.1–3 lists emission rates of SO_2, CO_2, and NO_X from Units 1 and 2 at the Spurlock Station for the year 2000. Emission levels of PM_{10} and air toxics are not available for the year 2000. The facility's Title V Operating Permit contains limits on the opacity of emissions for each unit.

TABLE 3.1–3.—2000 Emission Levels from Existing Units at the Spurlock Station

	SO_2 (sulfur dioxide)	CO_2 (carbon dioxide)	NO_x (nitrogen oxides)
Existing Units 1 & 2	38,652 tons	6,456,631 tons	12,962 tons

Source: EPA 2001.

Other Existing Sources. A number of industrial and power generating facilities are located in Kentucky and Ohio in the vicinity of Maysville, especially along the Ohio River. These facilities are each subject to *Clean Air Act* requirements, implemented by Kentucky Division for Air Quality and Ohio EPA. Table 3.1–4 lists major facilities in the area along with their distance from the Spurlock Station. Included in the list of facilities are a number of coal-fired power plants.

3.1.3 Noise

This section discusses the existing noise levels in the vicinity of the proposed project, and describes the basic measurements used for sound. Noise is a potential environmental issue associated with both construction and operation activities. The description of the existing sound environment requires a general understanding of how sound is measured and its effects on the human environment.

Noise is defined as sound that is undesirable because it interferes with speech, communication, or hearing; is intense enough to damage hearing; or is otherwise annoying. The measurement and human perception of sound involves two basic physical characteristics: intensity and frequency. Intensity is a measure of the sound energy of the vibrations, and frequency is the measure of the tone or pitch of the sound.

TABLE 3.1–4.—Major Facilities in Spurlock Station Region

Facility Name	State	Distance to Spurlock Generation Station (miles)
Inland Paperboard & Pkg.	KY	0.5
Bevins Sand & Gravel Inc.	KY	1.9
Dravo Lime, Inc.	KY	9.4
Vickers Welco	KY	4.9
Riverway Fertilizer Co.	KY	5.4
Standard Supply Co.	KY	5.5
Emerson Power Trans. Corp.	KY	5.6
Aristech Chemical Corporation	KY	53.7
Cincinnati Gas & Electric Co., WM. H. Zimmer	OH	25.9
Cincinnati Gas & Electric Co., Miami Fort Station	OH	60.3
Cincinnati Gas & Electric Co., W.C. Beckjord	OH	33.0
Cincinnati Paperboard	OH	42.7
Dayton Power and Light Co., Stuart Generating Station	OH	8.5
Dayton Power and Light Co., Killen Generating Station	OH	17.9
E.I. Dupont Fort Hill Plant	OH	17.9
GE Aircraft Engines, Evendale Plant	OH	51.0
Hilton Davis Company	OH	28.9
New Boston Coke Corporation	OH	47.2
United States Enrichment Corporation	OH	48.1
ZF Batavia LLC	OH	30.8

Source: Kenvirons 2001.

The physical unit most commonly used to compare the intensity of sounds is the decibel (dB). The higher the energy carried by the sound, the louder the perception of that sound, and thus, the higher the dB rating of the sound. A sound level of just above 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB.

The second important characteristic of sound is its tone or frequency, which is the number of times per second the air vibrates, measured in Hertz (Hz). All sounds in a wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for this variable response of the human ear to different tones, decibels may be adjusted to A-weighted decibels (dBA). The adjusted decibels represent the human hearing response to sound. The maximum sound levels of typical events are shown in Table 3.1–5.

In addition to measuring a single sound event, a time-average sound level can be calculated (also in dBA) to represent the average sound over a specified length of time. For the evaluation of community noise effects, and particularly construction noise effects, the Day-Night Average Sound Level is often used. The Day-Night Average Sound Level averages construction sound levels at a location over a complete 24-hour period, with a 10 dB adjustment added to those noise events that take place between 10:00 p.m. and 7:00 a.m. This 10 dB "penalty" represents the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

It is important to distinguish between the measurement of a single sound event and the calculation of a time-averaged Day-Night Average Sound Level, both of which are often represented in dBA. Because the Day-Night Average Sound Level is a measurement of an average, a Day-Night Average Sound Level of 50 dBA could result from a few noisy events or a large number of quieter events. Day-Night Average Sound Level does not represent the sound level heard at any particular time, but rather represents the total sound exposure.

The U.S. Department of Housing and Urban Development established a Day-Night Average Sound Level standard of 65 dBA for eligibility for federally guaranteed home loans. In 1974, the EPA identified noise levels that could be used to protect public health and welfare including prevention of hearing damage, sleep disturbance, and communication disruption. Outdoor Day-Night Average Sound Level values of 55 dBA or less were identified as desirable to protect against activity interference and hearing loss in residential areas and at educational facilities.

TABLE 3.1–5.—Comparative A-Weighted Sound Levels

Common Outdoor Sound Levels	Sound Level (dBA)	Common Indoor Sound Levels
	110	
Jet flyover at 1000 feet		Rock band
	100	
Gas lawnmower at 3 feet		Inside subway train
	90	
Diesel truck at 50 feet		Food blender at 3 feet Garbage disposal at 3 feet
Noisy urban daytime	80	
		Shouting at 3 feet
Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet Normal speech at 3 feet
Commercial area Heavy traffic at 300 feet	60	
		Large business office Dishwasher in next room
	50	
		Small theater, Large conference room (background)
Quiet urban nighttime	45	
		Library (background)
Quiet suburban nighttime	40	
		Bedroom at night Concert hall (background)
Quiet rural nighttime	30	
		Broadcast and recording studio (background)
	10	
	0	Threshold of hearing

Source: Canter 1977.

The two coal-fired boilers and associated equipment would be added adjacent to the existing units on the Spurlock Station property. Typical existing noise levels on the EKPC property line range from approximately 45 dBA near the existing units, to approximately 53 dBA near the landfill. The existing noise level near the landfill is primarily noise generated by ash haul trucks, with an average of 20 trucks per day. Construction of control equipment currently being added for the existing units has resulted in temporarily elevated noise levels of approximately 64 dBA on the EKPC property line nearest the construction activities (EKPC 2001).

Beyond the EKPC property line, and along the proposed transmission line corridor into Brown County, Ohio, the land is primarily rural with scattered residences and two-lane highways. Thus, current noise levels along the transmission line route are predominately low, typically with a Day-Night Average Sound Level near 30 dBA. The Day-Night Average Sound Level may increase to 50 to 68 dBA near industry and major roads along the Ohio River (Canter 1977).

All existing noise levels beyond the Spurlock Station property boundary are below what is normally considered compatible with residential land uses and other noise impact guidelines. The primary sources of noise are: (1) passage of trains several times daily on tracks along the south side of the Ohio River; (2) everyday vehicular traffic along nearby roadways; and (3) operational noise associated with industrial activity. Existing noise derived from construction at the Spurlock Station is generally intermittent and highly variable depending on the time of day.

3.2 GEOLOGY AND SOILS

This section discusses the geologic formation and soil types that underlie the proposed project area on Spurlock Station and the proposed transmission line corridor in Brown County, Ohio.

3.2.1 Geology

The Spurlock Station is located in the Outer Bluegrass Physiographic region, which is characterized by deep valleys with little flat land (Figure 3.2–1). The Outer Bluegrass physiographic region extends 6 miles (9.6 kilometers) into Brown County, Ohio, where the proposed transmission line is to be located (ODNR 1998). It is an Interior Low Plateau and has very steep hillsides with the steeper slopes in the most dissected areas near the major deep drainageways, such as the Ohio River (USDA 1987).

Elevations in the region surrounding the project site generally range from 500 feet (152 meters) above mean sea level (msl) along the Ohio River to 950 feet (289 meters) at the surrounding hilltops. The elevation ranges for the proposed project sites are as follows:

- Units 3 and 4 construction site: 540 to 550 feet (164 to 168 meters) above msl
- Special Waste Landfill (ash landfill): 800 to 900 feet (244 to 274 meters) above msl
- Transmission line route on the Kentucky side: approximately 520 feet (158 meters) above msl
- Transmission line route on the Ohio side: 500 to 933 feet (152 to 284 meters) above msl

Underlying the project site are geologic formations from the Ordovician and the Quaternary Periods (Figure 3.2–2). Rocks of the Ordovician Period, which underlie the ash landfill and the transmission line corridor in Brown County, Ohio, were formed approximately 490 to 435 million years ago. They consist of interbedded limestone, shale and siltstone of the Bull Fork, Grant Lake, Fairview, and Kope Formations and are easily eroded. Table 3.2–1 provides a detailed description of these formations. Open fractures or a zone of such fractures in bedrock have been found to exist in the Grant Lake Limestone formation that underlies a portion of the ash landfill (KGS 1972). Water percolates through the fractures, dissolving the soluble limestone and creating sinkholes or karst features in the topography of the area. A karst feature is located on the western border of the ash landfill. As mandated by the Kentucky Division of Waste Management, a 250-foot (76.2-meter) buffer will be maintained between the karst feature and the ash landfill.

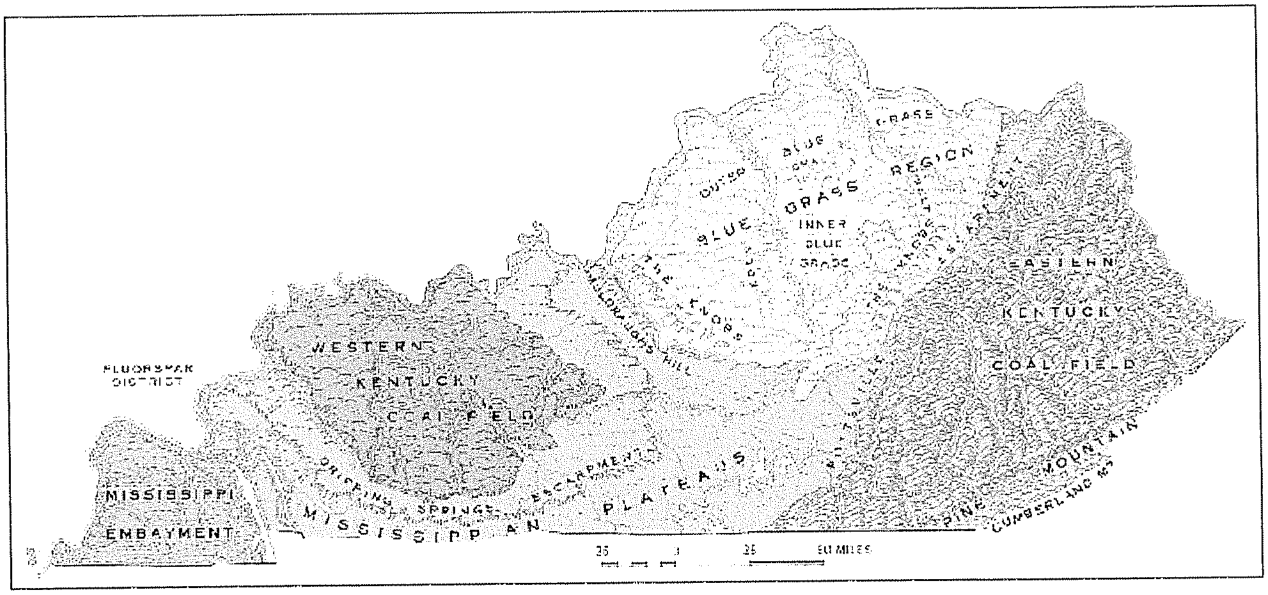


FIGURE 3.2–1.—Physiographic Diagram at Kentucky.

TABLE 3.2-1.—Description of the Geologic Formations Underlying the Proposed Project Site

System (Period)	Series (Epoch)	Formation and Member	Depth	General Description
Quaternary	**Pleistocene and Holocene**	**Ofm/Ofo**: Ohio River flood plain, backwater and low terrace alluvium **Ofm**: modern alluvium with little or no soil development **Ofo**: old alluvium with some soil development	0-40 ft (0-12m)	Silt, sand and clay: Beneath flood plain and low terraces, grades from clayey silt downward to sandy silt and fine to medium sand. Silt and sand, light-yellowish-brown to gray, noncalcareous, micaceous, obscurely to well bedded. Contains lenses of vegetable matter, gray silty clay, gravel and detrital coal. Low ridges are sandy; poorly drained swales are clayey. Rest on surface cut on glacial outwash. Thickness generally increases from about 20 to 30 feet beneath higher terrace to 30 to 40 feet beneath modern flood plain. Backwater alluvium consists of obscurely bedded yellowish-brown carbonaceous silt and clay that intertongue with locally derived gravelly alluvium. Soils on modern alluvium show little color, texture or ped development. In areas mapped as modern alluvium, flood couplets of sand and humic mud common. Soils on older alluvium show marked color and texture development and belong to the Wheeling soil cantena.
	Pleistocene	**Qe**: Eolian deposits: Stippling indicates areas where surface is markedly sandy	0-70 ft (0-21 m)	Silt and sand: Silt, well sorted, poorly to non stratified, weathers light brown to yellowish brown. Sand, light-yellowish-brown, very fine to medium, very well sorted, noncalcareous, generally forms ridges and mounds, locally mantled by silt.
	Pleistocene *(Glaciation: Wisconsin)*	**Qwo**: Glacial Outwash	0-130 ft (0-39 m)	Sand, gravel, silt and clay: Sand and gravel, yellowish-brown, well sorted, locally calcareous; show cut and fill structure. Sand, find to coarse, subangular, quartzose, with notable amounts of carbonate (5 percent), chert, feldspar, fragments of various rocks, heavy minerals, and coal grains. Gravel, dominantly pebble size, found mostly in upper and lower 15 feet of unit. Outwash generally leached to depth of more than 25 feet. A mantle of silt 5 to 20 feet thick covers terrace surfaces, ranging from sandy silt on terrace rights to sandy clayey silt in swales.
	Pleistocene *(Glaciation: Illinoian and Wisconsin)*	**Qla**: Lacustrine deposits	0-100 ft (0-30 m)	Silt, clay and sand: Silt and clay, light-olive-gray to bluish-gray, commonly calcareous, in alternating silty and clayey beds, laminated in part, locally fossiliferous. Leached at surface and oxidized to light yellowish-brown clayey silt; calcareous concretions at base of leached zone. Near Ohio River interbedded with sand from outwash deltas built into mouths of tributary valleys.

TABLE 3.2-1.—Description of the Geologic Formations Underlying the Proposed Project Site (continued)

System (Period)	Series (Epoch)	Formation and Member	Depth	General Description
Ordovician	**Upper Ordovician**	**Ob**: Bull Fork Formation	70+ ft (21+ m)	Limestone and shale, interbedded: Limestone content decreases from about 75 percent near base of unit to about 50 percent in the highest beds preserved. Limestone is medium light gray to medium bluish gray; weathers grayish orange, evenly thing to thick bedded; locally ripple marked. Dominant limestone type composed of medium to coarse fossil fragments in a fine-grained matrix; contains sparse to common argillaceous inclusions. Shale is medium gray, weathers dusky yellow, calcareous; thin bedded fissile; plastic when wet, in partings and sets as much as 12 inches thick. Top of formation not exposed in area.
		Grant Lake Limestone **Oglu**: Upper member	15-20 ft (4-6 m)	Limestone, rubbly-weathering, mottled medium light gray and light olive gray, thin-bedded, irregulary bedded to nodular; consists of whole fossils and coarse fossil fragments in a very fine to fine-grained argillaceous limestone matrix; contains irregular partings and seams of gray shale. Minor coarse-grained, well sorted limestone locally present.
			30-35 ft (9-10 m)	Limestone and shale interbedded: Limestone (65 percent to 85 percent of unit) is medium light gray to medium bluish gray, fine to coarse grained, fossil fragmental, evenly thin to medium bedded, medium to well sorted.
		Ogll: Lower member	50-60 ft (15-18 m)	Limestone, rubbly-weathering, mottled medium light gray and light olive gray, irregularly thin bedded to nodular; consists of whole and coarsely broken fossils in a fine-grained argillaceous limestone matrix. Gray shale occurs as irregular partings and thin beds. Minor fine- to coarse-grained, medium-sorted limestone in thin even beds, mostly in upper part. Gradational with underlying unit-through a zone of 3 to 10 feet thick.
		Of: Fairview Formation	75-95 ft (23-29 m)	Limestone and shale interbeded: Limestone (about 60 percent) of formation of two main kinds: light-olive gray to light-bluish gray, fine-grained, well-sorted, silty, evenly thin to medium bedded, sparsely fossiliferous limestone; and medium-gray to medium-bluish gray, thin- to medium-bedded, fossil-fragmental limestone consisting of closely packed medium to coarse fossil fragments in finely to coarsely crystalline calcite cement. Shale, olive-gray, fissle, calcareous, as partings and sets as much as 1 foot thick. Light-olive-gray silty limestone in even to contorted thin to thick beds, locally conspicuous in upper part. At base, a ledge-forming bed, 3 to 6 feet thick, of obscurely layered very coarse grained limestone composed chiefly of cemented shells of brachiopid *Strophomena*.
		Ok: Kope Formation	260-275 ft (79-84 m)	Shale and limestone interbedded: Shale (about 70 percent of unit), medium-gray, weathers light gray to dusky yellow; fissile, calcareous, fossiliferous in part. Limestone, medium-gray, thin to medium-bedded. Coarse-grained fossiliferous limestone dominant; find-grained, silty, sparsely fossiliferous limestone subordinate. Unit consists of beds 5 to 10 feet thick of closely interbedded shale and limestone in about equal abundance. Some beds very fossiliferous. Poorly exposed; forms moderate slopes commonly strewn with limestone float. Upper contact sharp; lower contact gradational.

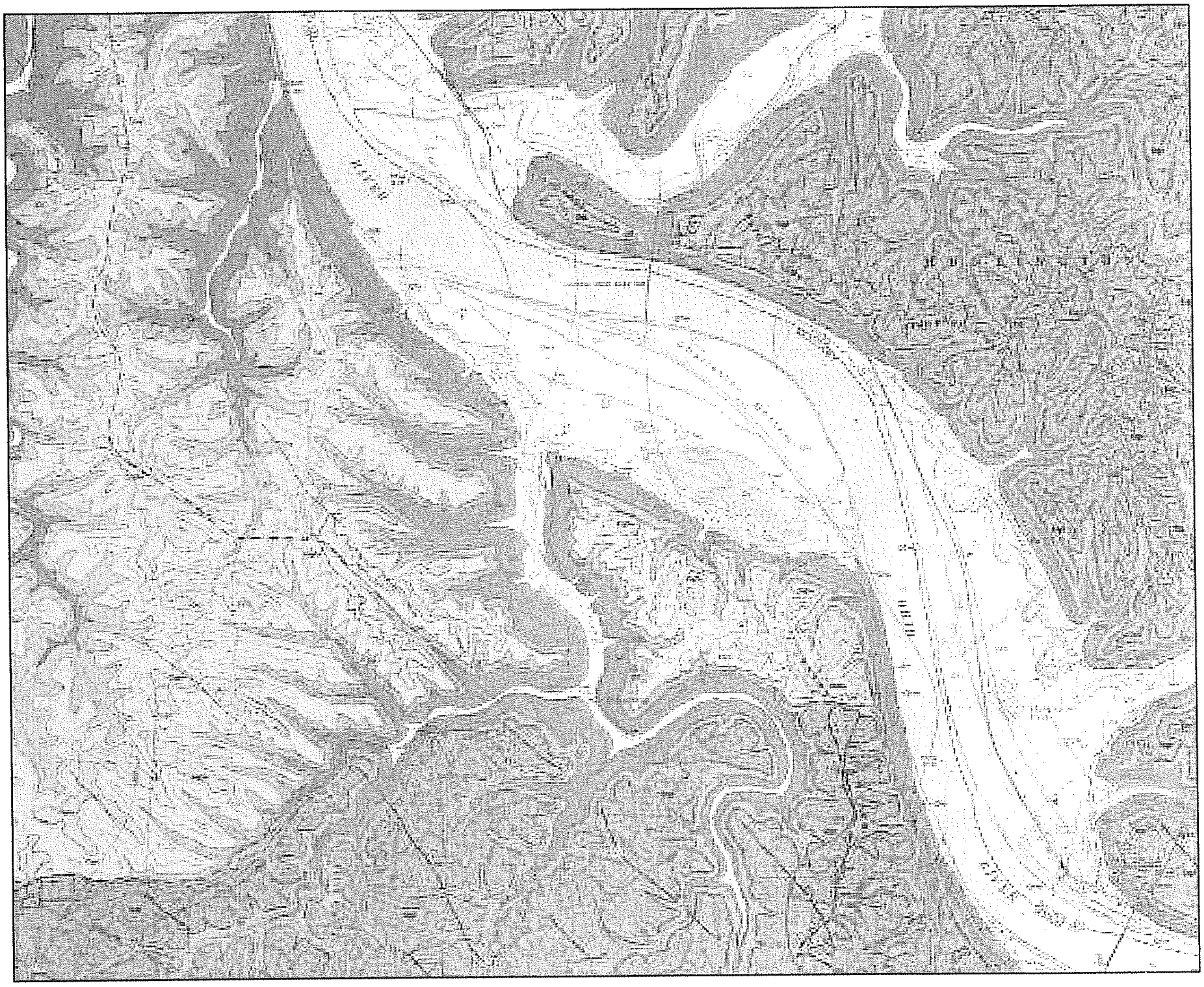


FIGURE 3.2–2.—Geological Map at the USGS Maysville West 7.5-Minute Quadrangle, Kentucky-Ohio.

Formed approximately 1.6 million years ago during the Pleistocene Epoch or Ice Age, the formations of Quaternary Period underlie the generating units and associated facilities of the Spurlock Station. The formations of the Quaternary Period consist of clay, silt, sand and gravel in various combinations that form alluvium, glacial outwash, and eolian (deposited by wind) and lacustrine (lake bottom) deposits that are generally restricted to the floodplains of rivers and creeks. Many varieties of igneous, metamorphic and sedimentary rocks not normally occurring in Kentucky were eroded and deposited in Quaternary Period formations along with wind blown deposits of silt called loess during the last Ice Age.

The Kentucky Geological Service has noted that glacial outwash, on which Units 3 and 4 are to be built, can reach a depth of 130 feet (39.6 kilometers) (KGS 1972). A 1975 Site Evaluation Report for Unit 1 stated that soil boring samples on Spurlock Station indicated that the alluvium depth beneath the site ranges between 113 to 136 feet (34.4 to 41.4 meters) to limestone and shale bedrock (D&M 1975).

3.2.2 Mineral Resources

According to the Kentucky Geological Survey, there are a number of industrial mineral resources such as limestone, clay, shale, sand and gravel, which exist throughout the state (KGS 1972). A number of them have been quarried on or near the Spurlock Station site in the past. Outwash sand with 10 percent gravel has been dug from pits on Spurlock Station in the area known as the Charleston Bottom and was used for general construction purposes (see Figure 3.2–2). Sand and gravel similar to the outwash has also been dredged from the bed of the Ohio River and a gravelly material was dredged from Charleston bar, formerly exposed off the mouth of Lawrence Creek on Spurlock Station. The area is now flooded by a new high pool and an abandoned sand and gravel pit is noted on Figure 3.2–2 on the site (KGS 1972).

The upper 25 feet (7.62 meters) of the Grant Lake Limestone formation is an argillaceous, or clayey, limestone suitable for the manufacture of Portland cement and is manufactured in Springdale, Kentucky, approximately 10 miles (16 kilometers) southeast of Spurlock Station (KGS 1972). Bedrock units in the area furnish construction materials for local use, including fill and unfinished limestone blocks for ripraps and rough masonry. However, none of the limestone in the area is thought to be low enough in insolubles to be used where high chemical purity is a requirement (KGS 1972).

According to the Commonwealth of Kentucky Transportation Cabinet Department of Highways, there are only two active producers of industrial minerals in the area. The Maysville Materials Company produces fine aggregate sand and is located 7 miles (11.2 kilometers) southeast of Spurlock Station. Dravo Lime produces quicklime and has a quarry located approximately 15 miles (24.1 kilometers) southeast of Spurlock Station (KDMDM 2001).

The Kentucky Geological Survey notes that a number of ore minerals, mineral concentrations which are found in veins or in uncommon sedimentary rocks and include calcite, barite, gypsum and various phosphate and iron minerals, exist throughout Kentucky but have not been found on Spurlock Station (KGS 2001).

There are no industrial, ore mineral, or mineral producing plants in Brown County, Ohio (USGS 1999).

3.2.3 Geologic Hazards

The proposed project area is situated on the Cincinnati Arch, a geologically prominent regional uplift in the eastern mid-continent of North America, extending from central Tennessee through central Kentucky to northeastern Ohio (USGS 2001). The most important fault systems in the area are Rough Creek, Kentucky River and Irvine-Paint Creek, all three of which are transacted and perhaps displaced by the north-northeast trending Lexington fault system, which is approximately 35 miles (56.3 kilometer) from the proposed project site (See Figure 3.2–3).

The proposed project area on both the Kentucky and Ohio sides of the Ohio River is located within Seismic Zone 1 (on a scale of 0 to 4, with 4 being the highest risk), the "central stable region" for seismic activity on the North American continent (USGS 2001). Only earthquakes of low to moderate intensity (between 1.6 to 5.2 on the Richter Scale, with less than 2 being no damage to greater than 9 being considerable damage) have been recorded within a 125-mile (201-kilometer) radius of proposed project area, suggesting a risk of moderately damaging earthquakes for the area (ODNR 2000). A search of the National Earthquake Information Center (NEIC) database from 1973 to the present found a July 27, 1980 earthquake of 5.2 on the Richter Scale located 28.7 miles (46.2 kilometers) from Spurlock Station to be the highest magnitude quake within the 125-mile (201-kilometers) radius (USGS 2001a). A search of the same database for a 322.0-mile (518.2-kilometer) radius found a November 30, 1973 earthquake with a magnitude of 5.6 on the Richter Scale located 182.8 miles (294.2 kilometers) from Spurlock Station. A search of Significant United States Earthquakes from 1586 to 1989 for a 125-mile (201-kilometer) radius did not find any earthquakes above 5.2 on the Richter Scale.

The closest active seismic zone to the proposed project area is the New Madrid Seismic Zone (UKY 2001), located approximately 353.0 miles (568.1 kilometers) southwest of Spurlock Station, near Fulton, Kentucky. It is the most seismically active region in the United States east of the Rocky Mountains (UKY 2001). The New Madrid Seismic Zone is located in the central Mississippi Valley with the northern end of the zone marked by the confluence of the Ohio and Mississippi Rivers in southern Illinois. From that point, the zone runs southwest through western Kentucky, through eastern Missouri and western Tennessee and terminates in northeastern Arkansas.

The New Madrid Seismic Zone is made up of a series of strike/slip and dip/slip faults associated the Reelfoot rift, an approximately 44-mile (70.8-kilometer) wide zone, which created these faults. Seismic waves generated from an earthquake in the New Madrid Seismic Zone travel long distances through the series of faults and onto the relatively brittle and flat-lying sedimentary rocks of the Cincinnati Arch region, which tend to carry these waves throughout an area of thousands of square miles for even a moderate-size earthquake (UKY 2001; ODNR 2000).

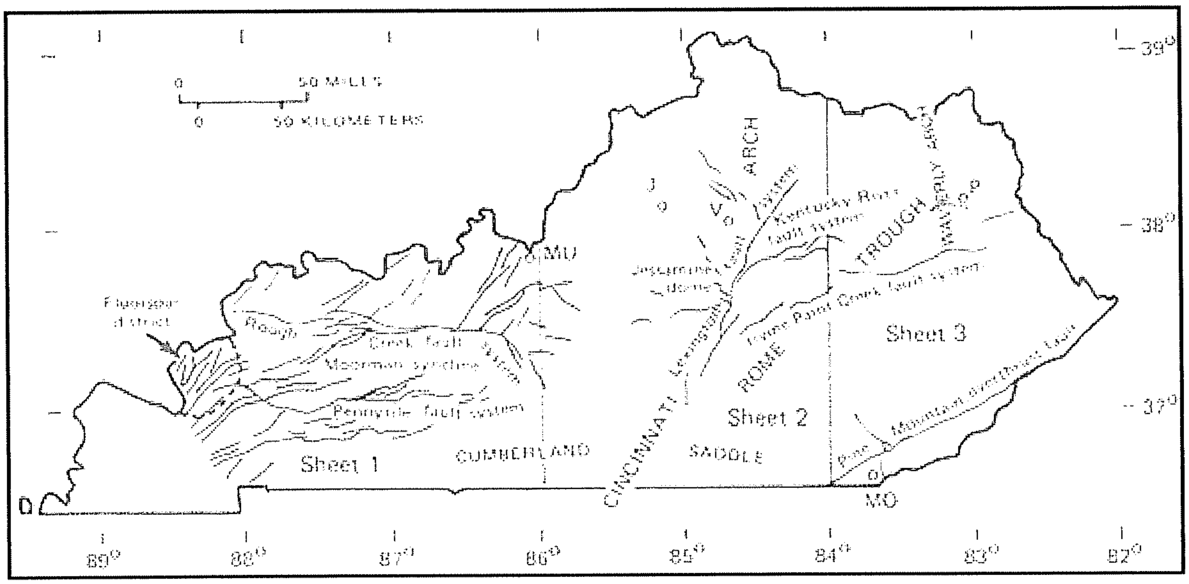


FIGURE 3.2–3.—Fault Systems in Kentucky.

Amongst the largest earthquakes recorded in the United States were the New Madrid earthquakes of 1811-12. At least four separate earthquakes, the largest of which would have registered 8 on the Richter Scale, occurred in New Madrid, Missouri, and were felt as far away as New Hampshire, with minor structure damage noted as far east as Cincinnati, 70 miles (113 kilometers) west of Spurlock Station (UKY 2001). While damaging earthquakes in the New Madrid Seismic Zone have been common throughout recorded history, the reoccurrence interval for the most severe earthquakes is probably every several thousand years (USGS 1987). Only the most severe New Madrid Seismic Zone earthquakes would likely be felt in the proposed project area.

3.2.4 Soils

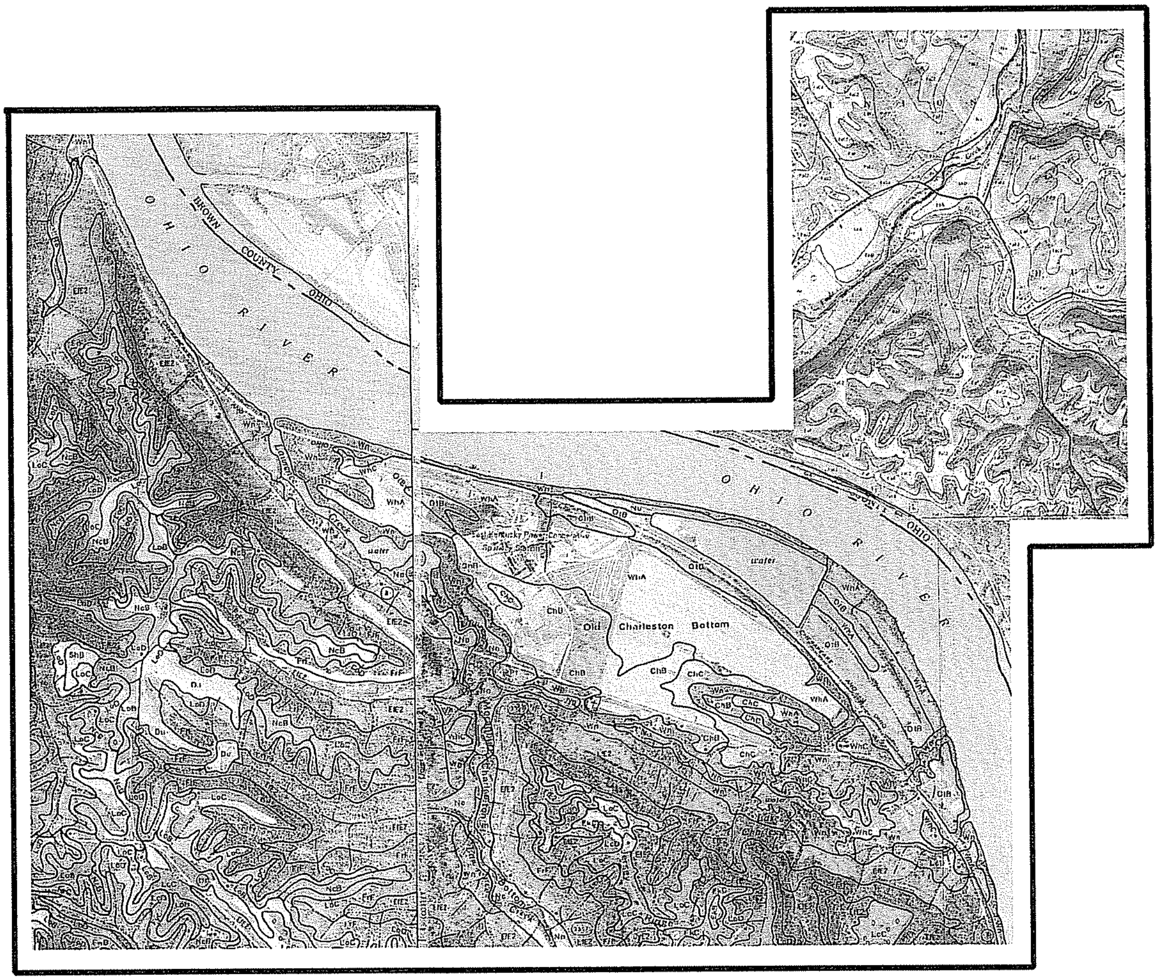
Facilities – Spurlock Station and Transmission Line (Kentucky side)

Soils within the proposed project site have been mapped by the U.S. Department of Agriculture Natural Resources Conservation Service (USDA 1983) (Figure 3.2–4). It is the Quaternary Period materials that formed the soils that dominate Spurlock Station. These soils are the Wheeling-Nolin-Otwell Association and consist of deep, well-drained and moderately well drained soils ranging from nearly level to steep soils that have a loamy subsoil. Long, wide terraces that break into short side slopes and narrow floodplains typically characterize the landscape. The slopes can range from 0 to 55 percent but are predominantly 0 to 6 percent. Most of the soil on the Spurlock Station has been previously graded for construction. As Table 3.2–2 details, the majority of soils in the Wheeling-Nolin-Otwell Association are generally well suited to construction as permeability is moderate and the shrink-swell potential is low. The soil type WhA dominates the Spurlock site and is the soil type on which Units 3 and 4 are to be constructed (see Figure 3.2–4). The proposed transmission line and 150-foot (46-meter) right-of-way are also to be constructed on the Wheeling-Nolin-Otwell soil series.

TABLE 3.2–2.—Soil Characteristics at the Spurlock Station

Soil Type/Soil Series Name(s)	General Description	Percent Slope	Permeability	Runoff	Shrink-Swell Potential	Erosion Factor*	Depth to Bedrock
Silt loam/Wheeling, Wheeling-Nolin							
WhA	Deep, well drained	0-4%	Moderate	Slow	Low	0.28	> 60 in
WhC	Deep, well drained	6-12%	Moderate	Rapid	Low	0.28	> 60 in
Wn	Deep, well drained	0-2%	Moderate	Rapid	Low	0.28	> 60 in
Fine sandy loam/Chavies							
ChB	Deep, well drained	2-6%	Moderately Rapid	Medium	Low	0.24	> 60 in
ChC	Deep, well drained	6-12%	Moderately Rapid	Medium to Rapid.	Low	0.24	> 60 in
Silt loam/Otwell							
OtB	Deep, moderately well drained	2-6%	Very slow	Medium	Low-Medium	0.43	> 60 in
Silt loam/Nolin							
No	Deep, well drained	Nearly level, occasionally flooded	Moderate	Slow	Low	0.43	> 60 in

* Measure of the susceptibility of a soil to sheet and rill erosion by water used by the NRCS of the USDA (USDS 1983). Values range from 0.02 to 0.69 with the higher value indicating more susceptibility of the soil to erosion. Measurement given in table is an average of two to four samples in succeeding depths to bedrock.



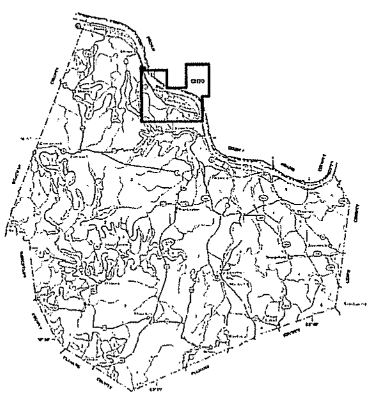


FIGURE 3.2–4.—Soil Classification for the Proposed Project Area in Mason County, Kentucky and Brown County, Ohio.

3.2.4.1 *Prime Farmland Soils - Kentucky*

According to the U.S. Department of Agriculture Soil Survey of Mason County, Kentucky, the WhA, OtB and No soil types that make up the majority of Spurlock Station are considered Prime Farmland soil types. Prime Farmland soils are best suited to producing food, feed, forage, fiber and oilseed crops and are identified as such to assist in meeting the Nation's short- and long-range needs for food and fiber and to facilitate the wise use of our Nation's Prime Farmland (USDA 1983). However, land that has any contiguous unit of 10 acres (4.05 hectares) or more in size that is used for such purposes as industrial or commercial sites cannot be considered Prime Farmland (USDA 1983). The Spurlock Station consists of approximately 2,500 contiguous acres (1,011.7 hectares) and began operations in 1977. Therefore, by definition, the project site is not considered Prime Farmland. In order to confirm this, EKPC requested that the Natural Resources Conservation office in Maysville, Kentucky conduct a Prime Farmland Determination for the affected area. The Natural Resources Conservation Service determination concluded that since this land area is already developed for non-agricultural purposes, it does not fall into the criteria of farmland use, and therefore, it is exempt from the Prime Farmland designation for environmental evaluation (LeGris 2001).

The only soil in the ash landfill classified as a Prime Farmland soil is the NcB, the Nicolson silt loam (USDA 1983). However, because the ash landfill is an existing permitted landfill, no land in the permitted area is classified as Prime Farmland.

Facilities – Landfill

Much of the soil that dominates the ash landfill has already been classified by the Natural Resources Conservation Service as "Dump" (USDA 1983) (see Figure 3.2–4). The Dump soils encompass the three different cells of the ash landfill, Cells A, B and C. Cell A is approximately 57 acres (23 hectares) and is full. EKPC is currently modifying the ash landfill permit with the Kentucky Division of Waste Management to expand Cell A horizontally and Cells B and C horizontally and vertically so that the entire landfill will ultimately be approximately 190 acres (77 hectares).

The landscape in the landfill area is characterized by broad ridgetops breaking into moderately long and short hillsides. The ash is placed in the valleys between the ridgetops. The soils in the area consist of a number of different types that are detailed in Table 3.2–3. In general, the soils are well drained but have a moderately slow to slow permeability, moderate shrink-swell potential and a shallow depth to bedrock. Because of the poor permeability, stormwater runoff is routed to three sedimentation ponds. Two more sedimentation ponds are proposed in the modified permit request.

TABLE 3.2–3.—Soil Characteristics at the Ash Landfill

Soil Type/Soil Series Name(s)	General Description	Percent Slope	Permeability	Runoff	Shrink-Swell Potential	Erosion Factor*	Depth to Bedrock
Flaggy silt clay loam/Eden							
EfE2	Moderately deep, well drained	20-40%	Slow	Rapid	Moderate	0.23	20-40 in
Rock outcrop complex/Fairmount							
FrF	Shallow, well drained	30-65%	Moderately slow or slow	Rapid	Moderate	0.37	10-20 in
Silt loam/Nicholson							
NcB	Deep, moderately well drained	2-6%	Slow	Medium	Low to Moderate	0.42	> 60 in
Silt loam/Lowell							
LoD	Deep, well drained	12-20%	Moderately slow	Rapid	Low to Moderate	0.31	> 40 in
Dump	NA	NA	NA	NA	NA	NA	NA

* Measure of the susceptibility of a soil to sheet and rill erosion by water used by the NRCS of the USDA (USDA 1983). Values range from 0.02 to 0.69 with the higher value indicating more susceptibility of the soil to erosion. Measurement given in table is an average of two to four samples in succeeding depths to bedrock.

Proposed Transmission Line and 150-foot (46-meter) Right-of-Way (Ohio side)

The soils that dominate the proposed transmission line and 150-foot (46-meter) right-of-way in Brown County, Ohio are from the Eden-Pate-Faywood Association distributed as 35 percent Eden soils, 20 percent Pate soils, 20 percent Faywood soils, and 25 percent soils of minor extent (see Figure 3.2–4). This association, formed on limestone and shale geologic formations, is noted by the Natural Resources Conservation Service as formed of soil material and rock fragments that are unconsolidated, weathered or partly weathered and that disintegrate in place and move down to the base of steep slopes by creep, slide or local wash (USDA 1987). The soils in this association, described in detail in Table 3.2–4, while moderately deep to deep and moderately well drained to well drained, are subject to hillside slippage and are considered unsuited to most kinds of building site development (USDA 1987).

3.2.4.2 *Prime Farmland Soils – Ohio*

The NRCS only lists two of the soils of minor extent of the Eden-Pate-Faywood soil series as Prime Farmland in Brown County, Ohio: the silt loam Nolin and the silt loam Sciotoville (ScA) (USDA 1987). As Figure 3.2–4 shows, the No soil, located almost 0.5 miles (0.8 kilometers) from the inter-tie to the existing Stuart-Zimmer 345-kV line, will shirt the edge of the 150-foot (46-meter) right-of-way for the proposed transmission line. The silt loam Sciotoville soil, less than an eighth of a mile wide, is located along the Ohio River. To confirm that these two small soil parcels do not constitute Prime Farmland, EKPC contacted the Natural Resources Conservation Service office in Georgetown, Ohio and requested a Prime Farmland Determination for these areas. The Natural Resources Conservation Service concluded that there is a total of 1.06 acres (0.43 hectares) of Prime and Unique Farmland in Brown County, Ohio that would be affected by the proposed transmission line corridor.

Table 3.2–4.—Soil Characteristics for the Proposed Transmission Line and 150-foot (46-meter) Right-of-Way (Ohio side)

Soil Type/Soil Series Name(s)	General Description	Percent Slope	Permeability	Runoff	Shrink-Swell Potential	Erosion Factor*	Depth to Bedrock
Flaggy silt loam/Eden							
EaE	Moderately deep, well drained	25-40%	Slow	Very rapid	Moderate	0.23	20-40 in
EaF	Moderately deep, well drained	40-70%	Slow	Very rapid	Moderate	0.23	20-40 in
Silt loams/Faywood-Lowell							
FeC2	Moderately deep to deep, well drained	8-15%	Moderately slow or slow	Rapid	Low to Moderate	0.32	Faywood: 20-40 in Lowell: > 40 in
Silt loam/Faywood							
FdD2	Moderately deep, well drained	15-25%	Moderately slow to slow	Very rapid	Low to Moderate	0.30	20-40 in
Silty clay/Pate							
PaC2	Deep, moderately well drained	8-15%	Very slow	Rapid	Moderate to high	0.35	> 50 in
PaE2	Deep, well drained	25-35%	Very slow	Very rapid	Moderate to high	0.35	> 50 in
Silt loam,/Nolin							
No	Deep, well drained	Nearly level, occasionally flooded	Moderate	Slow	Low	0.43	> 60 in
Silt loam/Sciotoville							
ScA	Deep, nearly level, somewhat poorly drained	0-2%	Moderate	Slow	Low	0.37	> 60 in

* Measure of the susceptibility of a soil to sheet and rill erosion by water used by the NRCS of the USDA (USDA 1987). Values range from 0.02 to 0.69 with the higher value indicating more susceptibility of the soil to erosion. Measurement given in table is an average of two to four samples in succeeding depths to bedrock.

3.3 Ecological Resources

The terrestrial and aquatic resources present in the proposed project area that could potentially be affected by the proposed project are described in this section. Much of the information presented is summarized from previous environmental studies of the project area (SCI 1975, 1978). Also discussed are wetlands, other environmentally sensitive areas, and threatened and endangered species.

3.3.1 Terrestrial Resources

3.3.1.1 *Vegetation*

The area around the proposed project area in northern Kentucky and southwestern Ohio is centrally located in the Deciduous Forest Formation of eastern North America. Most of the area was originally a part of the Western Mesophytic Forest, a complex, luxuriant association that covered southwest Ohio, southern Indiana, the southern tip of Illinois, central and western Tennessee, and portions of Kentucky. The Western Mesophytic Forest was comprised of a mosaic of oak-hickory, swamp forest, and mixed mesophytic forest (an association with shared dominance by 25 hardwood species).

Flood Plain Forest. The project area, divided by the Ohio River Valley, includes stands of second growth hardwoods that are scattered throughout the floodplain. These forests include vegetation of variable composition. The most common mature associates are beech mixed with white oak, maple, or elm-ash-buckeye. Several other tree species frequently occur in the bottom land hardwood forest, but do not constitute a dominance. Some of these are: white ash, box-elder, black cherry, American elm, black locust, red maple, sugar maple, silver maple, red mulberry, red elm, hackberry, cottonwood, bitternut hickory, shagbark hickory, red oak, sycamore, black walnut, and black willow. Within the project area, the flood plain forests vary greatly in the number and selection of plants included due to numerous factors such as drainage, soil types, associate species, amount of grazing and time of last timber operation. The flood plain forests are generally found along tributary streams of the area.

Mixed Mesophytic Forest. Adjacent to the river bottoms and making up much of the steeper valley walls are mixed mesophytic forests with plants requiring a basically humid climate with moist, well-drained soils. The mixed mesophytic forests are dominated by broad-leafed deciduous species, but with no single species comprising a very large fraction. Several of the more dominant species include oak, tulip tree, hickory, beech, maple, and some hemlock. The mixture of species in each area depends on such elements as relief, available moisture, and soil type.

Oak-Hickory Forest. The most common forest type in the region is a mixed oak and hickory. This forest type is widespread along ridgetops and invades the flatland prairies and croplands. Various combinations of black oak or scarlet oak, white oak, shagbark hickory, pignut, mockernut, and shellbark make up the dominant species of the forest type. Their associates are maples, black cherry, ash, tulip tree, black walnut, basswood, elm, buckeye, ironwood, and beech.

Shrubs and Vines. Typical shrubs and vines of the region's forests include Virginia creeper, poison-ivy, gooseberry, burning bush or wahoo, black raspberry, spice-bush, elderberry, virgin's bower, greenbrier, bladdernut, grape, and prickly-ash.

Herbaceous Plants. Some typical herbaceous plants of the project area are wild onion, nightshade, crownbeard, scouring rush, snakeroot, manna grass, water leaf, jewelweed, nettle, knotweed, wingstem, and numerous flowers and grasses.

Present Conditions. While most forest associations have been altered by timber harvesting, grazing, and agricultural use within the past 200 years, some isolated remnants occur on the Ohio side of the river. Few such areas occur on the Kentucky side of the river. Within a 20-mile (32-kilometer) radius of the Spurlock Station in Ohio, there are six areas noted for unique vegetation by the Ohio Biological Survey. These are all in Brown County to the northwest of Spurlock Station. The closest is Shot Pouch Run, located approximately 10 miles (16 kilometers) from the station.

3.3.1.2 *Wildlife*

The most abundant game mammal in the basin is the cottontail rabbit that supports the largest amount of hunting. Bobwhite quail and wild turkey are also abundant and are among the most widely hunted game birds. Most ring-necked pheasant hunting is supported by bird release on managed areas. Wild pheasant populations occur only in limited numbers throughout most of the proposed project area.

Gray squirrels are common in forested sections of the area. Fox squirrels are common in farm wood lots, mixed timber and open lands. Large timbered areas in the proposed project area and surrounding areas support huntable populations of turkey and ruffed grouse.

Woodchuck, gray and red fox, raccoon, muskrat, mink and beaver are also popular hunting or trapping game species. Migratory waterfowl and game birds are also plentiful throughout the area at specific times of the year. White-tailed deer is the only big game species hunted in the project area.

Along with these game species, hundreds of non-game species, small rodents, song birds, reptiles, and insects are important in the area.

3.3.2 Aquatic Resources

Indicator fish species which have shown significant increases in abundance since 1900 in the Ohio River include: Skipjack herring (*Alosa chrysochlcris*), Gizzard shad (*Dorosoma cepedianum*), Goldeye (*Hiodon alosoides*), Goldfish (*Carassius auratus*), Carp (*Cyprinus carpio*), Black bullhead (*Icatlurus melas*), Channel catfish (*Ictalurus punctatus*), Orangespotted sunfish (*Lepomis humilis*). Goldfish and carp are introduced species that came to the area around 1880 and were very successful in finding open niches.

Some representative species showing a significant decrease in abundance since 1900 in the Ohio River include: Ohio Lamprey (*Ichthyomyzon bdellium*), Lake sturgeon (*Acipenser fulvescens*), Shovelnose sturgeon (*Scaphirhynchus platorynchus*), Paddlefish (*Polyodon spathula*), Mooneye (*Hiodon tergisus*), Grass pickerel (*Esox americanus vermiculatus*), Muskellunge (*Esox masquinongy ohiensis*), Streamline chub (*Hybopsis dissimilis*), Gravel chub (*Hybopsis x-punctata*), Blue sucker (*Cycleptus elongates*), Harelip sucker (*Lagochila lacera*) - extinct, Spotted sucker (*Minytrema melanops*), Silver redhorse (*Moxostoma anisurus*), Yellow bullhead (*Ictalurus natalis*), Stonecat (*Noturus flavus*), Smallmouth bass, (*Micropterus dolomieui*), Crystal darter (*Ammocrypta asprella*), Mud darter (*Etheostoma asprigene*), Longhead darter (*Percina macrocephala)*, River darter (*Percina shumardi*), Walleye (*Stizostedion vitreum vitreum*), and Freshwater drum (*Aplodinotus grunniens*).

The invertebrate communities present in the Ohio River are also undergoing shifts from their historic profiles. Increased siltation is smothering the rock/sand congregations of Hydra, Vorticella, crayfish, caddis and stone fly larvae, dragonfly naiads, and unionid mollusks. Low oxygen-tolerant animals such as the chrionomid larvae are invading in their place. These benthic animals also reflect a generally low biomass due presumably to their constant disruption by barge turbulence. This is echoed down the food chain by a corresponding low biomass of game fishes. The plankton communities are diverse and apparently not adversely affected by the present water turbidity. Diatoms such as Melosira predominate the phytoplankton while the zooplankton is composed mostly of rotifers like Keratella and Brachionus.

No data are available on the aquatic resources of Lawrence Creek.

3.3.3 Wetlands

The only wetland in the project area is a constructed or man-made one located adjacent to Lawrence Creek at the ash landfill. This wetland is approximately 2 acres (0.8 hectares) in size and serves as a final filter for stormwater runoff from the landfill (see Section 3.5, Water Resources).

Vegetation present in this wetland is typical of wetlands in this region, and includes cattails, arrowroot and various sedges.

3.3.4 Environmentally Sensitive Areas

Environmentally sensitive areas are those areas that have not been set aside as wildlife preserves, critical habitat, or other protected areas, but are deemed to have exceptional biological value. Some examples are bird rookeries, areas containing rare plant species, or other areas providing exceptional wildlife habitat.

There are no environmentally sensitive areas within the area potentially affected by the proposed project.

3.3.5 Threatened and Endangered Species

Spurlock Station

Within Mason County, five endangered species can or possibly can occur: one bat (Indiana bat [*Myotis sodalis*]), two mussels (Fanshell [*Cyprogenia stegaria*]), and Clubshell [*Pleurobema clava*]), and two plants (Short's goldenrod [*Solidago shortii*] and Running Buffalo-clover [*Trifolium stoloniferum*]).

Of these listed species, only the Indiana bat may occur at the 2,500-acre (1,011-hectare) Spurlock Station. The closest critical habitat for this species is located in Carter County, Kentucky, approximately 50 miles (80 kilometers) southeast of the station. No known suitable habitat (i.e., roost trees or caves) is present at the areas of the station that will be affected by the proposed project. At the generating units site, no Indiana bats would be expected because of the industrial nature of the operations in the immediate area. Similarly, the unvegetated nature of the ash landfill and its operations make this area unsuitable for the Indiana bat.

Some field investigations have been conducted concerning the as yet undisturbed portions of the ash landfill. As part of the Flue Gas Desulfurization Effluent and Fly Ash Disposal Feasibility Study (1978), field investigations were conducted at the site of the current ash landfill. After the field investigation and confirmation of findings by the Kentucky Department of Fish and Wildlife Resources, it was determined that this area does not support unique habitats. Instead, the habitat was very similar to that found throughout northeast Kentucky and southeast Ohio. The study concluded that while the potential exists for suitable habitat for the Indiana bat, no caves or extensive ledge formations were observed during field investigations of potential disposal sites. Therefore, the presence of the Indiana bat appeared unlikely.

Transmission Line in Brown County, Ohio

Correspondence with the U.S. Fish and Wildlife Service indicates that only the Federally endangered Indiana bat is the only threatened or endangered species known to occur in Brown County, Ohio (Lammers 2001). (See Appendix B for a copy of the letter.) There are no Federal wildlife refuges, wilderness areas, or critical habitat within the vicinity of this project (Lammers 2001).

On October 11, 2001 as part of this environmental assessment, Josh Young and Seth Bishop, Biologists with the Natural Resources and Environmental Communications Department of EKPC, conducted a field survey of the proposed 150-foot (46-meter) right-of-way in Brown County. The area was surveyed for the potential occurrence of the federally endangered Running Buffalo-clover (*Trifolium stoloniferum*), habitat for the endangered Indiana Bat, and other special interest species or habitats. The following is a summary of the survey results.

Ninety-five percent of the proposed corridor is currently being used as cropland, open pasture, or is newly regenerated scrubby forest. Open brushy fields and farmland comprise about 70 percent of the habitat. The majority of the open habitat consisted of fescue (*Festuca arundinacea*) dominated ridge tops. Invasive brushy species such as eastern red cedar (*Juniperus virginiana*), black locust (*Robinia pseudoacacia*), and *Rubus sp.* characterized the remaining open areas. No federally threatened or endangered species or habitats of special interest were identified with these portions of the proposed corridor.

The remaining five percent of the corridor is comprised of the following plant communities. Dominating the wooded south-facing ridge located just north of the Ohio River and east of the existing Kentucky Utilities 138-kV transmission corridor, were very large older growth trees, most having a diameter at breast height of greater than 20 inches. This habitat can be characterized as a maple/oak/hickory dominated hardwood forest with very little understory and sporadic limestone outcrops. The principal overstory species is red maple (*Acer rubrum*), making up approximately 75 percent of the trees present. Other species encountered in the overstory were chinquapin oak (*Quercus muehlenbergii*), bitternut hickory (*Carya cordiformis*), and Ohio buckeye (*Aesculus glabra*). The understory has very sparse vegetation with the dominant species being Red Bud (*Cercis canadensis*), Pawpaw (*Asimina triloba*), and young trees of the overstory species. During the summer months this habitat may be occupied by the Indiana bat. The Indiana bat, if present, would forage within the area and use trees with exfoliating bark for roost sites.

The western side of the existing Kentucky Utilities line contained a large number of trees that were downed or killed by a landslide Approximately 20 trees in this area are snags with exfoliating bark that could provide potential roost sites for the Indiana bat Additionally, the Indiana bat, if present, may use this area for foraging. A copy of the field survey report is available from EKPC Headquarters.

3.4 CULTURAL RESOURCES

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. Cultural resources include expressions of human culture and history in the physical environment such as prehistoric or historic archaeological sites, buildings, structures, objects, districts, or other places including natural features and biota that are considered to be important to a culture, subculture, or community. Cultural resources also include traditional lifeways and practices, and community values and institutions.

The identification of cultural resources and Federal agency responsibilities with regard to cultural resources are addressed by a number of laws, regulations, executive orders, programmatic agreements and other requirements. The principal Federal law addressing cultural resources is the *National Historic Preservation Act* of 1966, as amended (16 United States Code [USC] Section 470). The implementing regulations, found at 36 Code of Federal Regulations 800, effective January 11, 2001, describe the process for identification and evaluation of historic properties; assessment of the effects of Federal actions on historic properties; and consultation to avoid, reduce, or minimize adverse effects. The term "historic properties" refers to cultural resources that meet specific criteria for eligibility for listing on the National Register of Historic Places. This Section 106 process does not require preservation of historic properties, but does ensure that the decisions of Federal agencies concerning the treatment of these places result from meaningful considerations of cultural and historic values and of the options available to protect the properties.

The identification and evaluation of cultural resources for National Register of Historic Places - eligibility is the responsibility of the Federal agency with the concurrence of the State Historic Preservation Officers. For this project, the appropriate State Historic Preservation Officers (SHPOs) are those from Ohio and Kentucky. The Section 106 process is a parallel requirement, independent of the *National Environmental Policy Act* process, which must be completed prior to constructing the project. The Advisory Council on Historic Preservation, an independent Federal Agency, administers the provisions of Section 106 of the *National Historic Preservation Act* regarding cultural resources and has review and oversight responsibilities defined in 36 Code of Federal Regulations 800.

3.4.1 Spurlock Station Area

Spurlock Station is located north of Highway Route 8, 4.5 miles (7.2 kilometers) southwest of Maysville in Mason County, Kentucky. The project area lies on the northeastern edge of the Outer Bluegrass Region of central Kentucky. Portions of the project area occupy the Ohio River floodplain as well as a low eroded hill overlooking the river valley.

The archaeology of Mason County, Kentucky has been studied by many dating back to as early as 1824. Mason County contains cultural evidence of prehistoric, protohistoric, and historic significance. The exact number of archaeological site types (prehistoric, protohistoric, and historic) and site locations in Mason County are not known. Mason County was one of the richest counties in Kentucky for prehistoric occupation (Funkhouser and Webb 1932). The entire region is thickly covered with mounds, cemeteries, and village sites and some of these localities have yielded the largest numbers and finest artifacts that have ever been found in the Mississippi Valley (Carstens and Jenings 1978). The most numerous of all archaeological sites in Mason County are from the Woodland Period (1000 BC to 900 AD). Cultural artifacts from this period include rounded- or conically-shaped burial mounds. Several mounds on or around Lawrence Creek and one mound on Beasley Creek were reported (Funkhouser and Webb 1932).

The surface area of the proposed project area has been disturbed by prior site development. Prior to September 2001, no cultural resource surveys have been conducted at the Spurlock Station site. However, because of the potential for buried archaeological resources to occur below the previously disturbed zone, and since no archaeological investigations were conducted prior to the initial construction of the Spurlock Station, the SHPO recommended deep backhoe testing of the Gilbert Unit 3 footprint to determine if buried archaeological sites eligible for listing in the National Registry of Historic Places were present. A Phase I investigation was conducted in September 2001. Three backhoe trenches were excavated at the proposed plant site to the undisturbed area underlying the previously disturbed ground surface. Trenches were excavated to a minimum depth of 8 ft (2.4 m). The Phase I investigation found that surface soils had been previously disturbed to a depth of 2 to 3 ft (0.6 to 1 m). No evidence of buried cultural resources was found in the excavated areas (Gray & Pape, Inc. 2001). The Kentucky SHPO concurs with this finding. (See letter of concurrence in Appendix B). A copy of the Phase I report is available from EKPC Headquarters.

Archaeological surveys have been conducted in and around Spurlock Station in Beasley Creek Hollow which is located about 0.5 miles (0.8 kilometers) west of the Spurlock Station site and in the area around the ash landfill. An archaeological surface reconnaissance of Beasley Creek Hollow, was conducted by Carstens and Jenings in 1977. Beasley Creek is believed to have been an ideal location for prehistoric settlement due to its past climatic conditions and favorable environment.

Carstens and Jenings' archaeological survey of Beasley Creek found 12 prehistoric, 1 protohistoric (cemetery site) and no historic sites above the 860-foot (262-meter) contour adjacent to Beasley Creek. Three historic sites were located at elevations lower than the 860-foot (262-meter) contour. Two of the three historic sites were being dismantled (a 20th century barn and a late 19th century log cabin with barn). The late 19th century log cabin with barn and/or tool shed foundations was being reconstructed elsewhere in Mason County. The third site was a crude limestone retaining wall within Beasley Hollow, believed to have been erected to prevent mudslides.

Consultations have not yet been conducted with the Kentucky SHPO to determine whether additional identification efforts (such as further backhoe testing) would be needed for the areas where Unit 4 and other supporting facilities at Spurlock Station would be sited. This determination will be made and followed through, as appropriate, prior to the construction of Unit 4. Because of the surface site disturbance and current land use, no other kinds of identification efforts (such as Native American consultations on traditional cultural use, or historical building surveys) are expected to be warranted for the Spurlock Station site.

3.4.2 Transmission Line

A new 345-kV transmission line is proposed to connect Units 3 and 4 at Spurlock Station in Kentucky, to the Stuart-Zimmer 345-kV Line in Brown County, Ohio. The centerline of the proposed transmission line, which would cross the Ohio River, has not yet been finalized and the cultural resource identification and consultation process is in its early stages for the transmission line portion of the project.

Prior to beginning clearing or construction activities on the proposed transmission line, consultation will be conducted with the SHPOs of Kentucky and Ohio to determine the scope of the cultural resource identification efforts for the transmission line portion of the project, define the area of potential effect, and identify any parties that should be consulted regarding this undertaking. The appropriate identification effort for this undertaking would likely include archival research to determine past land uses and settlement, review of relevant archaeological and historical studies, consultation with Native American or other groups with traditional ties to the area, and pedestrian archaeological survey of lands that would be directly disturbed by constuction and maintenance of the proposed transmission line. The timing of the identification effort and evaluation of any resources for NRHP eligibility or significance to a Native American group can be phased in agreement with the SHPOs.

The proposed transmission line into Brown County, Ohio would traverse land that has similar past environmental conditions to those described for the Spurlock Station site. This dynamic riverine environment provided an array of resources that supported extensive prehistoric settlement. Likewise these resources were attractive to later EuroAmerican settlers and traders. It is possible that cultural resources requiring evaluation and effect determinations are present in the proposed transmission line corridor.

3.5 WATER RESOURCES

In this section, the water resources potentially affected by the proposed project are discussed. Both surface water and groundwater are used for Units 1 and 2 at the Spurlock Station. The primary water source for those units is groundwater. The primary water source for the proposed Units 3 and 4 will be surface water.

3.5.1 Surface Water

Spurlock Station is located on the floodplain of the Ohio River at the U.S. Geologic Survey 414 mile mark. The site has river frontage from approximately U.S. Geologic Survey 414.7 to 412.7 mile mark. Lawrence Creek is located on the Spurlock Station site at approximately the U.S. Geologic Survey 415.3 mile mark. The river valley extends in a general southeast to northwest direction and the floodplain areas are primarily open terrain. Surface runoff drainage for the Spurlock Station plant area is to the Ohio River, while that from the ash landfill is to Lawrence Creek, which then drains into the Ohio River. In Brown County, Ohio, two perennial surface water bodies are located near the proposed transmission line corridor. They are Beetle Creek, which the proposed transmission line corridor would cross, and Eagle Creek, about 0.75 miles (1.2 kilometers) west of the proposed transmission line corridor.

Elevations on the Spurlock Station site range from 500 to 550 feet (152 to 168 meters) above msl. According to the U.S. Army Corps of Engineers' floodplain designation maps, the 100-year floodplain reaches an elevation of 514 feet (156 meters) above msl and the 500-year floodplain reaches an elevation of 520.5 (158 meters) above msl on both the Kentucky and Ohio sides of the Ohio River. The ash pond is located within both the 100-year and 500-year floodplain with the 500-year floodplain extending to just beyond the railroad tracks to the south.

According to the Ohio Department of Natural Resources, the 100-year floodplain in Brown County, Ohio without the floodway reaches an elevation of 514.8 feet (156.9 meters). The floodway adds additional width to the floodplain because it includes the stream channel and adjacent floodplain area that is required to pass the 100-year flood without unduly increasing flood heights. This is the hazardous portion of the floodplain where the fastest flow of water occurs. With the floodway included, the 100-year floodplain in Brown County is 515.6 feet (157.1 meters) above msl (ODNR 2001).

According to the Kentucky Geologic Survey, the average 2-year flood of the Ohio River reaches an elevation of 502 feet (153 meters) above msl at Maysville, which is 4.5 miles (7.2 kilometers) southeast of the Spurlock Station. The 502-foot (153-meter) flood level is considered the upper local limit of the modern floodplain, although less frequent floods may cover lower terraces and deposit or erode a thin layer of mud. The highest recorded flood in the area occurred in 1937 before the construction of the downstream Meldahl Lock and reached about 527 feet (160 meters) at Maysville (KDS 1972).

The flow of the Ohio River past Spurlock Station is now controlled by two locks: the upstream Greenup Locks and Dam on the U.S. Geologic Survey 341 mile mark of the Ohio River operational in 1963 and the downstream Meldahl Locks and Dam on the U.S. Geologic Survey

436 mile mark operational in 1964. The minimum 7-day 10-year low-flow between the Greenup and Meldahl is 6.3 billion gallons per day (25.9 billion liters per day) (ORSANCO 2000). The two dams control the flow of the Ohio River and keep the normal pool of the Ohio River at about 485 feet (148 meters) above msl (SCI 2001). The minimum 7-day 10-year low-flow at the Spurlock Station is 6.3 billion gallons per day (23.9 billion liters per day) (KY NREPC 2000).

The Spurlock Station has an intake structure on the Ohio River that currently withdraws 3.5 million gallons per day (MGD) (13.2 million liters per day [MLD]) for the operation of Units 1 and 2. The intake structure was constructed in 1992 to supplement the use of groundwater for the units.

Surface Water Quality

The State of Kentucky designates surface waters as having one or more specific legitimate uses. These uses are: Warm Water Aquatic Habitat; Cold Water Aquatic Habitat, Primary Contact Recreation; Secondary Contact Recreation; Domestic Water Supply; and Outstanding State Resource Water (401 KAR 5:026). The Ohio River in the vicinity of the Spurlock Station is designated as Warm Water Aquatic Habitat and Primary/Secondary Contact Recreation (KY NREPC 2000). In order to maintain the river's specific use designation, the river must meet certain physical, chemical, and biological water quality characteristics. Near the project site, there are several municipal and industrial sources that discharge treated wastewater to the Ohio River. All wastewater sources must comply with the KPDES permits to assist in maintaining the water quality standards and designation.

Pursuant to Section 303(d) of the *Clean Water Act*, the State of Kentucky has developed a list of waterbodies presently not supporting designated uses based on the monitoring and data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO 2000). Ohio River Valley Water Sanitation Commission was established in 1948 to control and abate pollution in the Ohio River Basin and has an interstate commission representing eight states (Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, and West Virginia) and the Federal Government. Ohio River Valley Water Sanitation Commission operates programs to improve water quality in the Ohio River and its tributaries, including setting waste water discharge standards; performing biological assessments; monitoring for the chemical and physical properties of the waterways; and conducting special surveys and studies.

Ohio River Valley Water Sanitation Commission monitoring indicated impairments on all Ohio River segments for fish consumption, aquatic life, or contact recreation. For these reasons, all Ohio River segments are included in the 303(d) *Clean Water Act* list (KDNR 1998). The entire length of the Ohio River bordering Kentucky is listed as partially supporting fish consumption use due to a limited fish consumption advisory. Fish tissue levels of polychlorinated biphenyls and chlordane are too high for unrestricted fish consumption. However, recent Ohio River Valley Water Sanitation Commission fish tissue sampling has shown a downward trend in polychlorinated biphenyls and chlordane concentrations in Ohio River fish. A review of the Spurlock Station KPDES permit by the Kentucky Division of Water in June 2000 indicated that no discharges from the station contained polychlorinated biphenyls or chlordane, but both the Ohio River and Lawrence Creek remain designated as Water Quality Limited.

3.5.2 Groundwater

The alluvium and glacial outwash on which the Spurlock Station is located are noted by the Kentucky Geologic Survey to be the best source for groundwater in Mason County (KGS 1978). The water is hard or very hard but otherwise of good quality. In August 1975, a Comprehensive Foundation Investigation of Spurlock Station was conducted and 30 separate exploration test soil borings were drilled to depths ranging from 20 to 145 feet (6 to 44 meters) below the existing ground surface. Groundwater was observed at elevations between 485 to 508 feet (148 to 155 meters) above msl and at a depth ranging between 19 to 48 feet (6 to 15 meters) below the existing ground surface (D&M 1975).

Spurlock Station withdraws 10 MGD (38 MLD) of groundwater before clarification to operate Units 1 and 2. The groundwater is drawn from 14 of 16 wells located on the north, south and east sides of the ash pond and in the vicinity of the coal storage area. Each well has the capacity to produce 850 to 1,000 gallons per minute (gpm) (3,217 to 3,785 liters per minute [lpm]) with an average of 850 gpm (3,217 lpm) for meeting peak needs (SCI 1975). Two of the wells were discontinued from use due to high nitrate concentrations (Holloway 2001).

Wells range in depth from 80 to 110 feet (24 to 33 meters) with wells 2 to 6 and 14 to 16 hydraulically connected to the Ohio River. All wells have been in use for 20 to 30 years. According to Spurlock Station personnel, there has been no drawdown of water levels over the years.

Monitoring wells have been drilled near the ash landfill to monitor for groundwater contaminants. See Section 3.11.1, Ash Disposal, for a full description.

3.5.3 Wastewater and Stormwater

Three types of effluents are produced at the Spurlock Station: facility generated or process wastewater, sanitary wastewater, and stormwater runoff. The sources of the former two are listed in Table 3.5–1. Monitoring points and requirements are discussed at the end of this subsection.

TABLE 3.5–1.—Facility Wastewater and Stormwater Runoff Sources

Process Wastewater	Site Generated Stormwater Runoff
Boiler Blowdown	Site Stormwater Runoff (including a 7.5 acre [3-hectare] switchyard)
Cooling Water Blowdown	Material Storage Runoff
Demineralizer Regeneration	Ash Landfill Runoff
System Chemical Cleaning Rinse Water	Ash Pond Surface Runoff
Plant Drains	Coal Storage Pile Runoff
Sanitary Systems	Emergency Coal Pile Runoff

Process Wastewater

Process wastewater is created by the recirculated water systems of Units 1 and 2. After water enters the boiler and is converted to steam to turn the turbines, the steam then enters the

condenser for conversion to water again. Some of this water is returned to the boiler to become steam for the turbines again and some is sent to the mechanical draft cooling towers. Still other water is sent to cool other equipment such as the generator and turbine oil and compressor cooling systems. Blowdown, generated by both the boiler and cooling towers, is the water removed from those systems after it has served its cooling purpose. Blowdown contains three to four times the amount of dissolved and suspended solids than fresh water and it is removed to prevent buildup within the machinery.
The boiler, cooling towers and condenser systems must be treated to prevent corrosion, scale deposits, sediment deposits and biological deposits. Demineralizers are used to treat water in the boiler cycle with demineralizer regeneration waste generating about 7,000 to 15,000 gallons per day (26,498 to 56,781 liters per day). Other system chemical cleaning rinse water includes chlorine that is used intermittently to control algae in the cooling towers and corrosion inhibitors used throughout the entire system.

All process water effluents for the plant eventually flow to the secondary lagoon and then through a permitted outfall and finally to the Ohio River. The water sources are: (1) boiler blowdown, (2) cooling tower blowdown, (3) clarifier blowdown, (4) reverse osmosis (RO) and demineralizer regeneration and rinse, (5) plant drains, and (6) system chemical cleaning rinse water. The boiler water and plant drains flow into a 750,000-gallon (2,839,050-liter) primary lagoon. This lagoon provides a retention area so that inadvertent discharges can be treated before final discharge. From this lagoon, the effluent flows to a 1,500,000-gallon (5,678,100-liter) secondary lagoon, where it mixes with cooling water and ash sluice water. Clarifier blowdown and ash water are pumped to the 50-acre (20-hectare) ash pond. Demineralizer effluent is neutralized before being pumped to the ash pond. RO pretreatment and rinse waters are also pumped to the ash pond, as are chemical cleaning rinse waters. Through sedimentation, the ash pond allows all solids to settle out before the water is pumped back to the secondary lagoon for monitoring and subsequent discharge into the Ohio River.

Currently, 2.5 MGD (9.5 MLD) of process wastewater is generated. Approximately 10,000 gallons per day (37,854 liters per day) of sanitary wastes are generated by plant washrooms, toilets and drinking fountains. This effluent is collected in the sanitary sewer system that discharges to the Maysville Water Treatment Plant.

Stormwater Runoff

As shown in Table 3.5–1, stormwater runoff from the Spurlock Station originates in several different areas. Stormwater runoff from the main plant area is routed to a culvert under the old Chesapeake and Ohio Railroad tracks (currently operated by CSX Transportation, Inc.) that discharges to the Ohio River through a KPDES permitted outfall that is monitored.

Runoff from the coal storage pile is directed to a holding pond, the Coal Storage Holding Pond. Liquid from this pond and the ash pond is pumped into the secondary lagoon. However, because of evaporation, it is sometimes necessary to pump water from the secondary lagoon into the ash pond to maintain an adequate water level.

Runoff from the ash landfill is channeled to three sedimentation ponds and a man-made wetland before it is discharged to Lawrence Creek. The man-made wetland increases retention time and facilitates metals removal. From Lawrence Creek, the runoff flows into the Ohio River.

Monitoring and Treatment Requirements

All wastewater sources, monitoring and treatment requirements, and outfall points are defined in the Spurlock Station KPDES permit and are summarized in Table 3.5–2. The Spurlock Station KPDES permit was reviewed and reissued effective November 1, 2000 and expires midnight April 30, 2004. Apart from the effluent limitations and monitoring requirements outlined in Table 3.5–2 for each specific outfall, the permit requires the Spurlock Station to develop and implement a Best Management Practices plan consistent with 401 KAR 5:065, Section 2(10) pursuant to KRS 224.70-110, to prevent, or minimize the potential for, the release of pollutants; install Best Practicable Control Technology Currently Available and Best Available Technology Economically Achievable for Unit 1, an existing source subject to the requirement of 40 CFR 423 for Steam Electric Power Generating Point Source Category; adhere to the specific requirements of the New Source Performance Standards for Unit 2, a new source subject to the requirements of 40 CFR 423.15; and initiate a series of biomonitoring acute toxicity tests to evaluate the wastewater toxicity of the discharge from Outfall 001.

TABLE 3.5–2.—Outfall Sources and Monitoring and Treatment Requirements

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
001	Combined wastewaters of ash pond overflow (ash transport waters, low volume wastes, coal pile runoff, and storm water runoff), cooling tower waters (Outfalls 002, 003) and metal cleaning wastes (Outfall 004)	Sedimentation and neutralization are provided to the combined wastewater	Ohio River between the USGS mile marks 414 and 413

Effluent Characteristics	Discharge Limitations: Monthly Average	Discharge Limitations: Daily Maximum	Monitoring Requirements: Measurement Frequency	Monitoring Requirements: Sample Type
Flow (MGD)	Report	Report	Continuous	Recorder
Total Suspended Solids	30 mg/l	62 mg/l	1/Month	Grab
Oil & Grease	6.2 mg/l	6.2 mg/l	1/Month	Grab
Temperature (°F)	95 °F	100 °F	1/Month	Grab
Total Copper	1.0 mg/l	1.0 mg/l	1/Batch	Grab
Total Iron	1.0 mg/l	1.0 mg/l	1/Batch	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Month	Grab
Total Recoverable Metals* (mg/l)	Report	Report	1/Quarter	Grab
Acute Toxicity	N/A	1.00 TU_A	1/Quarter	2 Grabs

TABLE 3.5–2.—Outfall Sources and Monitoring and Treatment Requirements (continued)

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
002	Cooling Tower Waters (Blowdown)	Shock Chlorination and screening.	Outfall 001
003	Cooling Tower Waters (Blowdown)	Shock Chlorination and screening.	Outfall 001

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	Continuous	Recorder
Free Available Chlorine	0.2 mg/l	0.5 mg/l	Occurrence+	Multiple Grab
Total Residual Chlorine	Report	0.2 mg/l	Occurrence	Multiple Grab
Time of Chlorine Addition (minutes/day/unit)	N/A	120	Occurrence	Log
Priority Pollutants** (mg/l)	Report	Report	1/Year	Grab
Total Chromium	0.2 mg/l	0.2 mg/l	1/Year	Grab
Total Zinc	1.0 mg/l	1.0 mg/l	1/Year	Grab

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
004	Metal Cleaning Wastes	Batch chemical precipitation of metal cleaning wastes	Outfall 001

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Batch	Instantaneous
Total Copper	1.0 mg/l	1.0 mg/l	1/Batch	Grab
Total Iron	1.0 mg/l	1.0 mg/l	1/Batch	Grab

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
005	Coal Pile Runoff Pond Emergency Overflow	No additional treatment	Ohio River between the USGS mile marks 414 and 413

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Discharge	Instantaneous
Precipitation (inches)	Report	Report	1/Discharge	Grab
Total Suspended Solids (mg/l)	Report	Report	1/Discharge	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Discharge	Grab
Total Recoverable Metals* (mg/l)	Report	Report	1/Discharge	Grab
pH (standard units)	Report	Report	1/Discharge	Grab

TABLE 3.5–2.—Outfall Sources and Monitoring and Treatment Requirements (continued)

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
006	Substation Stormwater runoff	Untreated	Outfall 001

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Quarter	Instantaneous
Precipitation (inches)	Report	Report	1/Quarter	Grab
Settleable Solids (mg/l)	Report	Report	1/Quarter	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Quarter	Grab
pH (standard units)	Report	Report	1/Quarter	Grab

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
007	Reverse osmosis reject waters	Ion exchange	Ohio River between the USGS mile marks 414 and 413

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Quarter	Instantaneous
Dissolved Solids (mg/l)	Report	Report	1/Quarter	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Quarter	Grab
Total Recoverable Metals* (mg/l)	Report	Report	1/Quarter	Grab

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
008	Ash Landfill Runoff	Sedimentation	Lawrence Creek

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Quarter	Instantaneous
Precipitation (inches)	Report	Report	1/Quarter	Grab
Total Suspended Solids (mg/l)	35 mg/l	70 mg/l	1/Quarter	Grab
Total Recoverable Metals* (mg/l)	Report	Report	1/Quarter	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Quarter	Grab
	Report	Report	1/Quarter	Grab

Outfall Number	Contents	Existing Pollution Abatement Facilities	Discharge Point
009	Plant intake	N/A	N/A

Effluent Characteristics	Discharge Limitations		Monitoring Requirements	
	Monthly Average	Daily Maximum	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	Continuous	Recorder
Temperature (°F)	Report	Report	Continuous	Recorder
Total Suspended Solids (mg/l)	Report	Report	1/Month	Grab
Hardness (as mg/l $CaCo_3$)	Report	Report	1/Month	Grab
Total Recoverable Metals* (mg/l)	Report	Report	1/Month	Grab
pH (standard units)	Report	Report	1/Quarter	Grab

*Total Recoverable Metals: Metals, Cyanide and Total Phenols (Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium and Zinc).
**Priority Pollutants: the 126 pollutants listed in 40 CFR 423 Appendix A.
[+]Occurrence: during periods of chlorination.

3.6 LAND USE

This section discusses the existing land use resources in the vicinity of the Spurlock Station and the proposed transmission line corridor crossing into Brown County, Ohio. The discussion also includes a description of recreational resources within the project vicinity.

3.6.1 Facilities

The Spurlock Station is located on an approximately 2,500-acre (1,011-hectare) property owned by EKPC along the south side of the Ohio River within Mason County, Kentucky. The EKPC property currently includes two coal-fired boilers, associated control equipment, a substation, a coal stockpile and handling system, a tailings pond, stormwater runoff ponds, and cooling towers. In addition, the ash disposal landfill on the property currently encompasses approximately 190 acres (77 hectares). The balance of the property is open and forested land with multiple double circuit transmission lines extending south from the substation. The property is bordered to the north by the Ohio River. To the east of the generating station is Inland Paperboard and Packaging, a paper products recycling and manufacturing facility. The Inland property contains a section of cultivated land facing the EKPC property. The areas to the south and west of the property are primarily agricultural land, intermixed with wooded hills and scattered residences. Lawrence Creek and numerous smaller creeks traverse the area. The downtown district of the city of Maysville is approximately 4.5 miles (7.2 kilometers) southeast of the Spurlock Station. Highway 8, connecting Spurlock Station to downtown Maysville, travels along the Ohio River through forested land, with occasional residences and commercial facilities.

The land area proposed for the new Units 3 and 4 and associated facilities is within the existing EKPC property, adjacent to the existing Unit 2. The land area has been previously disturbed and graded. The area to the east of the existing boilers that would contain the additional cooling towers has also been previously graded and is currently maintained with vegetation. A gated perimeter fence surrounds the EKPC property.

3.6.2 Transmission Line

The proposed route for the 3.5-mile (5.7-kilometer) 345-kV transmission line extends northeasterly from the generating station across the Ohio River and into Brown County, Ohio, where it will interconnect with the existing power grid. As it exits the EKPC property, the proposed transmission line would parallel existing railroad tracks and cross cultivated open land on the Inland Paperboard and Packaging industrial property. The proposed transmission line would then turn northeast and cross the Ohio River paralleling on either the east or west side an existing Kentucky Utilities 138-kV Transmission Line. The land use on the north side of the Ohio River is primarily forested land with agricultural land interspersed. Scattered residences are located along the Ohio River and along Flaugher Hill Road and Scoffield Road traversing the area. The forested land along the proposed route currently contains an approximately 150-foot (46-meter) wide cleared right-of-way for the existing Kentucky Utilities Transmission Line.

Recreation. The Ohio River in the vicinity of the EKPC property is used for recreational boating. Numerous boat launches and public access sites are located in the area. Eagle Creek, an Ohio River tributary 2 miles (3 kilometers) northwest of the EKPC property, has a public access site for fishing, sailing, canoeing, water skiing, and picnicking. Lake Charles, 1 mile (0.6 kilometers) southeast of the EKPC facility, is also utilized for similar recreation. There are no Kentucky State Parks within 50 miles (82 kilometers) of the EKPC property. The Daniel Boone National Forest is approximately 25 miles (41 kilometers) to the southeast of Maysville. In Ohio, the Wayne National Forest and Shawnee State Forest are both over 50 miles (82 kilometers) east of the proposed project area. There are no National Wildlife Refuges or Native American Lands in the vicinity of the proposed project.

3.7 VISUAL RESOURCES

This section discusses the existing visual resources in the vicinity of Spurlock Station and proposed transmission line corridor crossing into Brown County, Ohio. The discussion includes evaluation of the quality of the existing landscape and the sensitivity of the existing visual resources to change associated with the proposed project.

In evaluating the visual quality of the existing landscape and modifications, the following aesthetic values are considered:

- Form (topographical variation, mountains, valleys)
- Line/Pattern (ridges, rivers, roads, pipeline and transmission line corridors)
- Color/Contrast (brightness, diversity)
- Texture (vegetation, buildings, disturbed areas)

The sensitivity of the existing visual resources to change associated with the proposed project is based upon a number of factors: (1) the extent to which the existing landscape is already altered from its natural condition; (2) the number of people within visual range of the area, including residents, highway travelers, and those involved in recreational activities; and (3) the degree of public and agency concern for the quality of the landscape.

3.7.1 Facilities

Spurlock Station is located on an approximately 2,500-acre (1,011-hectare) piece of property along the south side of the Ohio River within Mason County, Kentucky. The property is on the northern edge of the Outer Bluegrass Physiographic Region, characterized by a rolling plateau that becomes more rugged near the edges. The EKPC property and surrounding area is a mixture of wooded hills and valleys, agriculture and low-density residences, and industry along the Ohio River. The topography of the land is dominated by the bluffs of the Ohio River Valley, at heights of up to 400 feet (120 meters). Lawrence Creek and numerous smaller creeks traverse the area. The Ohio River is approximately 0.25 miles (0.41 kilometers) wide along the EKPC property line. The downtown district of the city of Maysville is approximately 4.5 miles (7.2 kilometers) southeast of the Spurlock Station.

Spurlock Station is accessed through a gated perimeter fence and access road. The most visible features of the existing facilities include a 17-story cream colored building, two 805-foot (245-meter) cement stacks, and clouds of steam rising into the air from the cooling towers. These features are visible from portions of Highway 8 and Highway 52 (along the south and north sides, respectively, of the Ohio River), including several residences in the area. Views in the area are partially obscured by the hilly terrain and trees in the area.

There are 19 designated scenic byways located throughout Kentucky, though none are located within Mason County. In Ohio, the Ohio River Scenic Route has been designated as a National Scenic Byway, with almost continuous views of the Ohio River stretching for 462 miles (758 kilometers) from Cincinnati to Pennsylvania. Highway 52, from which there are partial views of the proposed project site, is included in this scenic byway.

The nearest national forest to the proposed project is the Daniel Boone National Forest, approximately 25 miles (41 kilometers) southeast of Maysville. There are nine sections of river designated as Kentucky Wild Rivers, characterized by undisturbed shorelines and vistas. The Red River, which runs through the Daniel Boone National Forest, is the closest Kentucky Wild River to the project site. For a complete discussion of recreational activities in the proposed project vicinity see Section 3.6, Land Use.

3.7.2 Transmission Line

The proposed route for the 3.5-mile (5.6-kilometer) 345-kV transmission line extends northeasterly from the project site across the Ohio River and into Brown County, Ohio, where it will interconnect with the existing power grid. The area crossed by the proposed transmission line is also within the Outer Bluegrass Physiographic Region, of the same character as surrounding the EKPC site. An existing Kentucky Utilities 138-kV Transmission Line crosses the Ohio River and parallels the proposed route, along a 150-foot (46-meter) wide cleared right-of-way through a mixture of agricultural and forested land. Multiple residences are contained within the viewshed of the existing transmission line, including several along the north bank of the Ohio River directly across from Spurlock Station.

3.8 SOCIOECONOMICS

This section describes current socioeconomic conditions within a region of influence where the majority of the Proposed Action workforce is expected to reside, based on proximity to the site and data received from EKPC. EKPC has indicated that all labor for construction of the project would be supplied from labor unions based in Cincinnati, Ohio and it is expected that individuals working on the construction of the two new units are currently employed in construction work on the Spurlock Station site. This requires an analysis of the area between the Cincinnati Metropolitan Area and the project site location in Maysville, Kentucky. Due to the size of the metropolitan area, only those counties considered central in the Cincinnati Metropolitan Area were included in the determination of the region of influence. The region of influence is therefore established as a nine-county area comprised of Boone, Bracken, Campbell, Kenton, Mason, and Pendleton Counties in Kentucky and Brown, Clermont, and Hamilton Counties in Ohio. The region of influence covers an area of 2,636 square miles (6,827 square kilometers) around the project site (Census 2001a through 2001i).

This region of influence is only applicable for this resource area. Social and economic impacts are distributed over a wider area and the selection of a comparatively larger area of analysis reflects that. The larger area is due to the fact that individuals who travel from as far away as Cincinnati, for example, to work on the site will not use their disposable income solely within Mason County. Rather, they would spend most of it closer to their homes and this is where the economic impact would be experienced.

3.8.1 Population and Housing

The central Cincinnati Metropolitan Area, comprised of Boone, Campbell, and Kenton Counties in Kentucky and Clermont and Hamilton Counties in Ohio, is the major population center in the region of influence. The city of Cincinnati, in Hamilton County, was home to 331,285 people in 2000 (Census 2000a) and the central Cincinnati Metropolitan Area had a population of 1,349,351 (Census 2001a, 2001c, 2001d, 2001h, 2001i). The Cincinnati Metropolitan Area is largely suburban in character, with the exception of Hamilton County, which is largely urban in character. Pendleton County, Kentucky and Brown County, Ohio are considered outlying counties of the Cincinnati Metropolitan Area and range from suburban to rural in character. Bracken and Mason Counties in Kentucky are outside of the metropolitan area and are largely rural in character. The town of Maysville, with a population of 8,993, is the largest town in these two counties (Census 2000b).

Over the last 40 years, the populations of Kentucky and Ohio have grown at a relatively moderate rate. In the past decade, Kentucky's population increased by 9.7 percent and Ohio's by 4.7 percent, which was a significantly higher growth rate than over the previous decade. Though the population of the region of influence did not increase at the same rate, it still grew by 4.4 percent over this period. Four of the counties experienced moderate growth; however, the population of Boone County grew by 49.3 percent, Pendleton County by 19.6 percent, Brown County by 20.9 percent, and Clermont County by 18.5 percent, while Hamilton County experienced a decrease in population of 2.4 percent. The population growth of the region of influence is expected to continue at a nearly equivalent rate over the coming decade, with projections showing a 4.5 percent increase. Boone, Pendleton, Brown, and Clermont Counties are expected to continue to have high growth over the next 10 years. The populations of Kentucky and Ohio are projected to increase by 4.8 and 4.0 percent, respectively, in the next 10 years. Table 3.8–1 presents historic and projected population growth within the region of influence and both states.

TABLE 3.8–1.—Historic and Projected Population

	1960	1970	1980	1990	2000	2010
Boone County	21,940	32,812	45,842	57,589	85,991	109,645
Bracken County	7,422	7,227	7,738	7,766	8,279	8,472
Campbell County	86,803	88,501	83,317	83,866	88,616	91,317
Kenton County	120,700	129,440	137,058	142,031	151,464	155,369
Mason County	18,454	17,273	17,765	16,666	16,800	16,377
Pendleton County	9,968	9,949	10,989	12,036	14,390	16,133
Brown County	25,178	26,635	31,920	34,966	42,285	47,492
Clermont County	80,530	95,725	128,483	150,187	177,977	196,869
Hamilton County	864,121	924,018	873,224	866,228	845,303	854,014
ROI	1,235,116	1,331,580	1,336,336	1,371,335	1,431,105	1,495,688
Kentucky	3,038,156	3,218,706	3,660,777	3,685,296	4,041,769	4,235,802
Ohio	9,706,397	10,652,017	10,797,630	10,847115	11,353,140	11,805,877

Source: Census 1995a, 1995b, 2001a through 2001i, KSDC 1999, OSR 1990.
Population projections were calculated using established rates applied to 2000 Census counts.
ROI = Region of Influence

Table 3.8–2 presents housing characteristics in the region of influence. There were a total of 555,785 housing units in the region of influence in 1990. According to 1990 Census data, approximately 60.7 percent of the houses were single-family units, approximately 34.9 percent were multi-family units, and approximately 4.4 percent were mobile homes. An estimated 6.1 percent, or 34,000, of the housing units were vacant. More than 62 percent of the occupied units were owner-occupied while almost 38 percent were rental units (Census 1992a through 1992i).

TABLE 3.8–2.—Region of Influence Housing Characteristics

	Total Number of Housing Units	Number of Owner-Occupied Units	Owner-Occupied Vacancy Rates	Median Value	Number of Occupied Rental Units	Rental Vacancy Rates	Median Monthly Contract Rent
Boone County	21,746	14,488	1.5%	$74,500	5,639	9.5%	$356
Bracken County	3,166	2,166	1.6%	$39,400	706	6.0%	$135
Campbell County	32,910	21,268	1.1%	$62,300	9,901	7.3%	$298
Kenton County	56,086	34,678	1.3%	$65,200	18,012	7.7%	$308
Mason County	7,089	4,241	1.5%	$43,800	2,296	5.9%	$171
Pendleton County	4,782	3,254	1.8%	$43,700	1,078	6.3%	$185
Brown County	13,270	9,404	1.4%	$49,200	2,975	5.0%	$212
Clermont County	55,315	38,028	1.3%	$71,200	14,698	7.4%	$340
Hamilton County	361,421	197,551	1.4%	$72,200	141,330	7.8%	$304
ROI	555,785	325,078	N/A	N/A	196,635	N/A	N/A

Source: Census 1992a through 1992i.
ROI = Region of Influence

In 1990, the median value of owner-occupied housing in the region of influence ranged from $39,400 in Bracken County to $74,500 in Boone County. In 1990, median monthly rent ranged from $135 in Bracken County to $356 in Boone County.

3.8.2 Employment and Income

Employment by sector over the last decade has changed slightly, as shown in Table 3.8–3. The major shift in employment has occurred as employment in the manufacturing and, to a lesser extent, government sectors has decreased, leading to an increase in employment in the service sector. The service sector provides the highest percentage of the employment in the region of influence, with 31.6 percent, followed by the wholesale and retail trade and manufacturing sectors, with 23.6 percent and 14.0 percent, respectively. Farm employment has decreased over the last decade, providing 1.1 percent of employment in 1990 but only 0.9 percent in 1997 (BEA 1999). Table 3.8–3 presents employment levels for the major sectors of the region of influence economy.

TABLE 3.8–3.—Region of Influence Employment by Sector (Percent)

Sector	1990	1997
Services	28.0	31.6
Wholesale and Retail Trade	23.5	23.6
Manufacturing	17.3	14.0
Government and government enterprises	11.3	10.3
Finance, insurance, and real estate	7.5	8.0
Transportation and public utilities	5.3	5.2
Construction	5.2	5.4
Farm employment	1.1	0.9
Mining	0.1	0.1
Other Sectors	0.6	0.6

Source: BEA 1999.

The region of influence experienced slight changes to the labor force throughout the late 1990s. The labor force increased from 739,106 in 1995 to 746,300 in 2000, which translates to a 5-year growth rate of 1 percent. Employment experienced growth as well, increasing from 707,868 in 1995 to 719,903 in 2000, a 5-year growth rate of 1.7 percent. The region of influence unemployment rate was 4.2 percent in 1995, falling to 3.5 percent in 2000, as shown in Table 3.8–4. Bracken County experienced a large decrease in its unemployment rate during this period, with the rate dropping from 5.9 percent in 1995 to 3.4 percent in 2000. Kentucky's unemployment rate also fell significantly, dropping from 5.4 percent in 1995 to 4.1 percent in 2000. The unemployment rate for Ohio was also 4.1 percent in 2000 (KDES 1995, 2000, OLMI 1995, 2000, 2001).

The average income in the region of influence was $32,486 in 1999, an over 18 percent increase from the 1995 level of $27,391. Average income ranged from $18,769 in Bracken County to $33,919 in Hamilton County. The average income in Kentucky was $26,911 and in Ohio was $30,512 while the U.S. average was $32,109 in 1999 (CBP 1995a through i, 1999a through l).

TABLE 3.8–4.—Region of Influence Unemployment Rates (Percent)

	1995	2000
Boone County	4.1	2.8
Bracken County	5.9	3.4
Campbell County	4.5	3.3
Kenton County	4.2	3.4
Mason County	5.4	3.0
Pendleton County	4.7	3.6
Brown County	5.8	6.0
Clermont County	4.3	3.6
Hamilton County	4.1	3.6
ROI	4.2	3.5
Kentucky	5.4	4.1
Ohio	4.8	4.1

Source: KDES 1995, 2000, OLMI 1995, 2000, 2001.
ROI = Region of Influence

3.8.3 Community Services

This environmental assessment presents the availability of public schools and medical services in the project's region of influence. Data on fire and police services is not readily available for the region of influence. However, the region of influence contains the Cincinnati Metropolitan Area and large fire and police services associated with major metropolitan areas. Other fire and police stations are located throughout the region of influence; however, the exact numbers of personnel and equipment in various locations is not available.

There are approximately 60 school districts serving the region of influence, with the majority of them located in the Cincinnati Metropolitan Area. These districts utilize over 13,200 teachers to educate over 221,000 students (EDU 2001a). There are also 153 private schools in the region of influence educating approximately 55,300 students (EDU 2001b). There are a number of institutions of higher learning in the region of influence, including the University of Cincinnati.

Twenty-three major hospitals are located in the region of influence, 16 in Cincinnati and 1 in Maysville. There are 6,031 beds in these hospitals and approximately 24,000 hospital personnel throughout the region of influence (AHA 1995). The majority of the hospital beds and physicians are located in the city of Cincinnati in Hamilton County. The hospital located in Maysville has 111 beds and is serviced by 258 personnel.

3.9 ENVIRONMENTAL JUSTICE

Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 *Federal Register* 32), and U.S. Department of Agriculture's implementing Departmental Regulation 5600-2 (December 15, 1997), this section identifies any minority or low-income populations that could be subject to disproportionate environmental impacts or health effects from the Proposed Action. The affected environment for environmental justice issues is more focused than that of the socioeconomic analysis because the majority of the impacts are experienced in close proximity to the project site.

Environmental justice guidance developed by the Council on Environmental Quality defines "minority" as individuals who are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black, or Hispanic (CEQ 1997). Minority populations are identified when either the minority population of the affected area exceeds 50 percent or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general population in the surrounding area or other appropriate unit of geographical analysis. Low-income populations are identified using statistical poverty thresholds from the Bureau of Census. The current threshold was defined in 2000 as 1999 income less than $17,463 for a family of four. The threshold applicable for this analysis was defined in 1990 as 1989 income less than $12,674 for a family of four.

The environmental impacts from most projects are typically concentrated at the actual project site and tend to decrease as distance from the project site increase. Due to this relationship, the environmental justice analysis examines smaller geographic regions around the project site for which statistical data is available. The area analyzed for environmental justice has no relation to, nor should be in any way mistaken for, the nine-county region of influence established for the socioeconomic analysis. By nature, the economic impacts associated with a project occur over a wider area (see Section 3.8, Socioeconomics).

The Proposed Action would occur at Spurlock Station, located 4.5 miles (7.2 kilometers) northwest of Maysville, in Mason County, Kentucky. The site is on the Ohio River, across from Brown County, Ohio. These two counties have the greatest potential to experience environmental and human health impacts as a result of this project. Therefore, these two counties will comprise the area considered for the environmental justice analysis. The town of Ripley is located just north of the plant across the Ohio River. The towns of Maysville and Ripley will be singled out as part of the affected environment for environmental justice due to their proximity to the project location.

This section details the racial composition of the two counties and the town of Maysville utilizing data from the 2000 Census. Racial composition data is also presented for Kentucky, Ohio, and the United States to provide other geographic regions for comparison.

The most recent data available for low-income populations comes from a 1997 computer model estimate, as opposed to an actual count (Census 2000a). This data is available at the county level. More refined data is available from an economic census study conducted in 1989 and this data will be used to examine the low-income population of Maysville, Kentucky and Ripley, Ohio. The data for Kentucky, Ohio, and the United States are also presented to provide other geographic regions for comparison.

Table 3.9–1 presents the racial composition of all geographic areas to be considered in the environmental justice analysis.

TABLE 3.9–1.—RACIAL COMPOSITION OF AREAS AFFECTED BY THE PROPOSED ACTION (PERCENT)

	One Race						Two or More Races	Hispanic	
	White	African American	American Indian	Asian	Pacific Islander	Other		Hispanic	Non-Hispanic
Maysville	86.0	11.5	0.1	0.6	N/A	0.5	1.2	0.9	99.1
Mason County	90.9	7.2	0.1	0.4	N/A	0.6	0.9	1.0	99.0
Kentucky	90.1	7.3	0.2	0.7	N/A	0.6	1.1	1.5	98.5
Ripley	91.7	6.6	0.1	0.2	N/A	0.2	1.3	0.7	99.3
Brown County	98.1	0.9	0.2	0.1	N/A	0.1	0.6	0.4	99.6
Ohio	85.0	11.5	0.2	1.2	N/A	0.8	1.4	1.9	98.1
United States	75.1	12.3	0.9	3.6	0.1	5.5	2.4	12.5	87.5

Source: Census 2000b, 2001e, 2001g, 2001j.

Both Mason and Brown Counties have a smaller or equivalent percentage of residents of each minority group than their respective states and the country as a whole. The town of Maysville has a higher percentage of African-American residents than Mason County and Kentucky; however, the percentage is below that of the national average. Maysville also has a higher percentage of Asian-Americans and persons of two or more races than Mason County; however, these levels are equivalent with Kentucky levels and are significantly smaller than national levels. Ripley has a significantly higher level of African-American and Hispanic residents and residents of two or more races than Brown County, yet all three are lower than Ohio levels.

The percentage of the population considered low-income in Maysville was 20.7 in 1989 (Census 1990a). This figure is higher than the level of Mason County, 18.2 percent, and the State of Kentucky, 16.0 percent (Census 2001e). The percentage of the population considered low-income in Ripley was 24.1 in 1989 (Census 1990b). This is much higher than the level of persons below the poverty level in Brown County at 12.0 percent, which is slightly higher than the state of Ohio level of 11.0 percent (Census 2001g). The figures for each county are higher than their respective states' averages. The level of low-income population in Kentucky is higher than the national average of 13.3 percent (Census 2001j), yet the levels for Ohio and Brown County are below the national average.

3.10 INFRASTRUCTURE

In this section, the existing infrastructure of Spurlock Station is outlined.

Spurlock Station is a 2,500-acre (1,011-hectare) coal-fired electric generating station with two conventional pulverized-coal boilers that burn low sulfur content coal. Unit 1, a 300-MW, dry bottom wall fired unit with a maximum continuous heat input rating of 3,500 mmBTU per hour, went online in August 1977. Unit 2, a 500-MW, dry bottom, tangentially fired unit with a maximum continuous heat input rating of 4,850 mmBTU per hour, was operational in October 1981. Equipment for each unit includes a turbine-generator, condenser and air removal equipment, condenser cooling system with mechanical draft cooling towers, coal-fired steam generator with associated heat removal equipment and auxiliaries, an 805-foot (245-meter) stack, electrostatic precipitators, as well as other systems necessary to support plant operations and buildings to house equipment.

The water that feeds the boilers is generated from 14 of 16 groundwater wells located on the north, south and east sides of the ash pond and in the vicinity of the coal storage area. An intake pipe brings water into the station from the Ohio River. Both the groundwater wells and intake pipe have pumps and pipes to move the water to the units.

Each of the units is connected to a switchyard that contains circuit breakers and automatic switches to turn power on and off for different transmission lines. The energy generated by the units is transmitted to the substation. The substation controls the voltage level of the energy before it is sent to the many transmission lines located adjacent to the substation. The Spurlock Station transmission lines connect to distribution grids in Kentucky.

Because the two units were built in different years, they conform to different air quality emissions regulations and thus have different air emissions control equipment. Unit 1, licensed prior to PSD regulations, has an electrostatic precipitator to control emissions of particulate matter and low-NO_x burners to limit NO_x emissions. Unit 2, subject to PSD regulations, has not only a boiler equipped with an electrostatic precipitator for particulate matter emissions control and low-NO_x burners to limit NO_x air emissions, but also a flue gas desulfurization system for SO_2 emissions control. EKPC is currently installing selective catalytic reduction units on both Units 1 and 2 to further reduce NO_x emissions. Aqueous ammonia will be injected into the selective catalytic reduction units to reduce the NO_x to primarily molecular nitrogen and water. Four 30,000-gallon (113,562-liter) aboveground tanks with aqueous ammonia will be located outside Units 1 and 2 (2 tanks per unit) and one 3,400-gallon (12,870-liter) aboveground tank located outside Unit 1. Construction of the selective catalytic reduction units is expected to be completed by the fall of 2002.

Specific coal-related infrastructure includes the barge dock, unloaders, Chesapeake and Ohio Rail tracks and car dumper that convey coal to the site and unload it; the coal storage pile and coal storage holding pond that catches stormwater runoff from the pile; the coal conveyor system that moves the coal to the crusher house and then to the units; an ash silo that holds the ash created from the burned coal; roads to carry trucks transporting ash from the silo to the ash landfill; and an ash pond that holds wet bottom ash and ash sluicing water for sedimentation and later discharge to the secondary lagoon, and ultimately to the Ohio River. The ash landfill also has stormwater sedimentation ponds, a man-made wetland that further filters the stormwater runoff, and an outfall that discharges the water to Lawrence Creek.

Other infrastructure equipment includes two 350,000-gallon (1,315,440-liter) aboveground storage tanks containing fuel oil to start the units after shutdowns; two underground storage tanks containing diesel and gasoline for the trucks that convey ash to the ash landfill; and several other storage tanks for the demineralizers and other cleaning chemicals necessary to operate and maintain the units. Two lagoons, a 750,000-gallon (2,839,030-liter) primary and a 1,500,000-gallon (5,678,100-liter) secondary lagoon, hold all process wastewater generated by the operation and maintenance of Units 1 and 2. Wastewater is treated and monitored in the lagoons before discharge to the Ohio River. There are a total of eight discharge outfalls; four are internal outfalls connected to an outfall that discharges to the Ohio River, three discharge to the Ohio River, and one discharges to Lawrence Creek. Spurlock Station also has a sanitary collection system for wastewater generated by plant washrooms, toilets and drinking fountains that discharge to the Maysville Water Treatment Plant.

The Kentucky Utilities 138-kV Transmission Line skirts the south edge of the ash pond, crosses the Ohio River and connects to the Stuart-Zimmer 345-kV Transmission Line in Brown County, Ohio.

3.11 WASTE MANAGEMENT

3.11.1 Ash Disposal

Spurlock Station operates a landfill for ash disposal and for asbestos waste. The landfill is located approximately 1 mile (1.6 kilometers) from the plant site. In 2000, Spurlock Station generated 262,219 tons of fly ash and 19,536 tons of bottom ash from its two generating units. In addition to ash, asbestos wastes originating from EKPC members, Headquarters, and other power stations are also disposed of in the ash landfill.

The landfill is permitted by Kentucky Division of Waste Management and is inspected at least weekly by a certified landfill inspector. Inspection includes checking for nuisance dust, insuring proper runoff controls are maintained, and visual inspection of compaction.

Three monitoring wells, one background well and two downgradient wells, have been drilled at the landfill sedimentation ponds to monitor the uppermost aquifer for contaminants. The wells were drilled to depths ranging from 28.5 to 32.8 feet (9 to 10 meters) and groundwater was not found. The limestone and shale geologic bedrock formations that underlie the landfill area are known to be poor aquifers.

3.11.2 Toxic and Hazardous Wastes

Spurlock Station is a conditionally exempt small quantity generator of toxic and hazardous wastes and is registered with the Kentucky Department of Environmental Protection (ID Number KYD072865272). A conditionally exempt small quantity generator is defined as a generator that produces less than 200 pounds/month (100 kilograms/month) of waste. This designation does not require an EPA identification number, annual registration of hazardous waste activity, use of manifests in shipping hazardous waste, or sending hazardous waste to a permitted or interim status Subtitle C waste management facility. conditionally exempt small quantity generators must determine whether their wastes are hazardous in accordance with 40 Code of Federal Regulations 261.5(g) and may accumulate hazardous waste onsite indefinitely provided that the total amount of waste accumulated does not exceed 2,200 pounds (998 kilograms) in one calendar month.

Spurlock Station typically generates less than 1,000 pounds/year (450 kilograms/year) of toxic and hazardous waste. However, on occasion the plant has generated more than 2,200 pounds (1,000 kilograms) during a year. When this occurs, the status of the plant is changed to the appropriate registration until the waste is properly disposed. Once the waste is disposed, Spurlock Station returns to its conditionally exempt small quantity generator status.

The primary hazardous wastes generated by Spurlock Station include halogenated and non-halogenated hydrocarbons, and halogenated and non-halogenated solvents, paint wastes, used motor oils and transmission fluids. There are also numerous chemicals throughout the station that are present in small quantities. Many of these reagent chemicals are located in the lab or are cleaning solutions used by the janitorial staff. Other miscellaneous wastes include batteries, light bulbs, and asbestos. Asbestos found on the plant site is cementatious material such as transite or tar-impregnated gasket material. An asbestos survey of Unit 1 was conducted and none of the 150 samples of thermal system insulation collected tested positive for asbestos. Both units at Spurlock Station are believed to not contain asbestos material.

Currently, hazardous wastes are collected in secure designated areas throughout the plant site and are stored in suitable, labeled containers and/or 55-gallon (208 liter) drums. All use and management of hazardous waste containers is in accordance with the 401 KAR 35:180, Sections 2, 3, and 4. Wastes are collected in secured areas such as the lab and oil storage facilities until sufficient quantities accumulate. They are then transferred under the supervision of the safety coordinator to a temporary protected storage area. Wastes are temporarily stored in the lime storage facility because it is a low traffic area. All wastes generated at the plant site are disposed of in accordance with Federal, state, and local regulations.

The Spurlock Station plant has been designated an "off-specification used oil fuel" burner under 401 KAR 36:050, Section 5. Used oils generated onsite are burned for energy recovery.

EKPC uses established waste transfer and disposal entities to transport and dispose of its wastes. Hazardous wastes are transferred to Safety Kleen's Greenbriar facility and from there to incinerators or approved hazardous waste landfills. BFI, Inc., is the waste disposal contractor responsible for universal wastes (e.g., fluorescent light bulbs and batteries) at the plant site. Universal wastes are shipped to registered universal waste collection sites in appropriate containers.

EKPC has a Spill Prevention, Control, and Countermeasures Plan for Spurlock Station which outlines Best Management Practices for addressing oil and other toxic and hazardous materials spills. All areas where potential spills could occur are checked on a regular basis and any leaks or spills constituting a hazardous reportable incident would be immediately contained and appropriate parties notified. In addition to the plan, EKPC has secondary containment structures around tanks containing oil and toxic and hazardous substances. It is noteworthy to mention that the Spurlock facility has had no reportable spill since January 10, 1973 (EKPC 2001).

3.11.3 Solid Wastes

Spurlock Station generates various office wastes, scrap metal, and construction debris. Solid waste generated from day-to-day activities at the plant site are stored onsite in dumpsters. Solid wastes generated at the plant site are characterized for proper management and disposal and to prevent improper disposal of hazardous wastes. Whenever possible, they are recycled. Solid wastes generated are transported by waste disposal contractors Rumpke or BFI to the Mason County Landfill.

3.11.4 Other Wastes

Other wastes included plant process wastes such as boiler cleaning wastes, boiler blowdown, excess service water, wastewater from the water treatment process (see Section 3.5, Water Resources) and stormwater runoff. Boiler cleaning wastes are treated to precipitate out the metal content. A Toxic Characteristic Leachate Procedure is then conducted on the precipitate. If the precipitate is found to be hazardous, it is disposed of according to the requirements outlined above for hazardous waste disposal. The liquid waste is treated to meet the limits specified in the KPDES permit and then transferred to the primary and secondary lagoons.

3.12 OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

Current activities associated with routine operations at Spurlock Station have the potential to affect worker and public health. Workers are exposed to occupational hazards similar to those experienced at most industrial work sites. The health and safety of the public could be impacted by the release of hazardous materials and/or hazardous waste during transport or due to an accidental release at the plant. Persons living near high-voltage transmission lines and workers involved in the construction and maintenance of transmission lines are also likely to be exposed to electric and magnetic fields.

The following discussion characterizes the current human health impacts from the operation of Spurlock Station. It is against this baseline that the potential incremental and cumulative impacts associated with the proposed action can be compared and evaluated.

3.12.1 Worker Health

Worker health and safety issues at Spurlock Station pertain to exposure to process chemicals and typical industrial work-related injuries. From January 1, 1995 to September 24, 2001, there were 121 typical industrial work-related injuries (falls, bruises, cuts, repetitive stress injuries, etc.). Fifty-nine (49 percent) did not require medical treatment or time away from work; 10 (8 percent) were lost time accidents requiring one or more days off of work; and 52 (43 percent) required treatment by a physician, but none lost time from work.

All employees that handle, use, transport, store or have contact with potentially hazardous or toxic materials are trained in safe and proper handling methods and in spill prevention and control. Spurlock Station has a Spill Prevention, Control, and Countermeasures Plan to reduce the impact to workers, the public, and the environment due to an accidental release/spill.

3.12.2 Public Health

The accidental release of chemicals to the air or water is the primary health and safety risks for the public. Spurlock Station has developed a Spill Prevention, Control, and Countermeasures Plan in the event of an accidental release to reduce the impact to public health and safety and the environment. There have been no reportable spills of hazardous substances at Spurlock Station since January 10, 1973 (EKPC 2001).

3.13 TRAFFIC AND TRANSPORTATION/AVIATION

This section discusses the major road and rail transportation routes to the proposed project site. Existing traffic levels are discussed for each method of transportation. The region used for the analysis is the same nine-county region of influence established in Section 3.8, Socioeconomics.

3.13.1 Roadways

The primary access routes to the region of influence are Interstates 71, 74, and 75, which all converge in Cincinnati. The Cincinnati Metropolitan Area is also served by Interstate 275, which is a beltway around the city itself. The primary access routes to Maysville are Kentucky Highway 9, which runs east from the Cincinnati Metropolitan Area, and U.S. Route 62, which runs north to south and crosses the Ohio River in town. The route traveled to the project site by the construction workers coming from Cincinnati will be along Kentucky Highway 9 into Maysville. In order to access the project site, workers will also have to use Kentucky Highways 8, 1597, and 3056 for brief distances. The site access road intersects with Kentucky Highway 8 just north of Maysville. Construction vehicles will primarily utilize Kentucky Highways 8 and 10 in Mason County.

Current and recent daily traffic loads for roads that will potentially be impacted by this project are presented in Table 3.12–1. All data was obtained from the Kentucky Transportation Cabinet's Traffic Counts searchable database computer program, which provides historic traffic count data for Interstates and Kentucky and County Highways throughout the state (CTS 2001). The Actual Count data presented in the table is the average number of car trips per 24 hours for that particular road segment. The mileposts presented in the table are those established by the Kentucky Transportation Cabinet for the purposes of collecting traffic counts. The site access road intersects Kentucky Highway 8 between milepost 7.6 and milepost 11.0. Data is presented along a route that travels from the project site to Interstate 275 near Cincinnati. Mileposts along Kentucky Highway 9 increase as one travels west along the road. Milepost 0.0 in one county is equivalent to the last milepost in the previous county. Mileposts for Kentucky Highways 8 and 10 increase in value as one heads east along the roads. Milepost 12.3 on Kentucky Highway 8 is the equivalent of milepost 3.8 on Kentucky Highway 10, as this signifies the point at which these roads intersect in the town of Maysville.

3.13.2 Railroads

The project site is located along a freight rail line segment that runs between Covington and Maysville, Kentucky. The line segment is owned and operated by CSX Transportation, Inc., of Jacksonville, Florida, and has been operating in the region for an extended period of time as part of the old Chesapeake and Ohio Railroad. Amtrak also runs passenger trains along this line segment. Existing rail traffic data for the line are currently unavailable. The project site also contains adequate rail yard capacity that runs off of the main freight line.

3.13.3 River Transport

The project site is located on the bank of the Ohio River between U.S. Geological Survey river miles 414.7 and 412.7. This section of the Ohio River is the pool created by the Captain Anthony Meldahl Dam located at mile 436.2. The site is downstream of the Greenup Locks and Dam located at mile 341. Table 3.13–2 shows a breakdown by commodity of the total tonnage shipped through the Greenup Locks and Dam in 1999. The total tonnage of commodities shipped through the Greenup Locks and Dams was over 71 million tons, of which 60 percent was coal. The project site currently receives approximately three to four barges per week, which supply about 95 percent of current plant operational material. The site has two docking facilities that can each dock one barge at a time. One is designed for operational deliveries and one for construction material deliveries.

3.13.4 Aviation

Because of its location near the greater Cincinnati airport, the Federal Aviation Administration regulates the heights of structures at Spurlock Station. The existing smoke stacks for Units 1 and 2 were built to the maximum height allowed, 805 feet (246 meters) aboveground level.

TABLE 3.13–1.—Traffic Levels for Main Roads Potentially Affected by the Project

Highway Number	County	Beginning MP	Ending MP	Actual Count	Year	Estimated Count, 2001
Maysville to Cincinnati						
8	Mason	7.6	11.0	1,280	2000	1,400
1597	Mason	0.0	1.9	242	1998	260
3056	Mason	2.8	3.5	917	1995	1,280
3056	Mason	3.5	7.8	724	1995	418
9	Mason	13.8	14.0	10,067	1998	12,000
9	Mason	14.0	14.9	5,945	1998	7,070
9	Mason	14.9	17.2	5,202	1998	6,210
9	Mason	17.2	17.4	4,873	1998	6,140
9	Bracken	0.0	5.5	4,873	1998	6,140
9	Bracken	5.5	9.4	6,243	1997	9,240
9	Bracken	9.4	10.3	6,132	1998	7,970
9	Bracken	10.3	13.6	5,483	1996	8,630
9	Bracken	13.6	19.9	7,419	1998	9,490
9	Pendleton	0.0	4.3	7,193	1999	8,060
9	Campbell	0.0	0.7	7,639	1999	9,200
9	Campbell	0.7	4.2	6,720	1996	9,510
9	Campbell	4.2	8.0	11,495	2001	N/A
9	Campbell	8.0	11.6	13,045	1999	14,100
9	Campbell	11.6	12.4	8,230	1991	9,580
9	Campbell	12.4	15.9	20,656	2001	N/A
9	Campbell	15.9	18.0	25,159	1998	29,600
Construction Routes						
8	Mason	0.0	1.3	916	2000	942
8	Mason	1.3	3.4	1,207	1994	1,360
8	Mason	3.4	7.6	920	1995	1,170
8	Mason	7.6	11.0	1,281	2000	1,400
8	Mason	11.0	11.3	4,210	2000	3,780
8	Mason	11.3	11.5	3,529	1999	3,260
8	Mason	11.5	11.8	4,956	1999	4,400
8	Mason	11.8	11.9	3,361	2000	3,310
8	Mason	11.9	12.1	2,847	1999	2,730
8	Mason	12.1	12.3	6,751	1998	6,350
10	Mason	3.8	4.1	9,925	2000	9,830
10	Mason	4.1	4.2	8,898	1999	8,830
10	Mason	4.2	4.7	10,918	1999	10,800
10	Mason	4.7	5.1	7,605	1999	7,310
10	Mason	5.1	5.4	4,450	1999	4,220
10	Mason	5.4	6.2	4,990	1998	5,350
10	Mason	6.2	6.5	2,375	1999	2,360
10	Mason	6.5	10.0	1,727	1995	1,050
10	Mason	10.0	13.3	1,431	1999	1,370

Source: CTS 2001.

TABLE 3.13–2.—Greenup Locks and Dam Tonnage and Commodity Distribution, 1999.

Commodity	Tonnage	Percent	Value (Millions)	Percent
Coal	42,796,499	60.0	$1,662	17.1
Petroleum	7,419,150	10.0	$1,145	11.8
Aggregates	6,713,639	9.0	$ 439	4.5
Grains	65,006	0.1	$ 12	0.1
Chemicals	3,516,549	5.0	$1,395	14.3
Ores/Minerals	2,803,109	4.0	$ 341	3.5
Iron/Steel	5,488,555	7.9	$2,797	28.7
Other	2,847,600	4.0	$1,946	20.0
Total	**71,650,107**		**$9,738**	

Source: USACE 2001.

4.0 ENVIRONMENTAL EFFECTS

4.1 AIR QUALITY AND NOISE

This section discusses the potential air quality and noise impacts of the Proposed Action and alternatives in the vicinity of the project. The methodology for determining impacts is presented, along with a description of the construction and operation impacts for each alternative.

4.1.1 Air Quality

Methodology

The air quality resource impact analysis consists of evaluating the impacts of criteria and Hazardous Air Pollutant (HAP) concentrations resulting from construction and operation of Gilbert Unit 3 and associated material handling and control equipment. A PSD analysis to evaluate the air quality impacts from Unit 4 and its associated material handling and control equipment is currently underway and will be reviewed by the Kentucky Division of Air Quality. If the analysis shows that the additional air emissions from Unit 4 would meet PSD requirements protective of air quality within the region, then EKPC would be issued a PSD permit. A PSD permit is required before construction can begin on Unit 4. The analysis of Gilbert Unit 3 is accomplished by using the EPA-recommended Industrial Source Complex Short Term air quality dispersion model (ISCST3) to estimate pollutant concentrations and visibility impacts at receptors located within the area of potential effect. Pollutant concentrations and visibility impacts are then compared with Federal and state air quality standards adopted to protect human health and public welfare. Refer to Section 3.1 for a discussion of the PSD review required for new major or modified sources.

The area analyzed for potential air quality effects resulting from operation of the Proposed Action for criteria and HAP concentrations is a 19 by 19 mile (31 by 31 kilometer) grid centered approximately on the Spurlock Station. The area of potential effects for visibility and/or acid deposition impacts includes the designated Class I airsheds at Mammoth Caves National Park located 150 miles (250 kilometer) southwest of the proposed project, and Great Smoky Mountains National Park located 198 miles (325 kilometer) south of the proposed project. Construction-generated air quality effects from fugitive dust and construction equipment would be limited to the immediate vicinity of Spurlock Station and the proposed transmission line right-of-way extending into Brown County, Ohio.

The decision as to whether an air quality impact from project operation is significant is determined by adding the maximum modeled air pollutant concentration from the proposed project and other existing sources in the area to the background air pollutant concentration for the respective pollutant. The resulting total is then compared with Federal and state air quality standards. In addition, the emissions from the proposed project and other sources in the area are modeled and compared to the allowable increases specified by the PSD increment. The significance of the impacts is assessed in terms of the percentage of the increment consumed. Impacts to air quality related values such as visibility are evaluated for the nearest Class I airsheds to the Spurlock Station. A 5-percent change in extinction (reduction of visibility) is considered a significant impact. Data used for the air impacts analysis comes from the PSD permit application for the addition of Gilbert Unit 3 (Kenvirons 2001). The PSD permit application is currently under review by the Kentucky Division for Air Quality.

The significance of the construction air quality impacts is evaluated based on the projected construction progression, local climate and soil conditions, and land use adjacent to the project area. Mitigation measures to avoid potential nuisance dust conditions and minimize construction equipment impacts to nearby residents are described.

4.1.1.1 *Construction*

Proposed Action

The potential for effects on air quality during construction would be from fugitive dust and construction equipment exhaust. Fugitive dust emissions (dust which escapes from a construction site) could result from the construction and staging areas at the Spurlock Station and along the proposed transmission line right-of-way extending into Brown County. The total area disturbed for construction of Gilbert Unit 3 and associated cooling towers would be approximately 1 acre (0.4 hectares). The active area along the 3.5-mile (5.6-kilometer) long transmission right-of-way would be 150 feet (46 meters) wide. The major sources of dust emissions would be construction equipment traffic, land clearing, drilling, excavation, and earth moving. EKPC does not anticipate any blasting operations. Dust emissions would vary substantially from day to day, depending on the level of activity, the specific operation, and the prevailing meteorological conditions.

The use of construction equipment would also result in the emission of air pollutants associated with diesel combustion (NO_x, CO, SO_x, PM_{10}, and reactive organic gases from the fuel). As part of the mitigation of transmission line construction impacts, all construction vehicle movements would be limited to the pre-designated staging areas at the Spurlock Station, and to the right-of-way or public roads along the transmission line. Roads and active areas would have watering requirements appropriate for dust control for the season and region. It is not expected that permits concerning dust control would be required.

Outside of the main Spurlock Station plant area, the proposed project area consists of primarily agricultural and undeveloped land. A limited number of residents in the vicinity of the proposed construction may be affected by a temporary adverse impact on their local air quality during construction from fugitive dust. However, EKPC would implement dust control measures such as watering to minimize further dust generation. Construction of Gilbert Unit 3 would be completed within 29 months. Given that the construction is temporary and the adjacent land is primarily undeveloped, no significant impacts are expected to occur from construction. No construction related air quality impact would occur at any Class I Areas.

No Action Alternative

Under the No Action Alternative considered in this environmental assessment, Units 3 and 4 at Spurlock Station and the associated transmission line would not be built. However, ongoing construction of the selective catalytic reduction for Units 1 and 2 would continue. Air quality impacts from the selective catalytic reduction construction are similar to those construction impacts described above for the Proposed Action. Construction of the selective catalytic reduction for Units 1 and 2 is expected to be completed by fall of 2002.

4.1.1.2 *Operation*

Proposed Action

To assess the potential air quality impacts of the operation of Gilbert Unit 3 and associated material handling and control equipment, the EPA-recommended ISCST3 air quality dispersion model is used to estimate pollutant concentrations and visibility impacts at receptors located within the area of potential effect, as required for PSD review. Data inputs for the model include emissions information, source parameters, a receptor grid, and meteorological information. The setup and results of the model runs are described below. An initial screening run of the model identified pollutants with the potential to have a significant impact, as defined in PSD regulations. Three sets of further refined modeling runs were used to asses the following: (1) Pre-construction monitoring requirements, (2) Class II increment analyses, and (3) NAAQS and state air quality standard analyses.

Proposed Equipment. The Proposed Action involves the addition of a 268 MW coal-fired CFB boiler powering a steam-turbine generator, along with associated emission control equipment, and coal, ash, and limestone handling facilities. In a CFB boiler, combustion occurs when coal, together with ash, and in this case limestone, are suspended through the action of primary combustion air distributed below the combustion floor. A CFB boiler design, when operated in conjunction with limestone in the combustion process, functions to significantly remove SO_2 from its emissions. An add-on dry lime scrubbing unit is also being proposed to allow the plant to combust higher-sulfur Western Kentucky coal without increasing emissions of SO_2 or H_2SO_4 (sulfuric acid) above levels that represent Best Available Control Technology (BACT), as described in Section 3.1.1. Selective Non-Catalytic Reduction is being proposed as the add-on control measure to limit emissions of NO_x to BACT levels. Control of combustion parameters such as air flow and temperature would also control NO_x and CO to BACT levels. Particulate emissions (PM_{10}) from the boiler would be controlled to BACT levels by means of a single pulse jet-type fabric filter with multiple compartments.

The proposed project also includes plans for the construction of a stack for dispersing controlled emissions from the boiler. The stack dimensions are proposed to be approximately 720 feet (220 meters) high by 16 feet (4.8 meters) inner diameter. The stack would be constructed with a reinforced concrete shell enclosing a steel liner. Plant heat rejection would be accomplished by a new mechanical draft cooling tower, the primary point of release for visible steam emissions from the plant.

The existing coal conveying system that transfers coal from the storage pile to the crushers and into storage silos before conveyance to the boiler would be utilized for Gilbert Unit 3 and would be expanded to accommodate the coal for Unit 4. In addition, handling and conveyance systems for limestone and ash would be added. Baghouses and wet suppression spray systems are proposed to meet BACT PM_{10} emission limits from coal, limestone, and ash handling.

Determination of Potential Emissions. The projected emissions increase from Gilbert Unit 3, including emissions increases from existing facilities (for example, due to increased throughput of the coal handling facilities), was calculated for each pollutant. The maximum annual potential to emit for each pollutant was calculated based on equipment manufacturer guarantees, assuming a nominal firing rate of 2,500 mmBTU/hr and 8,760 hours of operation per year (24 hours per day, 365 days per year). For pollutants where there is no manufacturer guarantee, emission factors were used from EPA's *AP-42 Compilation of Air Pollutant Emission Factors, Volume 1, Fifth Edition* (AP-42). Table 4.1–1 lists the potential criteria pollutant emissions from the proposed Gilbert Unit 3 CFB boiler on an hourly and annual basis.

TABLE 4.1–1.—Gilbert Unit 3 CFB Boiler Estimated Controlled Criteria Pollutant Emissions

Pollutant	Average Hourly Emissions (lbs/hr)	Annual Total (tons/year)
NO_x	250.00	1095.00
CO	375.00	1642.50
PM_{10}	75.00	328.50
SO_2	500.00	2190.00
VOC	9.00	39.42
H_2SO_4 mist	12.50	54.75
Particulate Flourides[1]	0.12	0.51
Lead[1]	0.0066	0.029
Beryllium[1]	0.00199	0.009
Mercury[1]	0.00664	0.029

[1] These trace elements are included in the list of PSD regulated pollutants, although they are not criteria pollutants.
Source: Kenvirons 2001.

Table 4.1–2 summarizes the net increase in annual emissions for each of the criteria pollutants for the addition of Gilbert Unit 3. The PSD review requirements apply to major sources and modifications for pollutants with an increase that would exceed PSD significant emission rates. The table shows that the PSD significant emission rates would be exceeded for PM_{10}, SO_2, NO_x, CO, and H_2SO_4 mist. Therefore, the requirements to demonstrate BACT and to evaluate air quality, Class I and secondary impacts apply for each of these five pollutants. Net increases of volatile organic compounds and particulate fluorides are below the PSD significant emission rates therefore, no further analysis of volatile organic compounds or fluoride emissions is required by the PSD regulations for the addition of Gilbert Unit 3. A separate PSD analysis will be performed for the addition of Unit 4 in accordance with the PSD and NEPA regulations.

Note that the calculation of emissions for PSD review requirements does not include engine exhaust emissions from vehicles (for example, ash haul trucks). However, based on typical emissions of off-road trucks as estimated by EPA in AP-42, the emissions from the increased trucks associated with the proposed project would be less than 1 percent of the project emissions listed in Table 4.1–2. Therefore, increased truck emissions would not significantly affect the model results described below.

Source Parameters. The ISCST3 dispersion model requires input of source data defining the physical attributes of the modeled emissions points. These attributes include Universal Transverse Mercator coordinates of stack location, and stack height, temperature, gas velocity, and diameter. For the CFB boiler, manufacturer design equipment specifications were the primary source for determining the source parameters.

TABLE 4.1–2.—Net Increase in Annual Emissions for Gilbert Unit 3[1]

Emissions Source	*Potential Criteria Pollutant Emission Increases, tons/year*						
	PM_{10}	SO_2	NO_x	CO	VOC	H_2SO_4 mist	Fluorides
New CFB Boiler	328.50	2190.00	1095.00	1642.50	39.42	54.75	0.51
Coal Crusher House	0.44	-	-	-	-	-	-
Coal Pile Unloading	0.99	-	-	-	-	-	-
Coal Silos	0.44	-	-	-	-	-	-
Existing Coal Transfer Tower	0.16	-	-	-	-	-	-
New Coal Transfer Tower	0.16	-	-	-	-	-	-
Bed Ash Silo	6.57	-	-	-	-	-	-
Fly Ash Silo	2.19	-	-	-	-	-	-
Limestone Preparation	0.44	-	-	-	-	-	-
Lime Silo	3.75	-	-	-	-	-	-
Limestone Truck Unloading	0.002	-	-	-	-	-	-
Cooling Tower	2.98	-	-	-	-	-	-
Total Emissions Increase	**346.77**	**2190.00**	**1095.00**	**1642.50**	**39.42**	**54.75**	**0.51**
PSD Significant Level	**15**	**40**	**40**	**100**	**40**	**7**	**3**
Emissions Increase Exceeds PSD Significant Emission Rate?	**yes**	**yes**	**yes**	**yes**	**no**	**yes**	**no**

[1] This Table only includes proposed emission increases associated with the addition of Gilbert Unit 3.
Source: Kenvirons 2001.

Receptor Grid. The receptors are the locations at which the ISCST3 model calculates concentrations for each of the pollutants. A receptor grid with 100-meter spacing was placed around the perimeter of Spurlock Station property boundary. For the initial screening run, additional receptors were located at 1,000-meter intervals on a 19 by 19 mile (31 by 31 kilometer) grid centered approximately on the Spurlock Station. Based on the initial screening model run, receptors were added at 100-meter intervals in the areas showing the highest potential air quality impacts.

Meteorological Data. Five years of data that accurately simulates meteorological conditions in the region were used. This data is comprised of surface data and upper air data. Surface data was obtained from the Cincinnati-Northern Kentucky Weather Station (approximately 50 miles [80 kilometers] northwest of the plant site) for the calendar years 1990 to 1994. No upper air station was located at the surface station, so the nearest available upper air station data were used. This station is located in Huntington, West Virginia. The same years of upper air data (1990 to 1994) were obtained from EPA and used for the modeling runs.

Model Assumptions. The EPA regulatory default ISCST3 model assumptions were used, as follows:

- Stack tip downwash
- Final plume rise
- Buoyancy induced dispersion
- Vertical potential gradient
- Calm processing
- COMPLEX1 terrain processing
- Wind Profile Exponents

Rural dispersion coefficients and simple terrain parameters were chosen based on EPA guidelines. Appropriate values were determined from review of six U.S. Geological Survey 7.5 minute topographic maps of the project area.

Model Results. An initial set of ISCST3 screening model runs was performed for the Gilbert Unit 3 emission increases using 5 years of meteorological data as input to estimate pollutant concentrations at receptor grid locations. This PSD modeling was performed as required for all pollutants with PSD Significant Emission Rates. The maximum concentration of each pollutant over the 5 year modeled period gives a conservative (maximum) estimate of the peak pollutant concentrations from the proposed project. Based on the screening model runs, maximum impacts of NO_x and CO, for all averaging periods, as well as annual impacts of SO_2 and PM_{10}, were found to be well below the PSD significant impact levels and thus would not have the potential to cause or contribute to an increment or NAAQS violation. (Air quality standards such as the NAAQS define the allowable average pollutant concentration over a given time period, or averaging period.) Likewise, beryllium, mercury, and H_2SO_4 mist were found to be less than PSD de minimis levels. Therefore, no further refined modeling analysis for these pollutants and averaging periods is required for Gilbert Unit 3. SO_2 (3-hour and 24-hour average) and PM_{10} (24-hour average) were identified as the only pollutants for which a significant off-property impact is predicted to occur. Therefore, a set of refined model runs was performed to compare the potential impacts to the NAAQS and Class II increment for SO_2 and PM_{10}, as described below.

Preconstruction Monitoring Analyses. The first set of refined modeling runs for SO_2 and PM_{10} examined only the emissions increases from Gilbert Unit 3 to determine if pre-construction monitoring of ambient pollutant levels at the Spurlock Station would be required. The modeling focused on significant impact areas with refined 100-meter receptor grids for each pollutant, shown in Figures 4.1–1 and 4.1–2. The modeling showed that the predicted maximum concentrations are less than the PSD de minimis levels, and thus no preconstruction monitoring is required for Gilbert Unit 3.

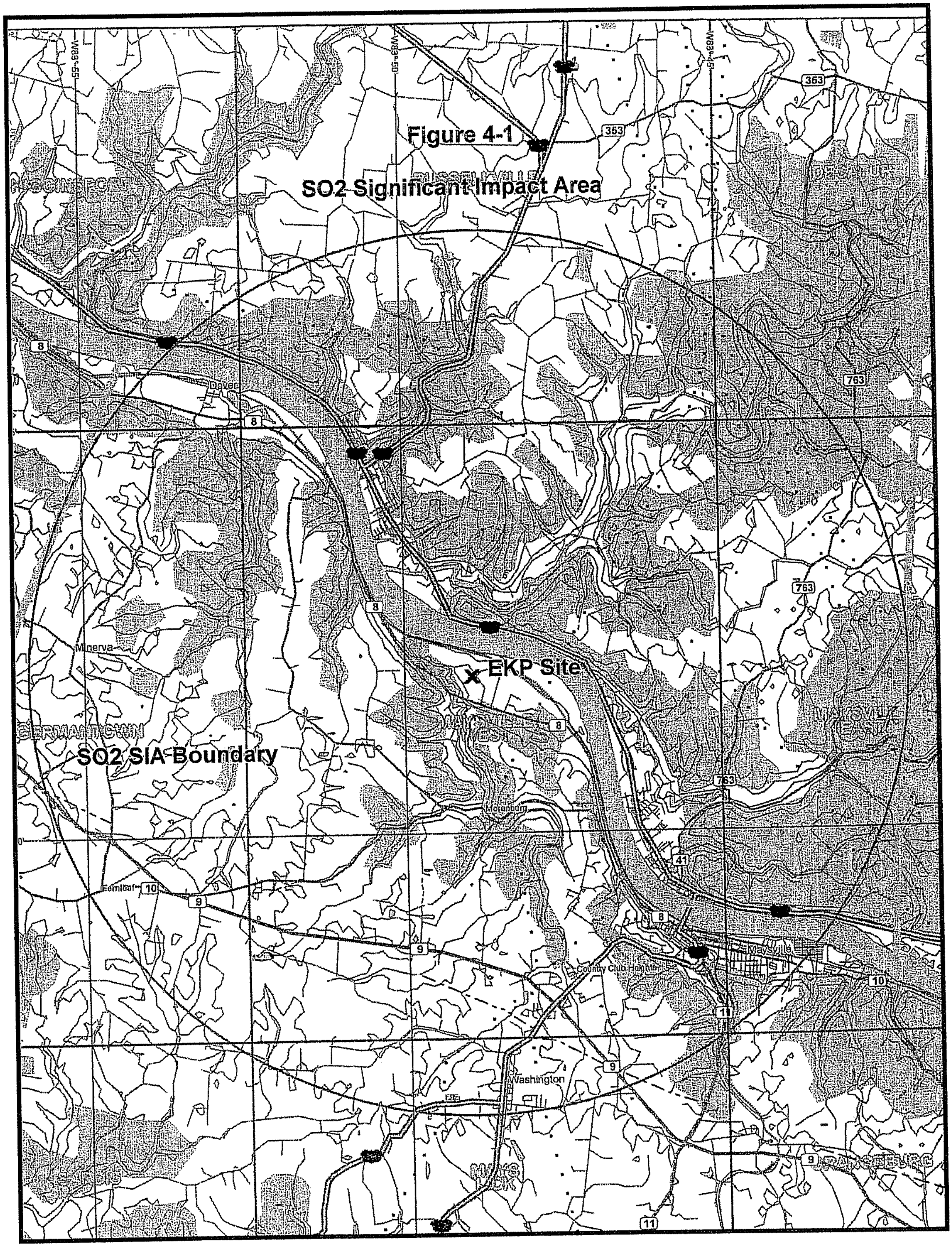


FIGURE 4.1–1.—SO_2 Significant Impact Area for Gilbert Unit 3.

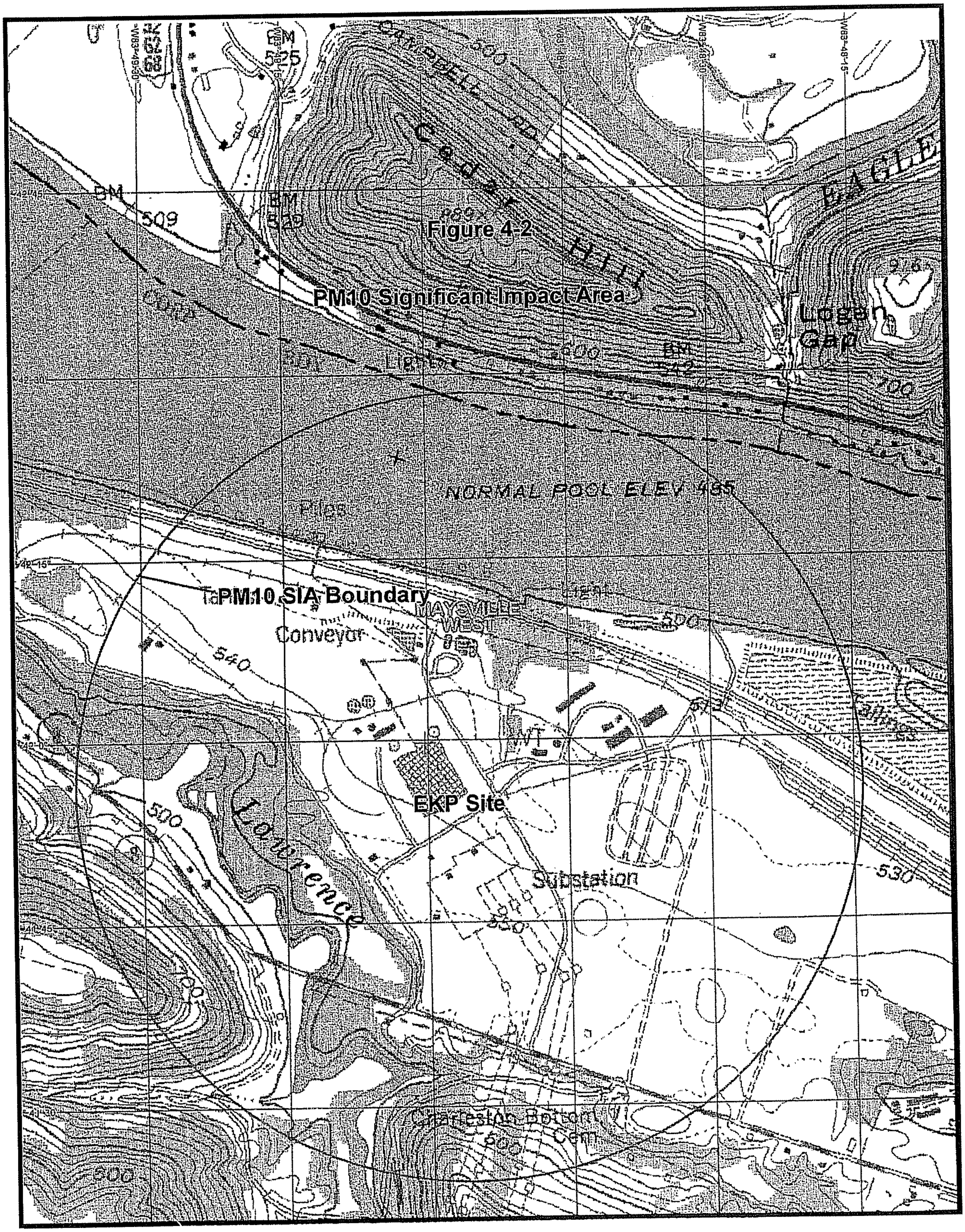


FIGURE 4.1–2.—PM_{10} Significant Impact Area for Gilbert Unit 3.

Increment Consumption Analyses. The second set of refined modeling runs included the impacts of emissions from specific sources in the project area to ensure emission increases in the area would not exceed the amount specified by the PSD Class II increment. The concept of the increment is that air quality should not be allowed to degrade right up to the level of the NAAQS; instead, air quality should be preserved to stay within a range (increment) of the air quality as it existed on the baseline date when increments were first established in the 1970s. The Class I increment provides special protection to parks and wilderness areas; the Class II increment is the standard that applies for areas outside Class I. Thus, increment-consuming sources included in the increment modeling analyses were those minor and major sources constructed after the establishment of the baseline date.

Table 4.1–3 shows the results of the increment consumption analyses for both SO_2 and PM_{10} over 5 years of meteorological data. This table shows that the maximum 3-hour SO_2 increment consumption impact is 174.12 micrograms per cubic meter ($\mu g/m^3$), which represents 34.0 percent of the 3-hour SO_2 increment. The maximum 24-hour increment consumption impact is 38.43 $\mu g/m^3$, which represents 42.2 percent of the available increment standard for this averaging time. The maximum 24-hour PM_{10} increment consumption impact is 16.62 $\mu g/m^3$, which represents 55.4 percent of the available increment for this pollutant. Figure 4.1–3 depicts the location of the maximum increment consumption impacts. Based on this detailed modeling analysis of all increment-consuming sources of PM_{10} and SO_2, the proposed new Gilbert Unit 3 boiler would not cause or contribute to any exceedance of the applicable PSD increment standards.

TABLE 4.1–3.—Gilbert Unit 3 Increment Consumption Analysis (all increment-consuming sources)

Pollutant	Averaging Time	Year Showing Maximum Impact	Maximum Impact (ug/m^3)	Increment Standard (ug/m^3)	Percent of Increment Consumed
SO_2	3-hour	1994	174.12	512	34.0 %
	24-hour	1993	38.43	91	42.2 %
PM_{10}	24-hour	1992	16.62	30	55.4 %

Source: Kenvirons 2001.

NAAQS Analyses. The third set of refined modeling evaluated if the proposed addition of Gilbert Unit 3, in combination with all other sources in the area, has the potential to cause or contribute to a violation of the NAAQS or state air quality standards. The sources included in this modeling run were as follows: (1) all sources of PM_{10} and SO_2 associated with the addition of Gilbert Unit 3, (2) all PM_{10} and SO_2 sources within the proposed project's significant impact areas, and (3) all sources expected to have a significant impact within the proposed project's significant impact areas. The NAAQS analyses is designed to look cumulatively at the impact of all significant emissions sources in the area. Based on review of emissions inventory data for the area, this included 9 sources in Kentucky and 18 sources in Ohio. The NAAQS analyses modeling was performed for the pollutants and averaging times (3-hour and 24-hour averages for SO_2, 24-hour average for PM_{10}) found to potentially have a significant impact. For comparison with the NAAQS, the highest modeled results over 5 years of meteorological data were added to the highest measured background concentration to assure conservative analysis of impacts.

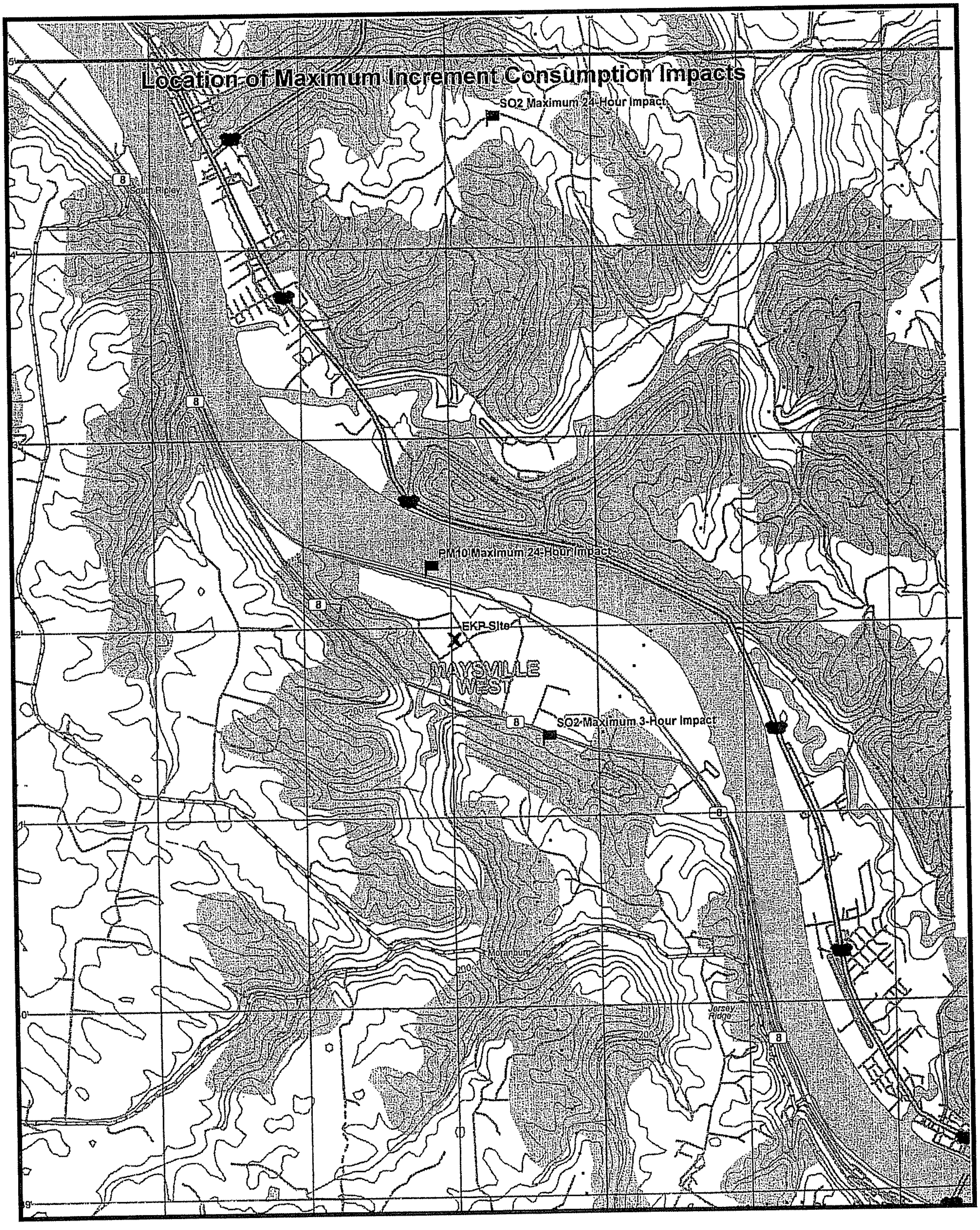


FIGURE 4.1–3.—Location of Maximum Increment Consumption Impacts for Gilbert Unit 3.

Table 4.1–4 presents the maximum ambient impacts of Gilbert Unit 3 for comparison with the NAAQS. The table shows that the maximum second-highest 24-hour total SO_2 impact (designated for PSD comparison with the NAAQS) from all modeled and background sources is predicted to be 302.27 $\mu g/m^3$; this is less than the applicable NAAQS of 365 $\mu g/m^3$. The maximum second-highest 3-hour total SO_2 impact is predicted to be 989.34 $\mu g/m^3$, which is also less than the applicable NAAQS of 1,300 $\mu g/m^3$. Finally, the total ambient concentration of PM_{10} based upon the 24-hour second-highest modeled impact and background sources is predicted to be 109.21 $\mu g/m^3$, which is less than the NAAQS of 150 $\mu g/m^3$.

TABLE 4.1–4.—Gilbert Unit 3 Maximum Air Quality Impacts

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)	Maximum Impact Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	Percent of Ambient Air Quality Standard (NAAQS)
SO_2	3-hour	1,300	813.06	177.6	990.66	76 %
	24-hour	365	182.97	119.3	302.27	83 %
PM_{10}	24-hour	150	55.21	54	109.21	73 %

Source: Kenvirons 2001.

Hazardous Air Pollutants. The proposed addition of Gilbert Unit 3 would qualify as a major source for Hazardous Air Pollutants (HAPs) under Section 112 of the *Clean Air Act,* as amended. HAPs are pollutants known or suspected to cause cancer or other serious health effects. Table 4.1–5 lists potential emissions of all regulated HAPs that would be emitted by the proposed Gilbert Unit 3. Section 112 requires new major sources of HAPs to have emission limits that represent the Maximum Achievable Control Technology, based on emissions levels that are already being achieved by the better-controlled and lower-emitting sources in an industry. A separate HAPs analysis under Section 112 of the *Clean Air Act* will be performed for Unit 4 in accordance with the NEPA requirements.

The proposed control of organic HAPs to Maximum Achievable Control Technology levels from Gilbert Unit 3 relies on proper boiler design and operation. Calculation of the organic HAP emissions for the proposed project were performed using EPA's *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units- Final Report to Congress.* Factors for Eastern Kentucky bituminous coal were selected as appropriate for the coal used at Spurlock Station. Control of inorganic HAPs is proposed to be through the main Gilbert Unit 3 baghouse that also controls particulate (PM_{10}) emissions. Control of acid gases, HF and HCl, is proposed to be by limestone injection and fabric filtration to stay below Maximum Achievable Control Technology levels.

Class I Area Impacts. PSD regulations require an evaluation of the proposed project's potential impact on Class I areas (National Parks, wilderness areas, and other areas provided special air quality protection). The analysis must evaluate increment consumption for any significant increase in PM_{10}, SO_2, or NO_x emissions due to the construction or modification of a major source. Deposition of total sulfur and nitrogen (a measure of acid deposition), along with

TABLE 4.1–5.—Potential Hazardous Air Pollutant Emissions from Gilbert Unit 3[1]

Pollutant	Emission Factor	Units	Baghouse EMF	Conc. (ppmw)	Cleaning factor	Emission Rate lbs/ hr	Emission Rate tons/ year
ORGANIC HAPS							
1, 1, 2-trichloroethane	4.7	lb/10^{12} BTU	-	-	-	0.0118	0.051
2-chloroacetophenone	0.29	lb/10^{12} BTU	-	-	-	0.0007	0.003
2,4-dinitrotoulene	0.015	lb/10^{12} BTU	-	-	-	0.0000	0.000
Acetaldehyde	6.75	lb/10^{12} BTU	-	-	-	0.0169	0.074
Acetophenone	0.68	lb/10^{12} BTU	-	-	-	0.0017	0.007
Acrolein	3.25	lb/10^{12} BTU	-	-	-	0.0081	0.036
Benzene	2.5	lb/10^{12} BTU	-	-	-	0.0063	0.027
Benzyl chloride	0.006	lb/10^{12} BTU	-	-	-	0.0000	0.000
Bis(2-ethylhexyl) phthalate	4.1	lb/10^{12} BTU	-	-	-	0.0103	0.045
Bromoform	6.6	lb/10^{12} BTU	-	-	-	0.0165	0.072
Carbon disulfide	4.3	lb/10^{12} BTU	-	-	-	0.0108	0.047
Carbon tetrachloride	3.25	lb/10^{12} BTU	-	-	-	0.0081	0.036
Chlorobenzene	3.18	lb/10^{12} BTU	-	-	-	0.0080	0.035
Chloroform	3.2	lb/10^{12} BTU	-	-	-	0.0080	0.035
Cumene	0.29	lb/10^{12} BTU	-	-	-	0.0007	0.003
Dibutyl phthalate	2.8	lb/10^{12} BTU	-	-	-	0.0070	0.031
Ethyl benzene	0.41	lb/10^{12} BTU	-	-	-	0.0010	0.004
Ethyl chloride	2.4	lb/10^{12} BTU	-	-	-	0.0060	0.026
Methyl chloroform	3.42	lb/10^{12} BTU	-	-	-	0.0086	0.037
Ethylene dichloride	3.1	lb/10^{12} BTU	-	-	-	0.0078	0.034
Formaldehyde	4	lb/10^{12} BTU	-	-	-	0.0100	0.044
Hexane	0.83	lb/10^{12} BTU	-	-	-	0.0021	0.009
Hexachlorobenzene	0.08	lb/10^{12} BTU	-	-	-	0.0002	0.001
Isophorone	24	lb/10^{12} BTU	-	-	-	0.0600	0.263
Methyl bromide	0.89	lb/10^{12} BTU	-	-	-	0.0022	0.010
Methyl chloride	5.9	lb/10^{12} BTU	-	-	-	0.0148	0.065
Methyl ethyl ketone	8	lb/10^{12} BTU	-	-	-	0.0200	0.088
Methyl iodine	0.4	lb/10^{12} BTU	-	-	-	0.0010	0.004
Methyl isobutyl ketone	4.9	lb/10^{12} BTU	-	-	-	0.0123	0.054
Methyl methacrylate	1.1	lb/10^{12} BTU	-	-	-	0.0028	0.012
Methyl tert-butyl ether	1.4	lb/10^{12} BTU	-	-	-	0.0035	0.015
Methylene chloride	13	lb/10^{12} BTU	-	-	-	0.0325	0.142
n-nitrosodimethylamine	0.68	lb/10^{12} BTU	-	-	-	0.0017	0.007
Naphthalene	0.77	lb/10^{12} BTU	-	-	-	0.0019	0.008
m,p-cresol	0.675	lb/10^{12} BTU	-	-	-	0.0017	0.007
o-cresol	1.7	lb/10^{12} BTU	-	-	-	0.0043	0.019
p-cresol	0.95	lb/10^{12} BTU	-	-	-	0.0024	0.010
Perylene	0.075	lb/10^{12} BTU	-	-	-	0.0002	0.001
Pentachlorophenol	0.008	lb/10^{12} BTU	-	-	-	0.0000	0.000
Phenol	6.1	lb/10^{12} BTU	-	-	-	0.0153	0.067
Phthalic anhydride	4.9	lb/10^{12} BTU	-	-	-	0.0123	0.054
Propionaldehyde	10.35	lb/10^{12} BTU	-	-	-	0.0259	0.113
Quinoline	0.053	lb/10^{12} BTU	-	-	-	0.0001	0.001
Styrene	3.1	lb/10^{12} BTU	-	-	-	0.0078	0.034
Tetrachloroethylene	3.1	lb/10^{12} BTU	-	-	-	0.0078	0.034
Toluene	3.6	lb/10^{12} BTU	-	-	-	0.0090	0.039
Trans-1,3 dichloropropene	4.7	lb/10^{12} BTU	-	-	-	0.0118	0.051
Trichloroethylene	3.1	lb/10^{12} BTU	-	-	-	0.0078	0.034
Vinyl acetate	0.42	lb/10^{12} BTU	-	-	-	0.0011	0.005
Vinylidene chloride	9.7	lb/10^{12} BTU	-	-	-	0.0243	0.106
Xylenes	4.65	lb/10^{12} BTU	-	-	-	0.0116	0.051
o-xylenes	0.81	lb/10^{12} BTU	-	-	-	0.0020	0.009
m,p-xylenes	1.45	lb/10^{12} BTU	-	-	-	0.0036	0.016
2,3,7,8-tetrachlorodi-benzo-p-dioxin	1.5E-06	lb/10^{12} BTU	-	-	-	0.0000	1.64E-08
1,2,3,7,8-tetrachlorodi-benzo-p-dioxin	2.8E-06	lb/10^{12} BTU	-	-	-	7.000E-09	3.07E-08
1,2,3,4,7,8-hexachlorodi-benzo-p-dioxin	5.9E-06	lb/10^{12} BTU	-	-	-	1.475E-08	6.46E-08
1,2,3,6,7,8-hexachlorodi-benzo-p-dioxin	6.6E-06	lb/10^{12} BTU	-	-	-	1.650E-08	7.23E-08
1,2,3,7,8,9-hexachlorodi-benzo-p-dioxin	7.9E-06	lb/10^{12} BTU	-	-	-	1.975E-08	8.65E-08
1,2,3,4,6,7,8-heptachlorodi-benzo-p-dioxin	4.2E+00	lb/10^{12} BTU	-	-	-	1.050E-02	4.60E-02

TABLE 4.1–5.—Potential Hazardous Air Pollutant Emissions from Gilbert Unit 3[1] (continued)

Pollutant	Emission Factor	Units	Baghouse EMF	Conc. (ppmw)	Cleaning factor	Emission Rate lbs/ hr	Emission Rate tons/ year
Heptachlorodi-benzo-p-dioxin	7.6E-05	lb/10^12 BTU	-	-	-	1.900E-07	8.32E-07
Hexachlorodi-benzo-p-dioxin	2.7E-05	lb/10^12 BTU	-	-	-	6.750E-08	2.96E-07
Octachlorodi-benzo-p-dioxin	3.6E-05	lb/10^12 BTU	-	-	-	9.000E-08	3.94E-07
Pentachlorodi-benzo-p-dioxin	8.0E-06	lb/10^12 BTU	-	-	-	2.000E-08	8.76E-08
Tetrachlorodi-benzo-p-dioxin	8.8E-06	lb/10^12 BTU	-	-	-	2.200E-08	9.64E-08
2,3,7,8-tetrachlorodi-benzofuran	4.4E-06	lb/10^12 BTU	-	-	-	1.100E-08	4.82E-08
1,2,3,7,8-pentachlorodi-benzofuran	4.6E-06	lb/10^12 BTU	-	-	-	1.150E-08	5.04E-08
2,3,4,7,8-pentachlorodi-benzofuran	4.8E-06	lb/10^12 BTU	-	-	-	1.200E-08	5.26E-08
1,2,3,4,7,8-hexachlorodi-benzofuran	7.9E-06	lb/10^12 BTU	-	-	-	1.975E-08	8.65E-08
1,2,3,6,7,8-hexachlorodi-benzofuran	4.0E-06	lb/10^12 BTU	-	-	-	1.000E-08	4.38E-08
1,2,3,7,8,9-hexachlorodi-benzofuran	6.8E-06	lb/10^12 BTU	-	-	-	1.700E-08	7.45E-08
2,3,4,6,7,8-hexachlorodi-benzofuran	1.2E-06	lb/10^12 BTU	-	-	-	3.000E-09	1.31E-08
1,2,3,4,6,7,8-heptachlorodi-benzofuran	5.7E-06	lb/10^12 BTU	-	-	-	1.425E-08	6.24E-08
1,2,3,4,7,8,9-heptachlorodi-benzofuran	1.8E-05	lb/10^12 BTU	-	-	-	4.500E-08	1.97E-07
Heptachlorodi-benzofruan	1.9E-05	lb/10^12 BTU	-	-	-	4.750E-08	2.08E-07
Hexachlorodi-benzofuran	2.1E-05	lb/10^12 BTU	-	-	-	5.250E-08	2.30E-07
Octachlorodi-benzofuran	1.7E-06	lb/10^12 BTU	-	-	-	4.250E-09	1.86E-08
Pentachlorodi-benzofuran	1.2E-05	lb/10^12 BTU	-	-	-	3.000E-08	1.31E-07
Tetrachlorodi-benzofurna	1.1E-05	lb/10^12 BTU	-	-	-	2.750E-08	1.20E-07
1-methylnaphthalene	0.01	lb/10^12 BTU	-	-	-	2.500E-05	1.10E-04
2-chloronaphthalene	0.04	lb/10^12 BTU	-	-	-	1.000E-04	4.38E-04
2-methylnaphthalene	0.032	lb/10^12 BTU	-	-	-	8.000E-05	3.50E-04
Acenaphthene	0.013	lb/10^12 BTU	-	-	-	3.250E-05	1.42E-04
Acenaphthylene	0.004	lb/10^12 BTU	-	-	-	1.000E-05	4.38E-05
Anthracene	0.004	lb/10^12 BTU	-	-	-	1.000E-05	4.38E-05
Benz(a)anthracene	0.002	lb/10^12 BTU	-	-	-	5.000E-06	2.19E-05
Benzo(a)pyrene	0.001	lb/10^12 BTU	-	-	-	2.500E-06	1.10E-05
Benzo(e)pyrene	0.001	lb/10^12 BTU	-	-	-	2.500E-06	1.10E-05
Benzo(b)fluoranthene	0.008	lb/10^12 BTU	-	-	-	2.000E-05	8.76E-05
Benzo(b+k)fluoranthene	0.004	lb/10^12 BTU	-	-	-	1.000E-05	4.38E-05
Benzo-(k)fluoroanthene	0.004	lb/10^12 BTU	-	-	-	1.000E-05	4.38E-05
Benzo-(g,h,i,)perylene	0.002	lb/10^12 BTU	-	-	-	5.000E-06	2.19E-05
Biphenyl	0.18	lb/10^12 BTU	-	-	-	4.500E-04	1.97E-03
Chrysene	0.003	lb/10^12 BTU	-	-	-	7.500E-06	3.29E-05
Dibenzo(a,h)anthracene	0.001	lb/10^12 BTU	-	-	-	2.500E-06	1.10E-05
Flouranthene	0.016	lb/10^12 BTU	-	-	-	4.000E-05	1.75E-04
Flourene	0.013	lb/10^12 BTU	-	-	-	3.250E-05	1.42E-04
Indeno(1,2,3-c,d)pyrene	0.003	lb/10^12 BTU	-	-	-	7.500E-06	3.29E-05
Phenanthrene	0.032	lb/10^12 BTU	-	-	-	8.000E-05	3.50E-04
Pyrene	0.012	lb/10^12 BTU	-	-	-	3.000E-05	1.31E-04
Total Organic HAPs							2.03
INORGANIC HAPS							
Antimony	1	ppmw	0.02	1.13	0.715	4.04E-03	0.018
Arsenic	0.77	ppmw	0.01	19.1	0.554	2.04E-02	0.089
Beryllium	0.56	ppmw	0.01	2.00	0.711	1.99E-03	0.009
Hydrogen chloride	1	ppmw	0.56	694.79	0.496	4.82E+01	211.318
Hydrogen flouride	1	ppmw	1	52.64	0.496	6.53E+00	28.590
Cadmium	1	ppmw	0.08	0.16	0.624	2.00E-03	0.009
Chromium	0.46	ppmw	0.01	16.3	0.512	9.60E-03	0.042
Cobalt	1	ppmw	0.004	6.6	0.537	3.54E-03	0.016
Lead	0.42	ppmw	0.01	14.00	0.449	6.60E-03	0.029
Manganese	0.63	ppmw	0.01	32	0.382	1.93E-02	0.084
Mercury	1	ppmw	0.56	0.06	0.79	6.64E-03	0.029
Nickel	0.67	ppmw	0.01	17.50	0.568	1.66E-02	0.073
Selenium	0.84	ppmw	0.31	3.83	0.745	1.86E-01	0.814
Total Inorganic HAPs							241.12
Total Annual HAP Potential Emissions							**243.147**

[1]Emissions were calculated using median emission factors for 2010 from EPA-453/R-98-004b for the organic HAPS. Inorganic HAP emissions were also calculated using EPA-453/R-98-004b factors for coal cleaning, baghouse control, and concentration for Kentucky bituminous coal.

visibility, must also be evaluated. The nearest Class I Areas to the Spurlock Station are Mammoth Cave National Park, approximately 155 miles (250 kilometers) to the southwest, and Great Smoky Mountains National Park, 202 miles (325 kilometers) south of the plant site. The required Class I analysis was performed for Gilbert Unit 3 and will be performed for Unit 4 separately in accordance with NEPA and PSD requirements.

Increment Consumption. At the recommendation of the Federal Land Managers and the National Park Service Office in Denver, Colorado, the CALPUFF modeling system was used. Source inputs and meteorological data for the CALPUFF model were similar to those previously described for the ISCST3 modeling. Based on the CALPUFF modeling results, none of the PSD significant impact levels would be exceeded. Therefore, no further modeling to demonstrate increment protection in Class I areas is required for the addition of Gilbert Unit 3.

Acid Deposition. Annual deposition values were used from the CALPUFF model for the Class I Area acid deposition assessment for Mammoth Cave National Park. These impacts are related to the dry and wet deposition of nitric acid, NO_3, NO_x, SO_2, and SO_4. Model-predicted deposition values were compared to existing deposition rates in the park. The maximum predicted sulfur deposition rate from the new Gilbert Unit 3 would be 0.0067 kilograms per hectare (0.0059 pounds per acre), which results in a total increase of 0.085 percent over current sulfur deposition levels. The maximum predicted nitrogen deposition rate from Gilbert Unit 3 is 0.000719 kilograms per hectare (0.000639 pounds per acre), which results in a total increase of 0.0002 percent over current nitrogen deposition levels.

For the Great Smoky Mountains National Park acid deposition analysis, National Park Service personnel provided screening threshold deposition values to identify whether further modeling analysis is needed. The screening threshold for total sulfur is currently 0.005 kilograms per hectare, while the screening threshold for total nitrogen is currently 0.0014 kilograms per hectare (0.0012 pounds per acre) (KENVIRONS 2001). Based on the CALPUFF modeling results, sulfur and nitrogen deposition rates within the park boundaries were below the screening thresholds, so no further modeling assessment was performed.

Visibility. The visibility analysis performed for Gilbert Unit 3 was conducted using the CALPUFF modeling system in the screening mode with the same input parameters as described above. The resulting CALPUFF output was then run with the CALPOST post-processing program to calculate changes in extinction at Mammoth Cave and Smoky Mountains National Parks due to the proposed project. Table 4.1–6 shows that the maximum change in extinction for in-park receptors is below 5 percent. Therefore, according to the procedures developed by the Federal Land Managers (FLAG 2000), the proposed project would not have an adverse effect on visibility in the Class I Areas evaluated. EPA's VISCREEN model was used for evaluation of plume visual impacts as observed from a given vantage point within each park. Based on the VISCREEN model results, the proposed project will not adversely affect visual parameters in these Class I Areas.

Greenhouse Effects. Carbon dioxide (CO_2) is the dominant greenhouse gas emission product from coal-fired boiler systems. Quantities of other greenhouse gases (such as methane and nitrous oxide) are very small in comparison to CO_2. CO_2 emissions from coal-fired boiler systems are primarily a function of fuel carbon content, not combustion system design. Most of the carbon content of the fuel is released as CO_2, with small amounts remaining in the residual ash or released as CO, total organic gases, and organic components of particulate matter. Based on the use of Eastern Kentucky bituminous coal (assuming medium volatility), total emissions of CO_2 from Units 3 and 4 combined are estimated to be approximately 6,084,696 tons per year.

TABLE 4.1–6.—Assessment of Visibility Impacts from Gilbert Unit 3 CALPUFF Modeling Results

Year	Mammoth Cave: Max. Change in Extinction All Receptors	Mammoth Cave: Total Days with Extinction > 5.0 %	Mammoth Cave: Max. Change in Extinction Park Receptors	Smoky Mountains: Max. Change in Extinction All Receptors	Smoky Mountains: Total Days with Extinction > 5.0 %	Smoky Mountains: Max. Change in Extinction Park Receptors
1986	9.84%	2*	2.10%	7.81%	1**	1.54%
1987	7.21%	2*	4.59%	5.75%	1**	0.71%
1988	3.75%	0	1.01%	2.62%	0	0.84%
1989	4.50%	0	1.61%	3.24%	0	0.86%
1990	5.94%	1*	2.24%	3.82%	0	3.82%

* The reported occurences of predicted changes in extinction of greater than 5 % are located at receptors on a part of the polar screening ring that do not pass through the park boundaries. The maximum change in extinction for all modeled years for receptors that are actually located within the park boundaries (Receptors 228 - 233) is 4.59 %.

** The reported occurences of predicted changes in extinction of greater than 5 % are located at receptors on a part of the polar screening ring that do not pass through the park boundaries. The maximum change in extinction for all modeled years for receptors that are actually located within the park boundaries (Receptors 189 - 193) is 1.93 %.

Transmission Line Operation. No significant air impacts are expected from ongoing operation and maintenance of the proposed transmission line. An occasional maintenance vehicle would be required to perform maintenance activities. Where maintenance access roads are not required, restoration of the right-of-way to natural shrubby vegetation would mitigate any fugitive dust emissions.

Conclusions. A number of steps in the modeling protocols introduce conservatism into the modeling results, thus assuring the absolute maximum impacts are predicted or over-predicted. Maximum emission rates are used for all emission points, assuming the maximum firing rate and maximum annual hours of operation. The modeled maximum impacts are based on the worst-case meteorological conditions for impacts selected from the 5 years of data. The maximum modeled impact is added to the maximum background pollutant concentrations, although the weather conditions that produce the highest impacts often do not coincide with the weather producing the highest background concentrations. Thus, the maximum air quality impacts presented in Table 4.1–4 follow PSD Regulations to obtain absolute maximum predicted impacts. The modeling analyses performed show that the proposed addition of Gilbert Unit 3 and associated equipment will be well below PSD increment limits and ambient air quality standards (NAAQS). Additionally, no significant air quality impacts are expected to occur from the addition of Gilbert Unit 3 in the Class I Areas nearest to Spurlock Station. A separate air quality analysis will be performed for Unit 4 in accordance with PSD and NEPA requirements.

No Action Alternative

Under the No Action Alternative considered in this environmental assessment, Units 3 and 4 at Spurlock Station and the associated transmission line would not be built. However, the selective catalytic reduction currently under construction for Units 1 and 2 would be operated once the ongoing construction is complete. The emissions given for Units 1 and 2 in Section 3.1 of the Affected Environment chapter would be reduced by approximately 5,612 tons (5,091 metric tons) of NO_x per year upon operation of the selective catalytic reduction.

4.1.2 Noise

This section discusses the potential noise impacts of the construction and operation of Units 3 and 4 at the Spurlock Station, and the transmission line extending into Brown County, Ohio. The methodology for determining impacts is presented below, followed by a description of the potential impacts.

Methodology

The noise impact analysis evaluates the potential noise levels generated during construction and operation of the proposed project, and identifies potential receptors (for example, residences) in the vicinity of the proposed project. The analysis includes quantification of projected noise levels, based on calculations of construction related noise and sound level measurements taken at various locations near Spurlock Station. The analysis also assesses the potential for corona effects from the transmission lines, generally described as a crackling or hissing sound.

As explained in Section 3.1.2, noise levels are measured in composite decibel (dB) value. The adjusted decibels (dBA) represent the human hearing response to sound for a single sound event. The average sound level over a complete 24-hour period is represented by the Day-Night Average Sound Level, often used for the evaluation of community noise effects.

For construction of the proposed project, the predicted peak noise level for a single sound event (for example, a pile being driven) was calculated for the nearest residences to the construction locations. Noise levels would be reduced for receptors further removed from the construction by approximately 6 dBA for each doubling of distance from the source. For example, a 75 dBA noise heard at 50 feet (15 meters) from the source would be reduced to 69 dBA at 100 feet (30 meters) away from the source (Canter 1977).

For ongoing operation of the proposed project, the Day-Night Average Sound Level best represents the predicted average community noise levels near the Spurlock Station. In determining the significance of the calculated Day-Night Average Sound Level, results for each alternative are compared to established standards. In 1974, the EPA identified noise levels that could be used to protect public health and welfare, including prevention of hearing damage, sleep disturbance, and communication disruption. Outdoor Day-Night Average Sound Level values of

55 dBA were identified as desirable to protect against activity interference and hearing loss in residential areas and at educational facilities.

The determination as to whether the impact of a single sound event (or series of single events) is significant is a qualitative assessment of the increase in noise level above background as experienced by receptors near the source. A subjective response to changes in sound levels based upon personal judgements of sound presented within a short timespan indicate that a change of +/-5 dBA may be quite noticeable, although changes that take place over a long period of time of this magnitude or greater may be "barely perceptible." Changes in sound levels of +/-10 dBA within a short timespan may be perceived by humans as "dramatic" and changes in sound levels of +/-20 dBA within a short timespan may be perceived as "striking." In qualitative terms, these types of changes in sound level could be considered significant (DOE 2001).

4.1.2.1 *Construction*

Proposed Action

The acoustical environment would be impacted during construction of the proposed project, both from activities at the Spurlock Station and along the transmission line extending into Brown County, Ohio. Construction activities would generate noise produced by heavy construction equipment and trucks. Piles would be driven on the Spurlock Station site. No explosive blasting is anticipated during construction. Construction noise levels would be variable and intermittent, as equipment is operated on an as-needed basis. Construction activities normally would be limited to daytime hours, and thus would not impact existing background noise levels at night. While relatively high peak noise levels in the range of 80 to 103 dBA would occur on the active construction sites, these noise levels would be temporary and the impact would be minimized given the distances to the limited development in the project area. Table 4.1–7 presents the peak noise levels (dBA) expected for a single sound event from various equipment during construction.

TABLE 4.1–7.—Peak Attenuated Noise Levels (dBA) Expected from Construction Equipment

Source	Peak Noise Level	Distance from Source						
		50 ft	100 ft	200 ft	400 ft	1,000 ft	1,700 ft	2,500 ft
Heavy Trucks	95	84-89	78-83	72-77	66-71	58-63	54-59	50-55
Dump trucks	108	88	82	76	70	62	58	54
Concrete mixer	108	85	79	73	67	59	55	51
Jackhammer	108	88	82	76	70	62	58	54
Scraper	93	80-89	74-82	68-77	60-71	54-63	50-59	46-55
Bulldozer	107	87-102	81-96	75-90	69-84	61-76	57-72	53-68
Generator	96	76	70	64	58	50	46	42
Crane	104	75-88	69-82	63-76	55-70	49-62	45-48	41-54
Loader	104	73-86	67-80	61-74	55-68	47-60	43-56	39-52
Grader	108	88-91	82-85	76-79	70-73	62-65	58-61	54-57
Pile driver	105	95	89	83	77	69	65	61
Forklift	100	95	89	83	77	69	65	61

Source: Golden et al. 1980.

The combined effect of several equipment types operating simultaneously is not represented by the sum of the individual noise levels, but rather is calculated based on the logarithmic scale of decibels (see explanation in Section 3.1.2). Table 4.1–8 presents the results of a sample calculation assuming a worst-case scenario of a bulldozer, pile driver, and scraper operating simultaneously.

TABLE 4.1–8.—Worst-Case Combined Peak Noise Level from Bulldozer, Pile Driver, and Scraper

	Distance from Source				
	50 feet	**100 feet**	**200 feet**	**¼ mile**	**½ mile**
Combined Peak Noise Level	103 dBA	97 dBA	91 dBA	74 dBA	68 dBA

Noise measurements taken in the vicinity of the Spurlock Station during current construction (unrelated to the proposed project) verify the calculated noise levels described above. A series of sound level measurements was taken along the south side of the Ohio River, approximately 0.25 mile (0.4 kilometer) from pile driving activities adjacent to the existing boiler units. These readings showed sound levels ranging from 56 to 72 dBA (EKPC 2001). Thus, the predicted peak noise level of 74 dBA shown in Table 4.1–8 for 0.25 miles (0.4 kilometers) from the source provides a conservative estimate of the peak noise levels expected during construction activities.

The noise impacts from construction at the Spurlock Station would primarily affect the residents along Highway 52 across the Ohio River to the northeast, located 0.75 miles (1.2 kilometers) or more from the proposed construction areas. Peak noise levels at a distance of 0.75 miles (1.2 kilometers) from the construction areas would be approximately 65 dBA. In addition, a limited number of residents along Highway 8 near the plant entrance may be affected by construction noise, with one residence approximately 0.25 miles (0.4 kilometers) from the proposed construction areas. The peak noise level at a distance of 0.25 miles (0.4 kilometer) from the construction areas would be approximately 74 dBA. An automobile passing at a distance of 20 feet (6 meters) would have a sound of approximately 74 dBA. Thus, the effect to the nearest residents to the construction noise would be similar to a passing car on the adjacent highways to the residences. These temporary and intermittent noise level increases may be perceived as dramatic or striking relative to background noise levels when no construction is occurring. In addition to residences, intermittent peak noise levels may be experienced at businesses and by boaters and other recreational participants along the Ohio River. Refer to Section 3.1.2 for a complete discussion of existing noise levels in the area.

In evaluating the potential for hearing damage (both Temporary Threshold Shift and Noise-induced Permanent Threshold Shift), the noise level and duration of exposure are considered. For example, Noise-induced Permanent Threshold Shift would be produced by unprotected exposures of 8 hours per day for several years to noise above 105 dBA. Similarly, Temporary Threshold Shift would be based on exposure to a steady noise level of 80 to 130 dBA, increasing with duration of exposure (Canter 1977). The intermittent peak construction noise levels would not approach the steady noise level conditions for an extended duration that could lead to Temporary Threshold Shift or Noise-induced Permanent Threshold Shift hearing damage.

Based upon the noise impacts analyses of construction of the proposed project, the primary effect of noise generated would probably be one of annoyance to the residents nearest to the right-of-way during the construction period. Construction workers who would be located closer to the noise sources and would experience longer exposure durations than the public would follow standard industry and Federal Occupational Safety and Health Administration procedures for hearing protection.

No Action Alternative

Under the No Action Alternative considered in this environmental assessment, Units 3 and 4 at Spurlock Station and the associated transmission line would not be built. However, ongoing construction of the selective catalytic reduction for Units 1 and 2 would continue. Noise impacts from the ongoing selective catalytic reduction construction are similar to those construction impacts described above for the Proposed Action. Construction of the selective catalytic reduction for Units 1 and 2 is expected to be completed by fall of 2002.

4.1.2.2 *Operation*

Proposed Action

Upon completion of construction, the potential for noise impacts along the transmission line right-of-way would be from two major sources: (1) corona effects from the transmission lines, generally characterized as a crackling or hissing noise, and (2) occasional maintenance vehicles. Corona is the electrical breakdown of air into charged particles caused by the electrical field at the surface of conductors. During dry weather conditions, audible noise from transmission lines is often lost in the background noise at locations beyond the edge of the right-of-way. Modern transmission lines are designed, constructed and maintained so that during dry conditions they will operate below the corona-inception voltage, meaning that the line will generate a minimum of corona-related noise. Sound level measurements taken during fair weather at existing 345-kV transmission lines indicate only a 2 to 3 dB difference between background noise levels and levels beneath the transmission lines (Meyer 2001b). In foul weather conditions, corona discharges can be produced by water droplets and fog. Given the distance of receptors from the right-of-way, the impact of corona-generated audible noise is not expected to be significant.

The potential for noise impacts associated with Units 3 and 4 at the Spurlock Station would be primarily from the following sources: (1) Operation of Unit 3 and 4 boilers, steam turbines, and control equipment, (2) increased barge or rail deliveries and handling of coal, (3) increased limestone truck deliveries and handling, and (4) increased landfill ash trucks. The noise from the first three listed sources would be focused in the vicinity of the existing boiler units, while noise from the landfill ash trucks would occur between the ash silos and the ash landfill.

Current noise levels near the plant entrance and across the Ohio River are in the range of 44 to 51 dBA, measure during periods with minimal highway traffic (EKPC 2001). Residences at these locations are along Highway 8 and Highway 52, respectively. Existing noise levels near these residences are dominated by intermittent highway traffic. The increase in ongoing operating noise from Units 3 and 4 and associated equipment would be less than 2 dB at the nearest residences on Highway 8 and Highway 52. This change in the background noise level would be overshadowed by existing highway traffic, which currently causes fluctuations of up to 20 dBA (EKPC 2001).

Noise levels at residences along the highway, currently averaging approximately 63 dBA during periods of traffic, would increase due to additional delivery of limestone. Limestone delivery trucks would be limited to a 6-hour period during the daytime, 5 days per week. During these delivery times, approximately 14 trucks of limestone would be delivered to the Spurlock Station each hour, along Highway 8. Based on the average noise level of 80 dBA for a two-axle commercial truck (35 mph, at a distance of 20 feet [6 meters]), the hourly average traffic noise during delivery hours would increase from 63 dBA to 64 dBA (Canter 1977).

As a result of the Proposed Action, the number of ash truckloads per hour taken to the landfill would also increase. Currently, approximately three truckloads of ash per hour are taken to the landfill. For operation of Units 3 and 4, an additional nine truckloads per hour would occur. Ash trucks would operate 7 daytime hours per day, 7 days per week. Current noise levels on South Ripley Road adjacent to the landfill range from 42 to 65 dBA, with the higher values resulting from public traffic (non-EKPC) on South Ripley Road, and from farm equipment on adjacent agricultural land. The terrain of the land shields the landfill almost entirely from view from South Ripley Road, and likewise, the noise levels from the ash landfill trucks are significantly shielded. Thus, the additional ash landfill truck noise as heard on South Ripley Road would be at a level similar to existing noise levels from traffic and activities in the area.

Given the change in sound levels described above, the increase in the Day-Night Average Sound Level was calculated for operation of the proposed project (after construction is complete). Beyond the EKPC property line, the Day-Night Average Sound Level would increase by 2 to 3 dBA due to the proposed project. This increase would not be expected to be perceived as noticeable by nearby residents given that the change would be constant, and that existing intermittent noise peaks already exist in the area due to traffic on nearby roads.

No Action Alternative

Under the No Action Alternative considered in this environmental assessment, Units 3 and 4 at Spurlock Station and the associated transmission line would not be built. Noise levels would remain similar to those described in the Affected Environment chapter, Section 3.1.

4.2 GEOLOGY AND SOILS

Methodology

The geology and soil resource impact analysis consists of an evaluation of the effects generated by the construction and operation of the proposed project on specific geologic and soil resource attributes. Construction activities represent the principal means by which an effect to the geologic resource (e.g., limiting access to mineral or energy resources) and the soil resource (e.g., disruption of prime farmland soils) would occur. The principal element in assessing the effect on the geologic and soil resource is the amount and location of land disturbed during construction.

To determine if an action may cause a significant impact, both the context of the action and the intensity of the impact are considered. For actions such as those proposed, the context is the locally affected area and its significance depends on the effects in the local area. The intensity of the impact is primarily considered in terms of any unique characteristics of the area (e.g., mineral resources, prime farmland), and the degree to which the Proposed Action may adversely affect such unique resources.

Impact analysis on the geologic resource by the proposed project involves the evaluation of potential effects to critical geologic attributes such as access to mineral and energy resources, destruction of unique geologic features, and mass movement or ground shifting induced by the construction of the proposed facilities and transmission line. The impact analysis includes the analysis of hazards from large-scale geological conditions such as earthquakes and volcanism. These conditions tend to affect broad expanses of land and are not typically restricted to smaller discrete areas of land.

Impact analysis on the soil resource by the proposed project involves the evaluation of potential effects to specific soil attributes such as increasing the potential for erosion and compaction by construction activities. Unlike the large-scale geologic conditions discussed above, affects to the soil resources occur on small, discrete areas of land.

4.2.1 Construction

Proposed Action

<u>Geology</u>

Part of the proposed project, Units 3 and 4, their associated facilities and 1¼ mile (2 kilometers) of transmission line, would be constructed on the previously disturbed Spurlock Station, which had already been graded and leveled during the construction of Units 1 and 2 and associated facilities in the late 1970s and early 1980s. Spurlock Station is built on the geologic formations of the Quaternary Period that consist of clay, silt, sand and gravel in various combinations that form alluvium, glacial outwash and eolian and lacustrine deposits. The depth to limestone and shale bedrock for Units 1 and 2 were found in a 1975 subsurface investigation to range between 113 to 136 feet (34.4 to 414. meters) (D&M 1975). Taking that design parameter into account during construction, the structures of Units 1 and 2 are supported on piles driven to bedrock with exceptions of the cooling tower foundations and other lightly loaded foundations, which are supported by slab or spread footings bearing on soil (SCI 2001). Another geotechnical subsurface investigation would be conducted for Units 3 and 4 and would be expected to produce the same results. The construction of Units 3 and 4 would therefore likely employ the same design parameters and construction methods used for Units 1 and 2 (SCI 2001).

Construction of the proposed transmission line and 150-foot (46-meter) right-of-way would include the following roughly sequential major activities performed by small crews progressing along the proposed right-of-way:

- Surveying
- Staging area development
- Structure site clearing
- Stringing site grading/clearing
- Drilling holes for H-frame support poles/preparing and pouring concrete foundations for lattice structures
- Structure assembly/erection
- Conductor stringing/tensioning
- Right-of-way cleanup and restoration

In order to minimize erosion impacts along the proposed transmission line corridor during construction, standard erosion control measures would be implemented including the construction of silt fences and placement of hay bales to prevent the transport of silt and soil.

On the Spurlock Station site, Figure 4.2-1 shows a diagram of the wooden H-frame structure that would support the majority of proposed transmission line with the line strung from the substation and then south of the railroad tracks adjacent to the tailings pond until it would intersect the existing Kentucky Utilities 138-kV Transmission Line. The H-frame structures would then be sited either on the west of east side of the 138-kV Line to the Ohio River. The structure at the edge of the Ohio River would be a steel lattice structure with a corresponding steel lattice structure sited on the opposite side of the Ohio River in Brown County, Ohio. (See Appendix A, Photo 26 for an example of an existing steel lattice structure.) The 125-foot (38.1-meter) steel lattice structures are needed to give the proposed transmission line the necessary height above the Ohio River in order for the line not to interfere with river traffic.

The remainder of the proposed project, 2¼-miles (3.6-kilometers) of transmission line crossing the Ohio River into Brown County, Ohio, would be constructed on Ordovician Period formations consisting of interbedded limestone, shale and siltstone on ridgetops, hillsides and slopes that are easily eroded. The majority of the proposed transmission line structures would also be constructed of H-frame structures. The two support poles would be installed by drilling holes into the ground, approximately 2-feet (0.61 meters) in diameter and 5 feet (1.5 meters) deep. The two steel lattice structures directly on either side of the Ohio River would be have 3,600 square foot (334 square meter) concrete foundations, measuring 60 feet x 60 feet (18 meters x 18 meters).