

In February 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629 (1994)). This Order directs Federal agencies to incorporate environmental justice as part of their missions. As such, Federal agencies are specifically directed to identify and address as appropriate disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The CEQ has issued guidance to Federal agencies to assist them with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (CEQ 1997). In this guidance, the Council encouraged Federal agencies to supplement the guidance with their own specific procedures tailored to particular programs or activities of an agency. DOE has prepared a document titled *Draft Guidance on Incorporating Environmental Justice Considerations into the Department of Energy's National Environmental Policy Act Process* (DOE 2000). DOE's draft guidance is based on Executive Order 12898 and the CEQ environmental justice guidance. Among other things, the DOE draft guidance states that even for actions that are at the low end of the sliding scale with respect to the significance of environmental impacts, some consideration (which could be qualitative) is needed to show that DOE considered environmental justice concerns. DOE needs to demonstrate that it considered apparent pathways or uses of resources that are unique to a minority or low-income community before determining that, even in light of these special pathways or practices, there are no disproportionately high and adverse impacts on the minority or low-income population.

Table 3 illustrates the high degree of racial homogeneity in Iowa and in the counties where the Proposed Action would occur. White residents account for 96.3 to 98.8 percent of the population in seven counties in this area, compared to 93.9 percent statewide, and 75.1 percent nationally. Hispanic/Latino and African-American/Black are the two largest minority groups, but neither of these two groups account for more than 4 percent of the population, and in most Iowa census areas they represent less than 2 percent of the population. Nationally, the Hispanic/Latino and African-American/Black populations represent 12.5 percent and 12.3 percent of the population, respectively. Native Americans represent 0.3 percent of the population in Wapello County and statewide.

Economically, Wapello County and the counties surrounding Rathbun Lake are among the poorest in Iowa. All seven counties have median household incomes below the state average, and all but one have a higher percent of families below the poverty level than does the state overall (Table 3). The Bureau of Economic Analysis reports that in 2000, Wapello County, the site of the proposed new construction, had a per capita personal income (PCPI) of \$22,110. This PCPI ranked 80th among the state's 99 counties and was 84 percent of the state average and 75 percent of the national average. In 1990, Wapello County's PCPI ranked 62nd in the state, indicating a significantly declining trend in the county's comparative PCPI. This unfavorable trend is further seen in the county's 3.6 percent average annual growth rate of PCPI over the past 10 years, compared to 4.3 percent statewide and 4.2 percent nationwide.

#### **4.0 ENVIRONMENTAL IMPACTS**

Impacts from the Proposed Action are described in Section 4.1; impacts under the No Action Alternative are described in Section 4.2.

The Proposed Action would result in impacts from construction of switchgrass feedstock storage, handling, and conveying systems and from switchgrass co-fire tests that would be conducted at the OGS. The Proposed Action would also result in impacts from agricultural activities in the 16 to 28 square kilometers (4,000 to 7,000 acres) needed to supply switchgrass for Phase 2 testing. These activities

**Table 3. General Socioeconomic Profile Data for Iowa Counties and Cities Near the Proposed Action<sup>a</sup>**

Jurisdiction	Population	Percent White	Percent Hispanic	Percent African-American	Percent Unemployed	Median Household Income (\$)	Percent Families Below Poverty Level
Iowa	2,926,324	93.9	2.8	2.1	2.8	39,469	6.0
<b>Counties in the Potentially Affected Area</b>							
Appanoose	13,721	98.2	1.0	0.4	3.4	28,612	10.1
Clarke	9,133	96.6	4.0	0.1	4.0	34,474	6.2
Decatur	8,689	96.5	1.7	1.0	4.8	27,343	10.9
Lucas	9,422	98.4	0.9	0.1	3.1	30,876	8.4
Monroe	8,016	98.4	0.5	0.2	2.2	34,877	5.6
Wapello	36,051	96.3	2.2	0.9	4.1	32,188	9.4
Wayne	6,730	98.8	0.7	0.1	2.4	29,380	10.8
<b>Cities in the Potentially Affected Area</b>							
Albia	3,706	97.9	0.8	0.3	2.9	31,728	4.3
Chillicothe	90	97.8	0	0	0	30,781	12.0
Centerville	5,924	97.3	1.5	0.8	4.8	25,498	11.3
Moravia	713	99.0	0.1	0	1.0	26,042	7.6
Ottumwa	24,998	95.3	2.8	1.3	4.8	30,174	10.9

a. Source: U.S. Census Bureau, Census 2000.

would be switchgrass growing, harvesting, storage, transporting, and related research that would occur in the Rathbun Lake watershed area. Potential indirect impacts could result over the 200 square kilometers (50,000 acres) needed for switchgrass production if the Proposed Action led ultimately to commercialization of switchgrass as a biomass energy crop. Under a commercialization scenario, switchgrass would be obtained from farms within a 110-kilometer (70-mile) radius of the OGS. This area would include the 30 counties of southeast Iowa and portions of northeast Missouri.

## 4.1 Impacts from the Proposed Action

### 4.1.1 Air Quality and Meteorology

**Stack Emissions.** The results of Phase 1 testing at OGS (as well as results of similar co-fire tests in Denmark and Alabama), and the known chemical composition differences between coal and switchgrass suggest that the Proposed Action would not result in emissions that exceed those currently permitted at OGS. During Phase 1 testing, a problem unrelated to the switchgrass testing caused high carbon monoxide levels in flue gas, but further flue gas sampling showed that carbon monoxide emissions were not significantly affected. Sulfur emissions decreased during Phase 1 testing due to the lower sulfur content of the switchgrass. Nitrogen oxide levels were somewhat higher during Phase 1 testing, but problems in the feed-handling system and boiler load conditions may have contributed to higher nitrogen oxide emissions (NREL 2002). Modifications to the feed-handling system and boiler load that would be implemented for Phase 2 testing would be expected to reduce nitrogen oxide emissions.

Alliant Energy's *Environmental Permitting Plan for the Chariton Valley Biomass Project* (Alliant Energy 2002) acknowledges that the ability of the project to proceed under an Iowa DNR variance depends critically on whether Co-fire Test 2 can be conducted without creating emission increases in excess of the PSD limits. The appendix to the permitting plan includes calculations that suggest that

Co-fire Test 2 could be conducted without exceeding PSD limits. Specifically, the appendix draws the following conclusions regarding expected Co-fire Test 2 emissions compared with current coal-only emissions:

- Lead emission increases would not exceed the PSD threshold, even under commercial operations.
- Carbon monoxide emissions would likely not exceed the PSD threshold.
- It does not appear that nitrogen oxide emissions would exceed the PSD threshold. However, given the limitations of Co-fire Test 1, this cannot be said with 100 percent certainty. A running total of nitrogen oxide emissions should be maintained, and there should be agreement that the Iowa DNR may terminate the test prematurely if the nitrogen oxide PSD threshold is in danger of being exceeded.
- Sulfur oxide emissions would be expected to decrease.
- Even though Co-fire Test 1 showed PM/PM<sub>10</sub> emission decreases of about 50 percent, this large reduction was unexpected and calls the validity of these data into doubt. Co-fire Test 2 should proceed with caution in regard to PM/PM<sub>10</sub> emissions.

**Dust.** During the Proposed Action, switchgrass processing equipment would be located in an enclosed building, as it was during Phase 1 testing. Fugitive dust emissions from milling operations would occur but would be minimized by enclosing the processing equipment in a slight negative pressure envelope downstream from the milling equipment and by using a baghouse system for dust collection and filtering. Collected dust would be sent to the boiler in the same pneumatic lines that would deliver the processed switchgrass to the boiler.

**Construction.** Potential construction-related air quality impacts associated with the Proposed Action would be consistent with the provisions of Iowa DNR air quality construction permits or variances to existing construction permits. The Iowa DNR would review the construction permit applications for Phase 2 equipment. Some fugitive dust from construction-related activities would occur. Reasonable precautions to prevent fugitive dust from becoming airborne in quantities sufficient to become a nuisance, as defined in Iowa Code Section 657.1, would be implemented.

The need for open burning is not anticipated, but if some limited open burning were found to be unavoidable, it would be conducted in compliance with Iowa Administrative Code rule 23.2[567]. Demolition of existing facilities is not part of the Proposed Action; the only deconstruction would be removal of an existing pole-mounted transformer.

**Traffic.** The Proposed Action would result in increased truck traffic along county roads leading to OGS, which would result in a comparable increases in vehicle-related dust and exhaust emissions. The increase is expected to be about 6 percent, reflecting a projected 6 percent increase in truck traffic.

**Carbon Sequestration.** Carbon dioxide, the principal greenhouse gas emitted by fossil fuel combustion and deforestation, is adding about 3.5 billions metric tonnes (gigatonnes) of carbon (GtC) to the atmosphere annually. Scientists of the Intergovernmental Panel on Climate Change have calculated that over the course of the next 50 to 100 years, between 40 and 80 GtC might be absorbed in agricultural soils by applying well-established land management practices. For example, when crop lands are planted to perennial grasses under the CRP or formerly cultivated land is planted to switchgrass, a biomass crop, between 0.5 and 1.5 tonnes per hectare (1 hectare = 2.47 acres) of carbon are added to the soil annually (CAST 1998).

Because the CRP land that would provide the switchgrass feedstock for the Proposed Action is currently already planted in switchgrass, the Proposed Action would not have a significant impact on greenhouse gas due to changes in carbon sequestration rates in soil. However, under a full commercialization scenario where large areas of pasture, marginal, or poorer row crop acreage would be converted to commercial switchgrass, such a potential exists.

The Center for Global and Regional Environmental Research conducted a study of the greenhouse gas emission impacts of switchgrass production and combustion as a substitute for coal. The proposed displacement of up to 5 percent of the coal-fired generation at the OGS appears to provide a positive impact on greenhouse gas emissions. The analysis indicated that co-firing 5 percent switchgrass with coal may reduce emissions of greenhouse gases (carbon dioxide equivalent emissions [CO<sub>2</sub>-eq]) by as much as 462,000 tonnes (509,000 tons) per year (Ney and Schnoor 2002). However, while recognizing the potential for increased carbon sequestration, other investigators are reluctant to make quantitative estimates due to variations in current soil carbon levels in the Chariton Valley and uncertainties regarding the status and total acreage of land that would be converted to switchgrass (CAST 1998).

#### **4.1.2 Soils and Geology**

**OGS Site.** The Proposed Action would result in new construction on approximately 3,340 square meters (36,000 square feet) of previously disturbed land on the OGS plant property. The proposed construction site is currently used primarily for storage and parking and is underlain by fill emplaced during construction of the OGS. The Proposed Action would not disturb any previously undisturbed soils or geological resources. Required construction cut depths would not intrude on groundwater levels observed during recent soil borings.

**Rathbun Lake Watershed.** The switchgrass needed for the Proposed Action would be drawn from existing stored supplies or would be harvested from the existing 16 square kilometers (4,000 acres) of CRP reserve lands that the USDA has previously authorized for the project and planted in switchgrass. If necessary, an additional 12 square kilometers (3,000 acres) of switchgrass could be harvested. No soils currently in production for other crops would be converted to switchgrass production for the Proposed Action. Because the Proposed Action would not require cropland conversion, it would not impact current soil quality.

Under a commercialization scenario (Phase 3), up to 200 square kilometers (50,000 acres) of cropland could be dedicated to switchgrass production, much of which would be converted from CRP lands that are typically marginal lands and may currently support native switchgrass pasture or row crops. Conversion of pasture to switchgrass production would increase soil erosion and could require additional soil conservation measures on highly erosive soils. In contrast, conversion of row crop land to switchgrass production would reduce soil erosion.

#### **4.1.3 Biological Resources**

##### **4.1.3.1 OGS Site**

At the OGS plant site, the Proposed Action would result in short-term construction-related disturbances to the wildlife that visits the plant site. These disturbances would include increased noise, outdoor human presence, and vehicles. The new facilities would occupy land currently used largely for pole and equipment storage, land that is not an attractive source of wildlife food or habitat. During and immediately after construction, the new facilities and the increased level of human activity would discourage wildlife from occupying the site area immediately west of the main plant. Because the wildlife that visits the site is attracted to it and is acclimated to plant operations and noises, it would probably initially move to land further removed from the new facilities until it became acclimated, and then return.

#### 4.1.3.2 Rathbun Lake Watershed

Research to characterize the potential impact of switchgrass as a biomass energy crop on biological resources in the Chariton Valley has only recently been systematically undertaken and is still ongoing. Results published to date suggest that harvesting standing switchgrass acreage for the Proposed Action would change the habitat structure and wildlife recruitment and retention potential of the harvested acres and that under a commercialization scenario, conversion of pasture or row crop acreage to commercial switchgrass production would change the habitat structure and wildlife recruitment and retention potential of the converted acres. The research, most of which addresses avian resources, allows for a qualitative assessment of probable impacts. A recent Iowa State University thesis addresses three critical aspects of avian impacts: (1) bird abundance and nesting success in CRP fields harvested for biomass in southern Iowa, (2) potential effects of converting marginal cropland to switchgrass production, and (3) winter bird use of CRP fields harvested for biomass (Murray 2002). The following discussion summarizes the reported results relative to the Proposed Action and a full commercialization scenario.

***Harvesting Switchgrass Under the Proposed Action.*** Switchgrass fields probably support stable populations of grassland birds, and the harvest of switchgrass, which typically occurs in the fall and winter, would not have direct effects on the reproductive success of grassland birds. Other grasslands (e.g., hayfields) in the region are often disturbed during the breeding season and thus experience low nest success in these habitats. However, the switchgrass harvest would alter vegetation structure in the fields and thus would affect relative bird abundances. Strip-harvest fields would provide habitat for more species of concern than would total-harvest fields, but grasshopper sparrows are more abundant in the latter. In the winter, sparrow species would be more abundant in strip-harvest fields than total-harvest fields, and pheasants would use the uncut strips of strip-harvest fields for protective cover.

***Conversion of Other Acreage to Switchgrass Production Under a Commercialization Scenario.*** Replacing row crop fields with switchgrass fields would benefit some bird species of management concern in the region. Converting row crop fields to switchgrass fields would create more habitat for grassland birds in the region. A Geographic Information System (GIS) model showed that species that are management priorities would increase if row crop fields in areas of marginal soil were replaced by biomass fields in the Rathbun Lake watershed. However, the abundances of species that are common in row crop fields (e.g., horned lark, killdeer) could decrease by more than 25 percent in the watershed.

#### 4.1.4 Water Resources

***OGS Site.*** Switchgrass operations would not require any modifications to OGS's extracted cooling water or discharge water because both are independent of the fuel source combusted in the boiler. Intake and discharge water needs depend only on steam flow rates and boiler operating properties, neither of which is expected to change due to switchgrass co-firing either during the Proposed Action or during possible future Phase 3 operations. Effective March 10, 2003, any construction activity in Iowa that bares the soil of an area equal to or greater than 4,047 square meters (1 acre), including clearing, grading, or excavation, may require a stormwater discharge permit from the Iowa DNR. The projected combined footprints of the proposed new facilities and parking area exceed 4,047 square meters (1 acre); consequently, a new or revised stormwater discharge permit may be required.

***Agricultural Runoff.*** Because the CRP land that would provide the switchgrass for the Proposed Action is currently already planted in switchgrass, the Proposed Action would not require changes to current fertilizer or pesticide application rates and would therefore not have significant impacts on water quality due to changes in runoff. However, under a full commercialization scenario where a significant number of acres could be converted to commercial switchgrass production, a potential for beneficial changes in water quality exists. Switchgrass requires lesser amounts of applied fertilizer and pesticides than do row crops such as corn or soybeans. Ongoing research indicates that conversion of row crop acreage to

switchgrass would reduce the levels of fertilizer, pesticide, and sediment that reach Rathbun Lake and surrounding wetlands due to runoff (Kost et al. 2002).

***Floodplains and Wetlands.*** Under the Proposed Action, new facilities would be built at the OGS site on a low hill that is approximately 370 meters (1,200 feet) from Avery Creek and 1 kilometer (0.6 mile) from the Des Moines River. This proposed location is close to, but outside of, the 100-year floodplain (see Figure 9). The hill is above the OGS main plant and the coal storage yard, neither of which have been threatened by floodwaters since operations began, including the Great Flood of 1993 (a record flood for the Des Moines River). Even if flooding were to occur at the proposed new facilities, DOE does not believe that this would pose an unacceptable risk. The proposed new facilities would house little or no highly toxic, volatile, or water-reactive materials. Finally, if major flooding were to occur, the main OGS plant, being on lower ground, would be flooded before the proposed new facilities, and any incremental disruptions due to flooding of the new facilities would be minor in comparison. There are no wetlands at the site of the proposed new facilities.

#### **4.1.5 Solid Waste**

The Proposed Action would result in a very small increase in the total amount of ash generated at OGS. Co-firing the maximum amount of switchgrass per year under commercial operations (approximately 180,000 tonnes [200,000 tons]) would result in an increased annual ash generation of about 154 tonnes (170 tons), an increase of about 0.1 percent relative to the current (coal-only) annual ash generation. Because the chemical composition of coal differs from that of switchgrass, there would also be differences, albeit minor ones, in the chemical composition of the generated ash. These minor chemical differences would not pose any human or environmental safety or health concerns. They may, however, impact whether co-fire fly ash can meet ASTM C618-01 (ASTM 2001) and be certified for use as a cement additive. Approximately 90 percent of the OGS fly ash finds its way to the Iowa DOT market for use in cement mixtures used for roads. Fly ash that does not meet ASTM standards cannot be used as a cement additive unless and until the Iowa DOT certifies its suitability or until the standard is revised. Although this is not an environmental assessment issue, per se, it is significant to the economic viability of the use of switchgrass as a biomass crop. Alliant Energy is working closely with the Iowa DOT to resolve specific concerns related to the use of co-fire fly ash and is currently confident that the marketability of its fly ash would not be compromised by adding switchgrass to the combustion process.

Baling twine is the only new solid waste that would be generated at the OGS due to the Proposed Action. After its removal, the twine would be collected and either recycled or disposed of as municipal waste.

#### **4.1.6 Infrastructure**

##### **4.1.6.1 OGS Site**

With the exception of fire safety systems, the Proposed Action would not require major upgrades to the utility infrastructure currently in place at OGS. Relatively short extensions of existing water, sewer, electric, and steam lines would support the utility service needs of the proposed new facilities.

The Proposed Action would pose a new and increased fire hazard at the plant due to increased truck traffic; increased storage of large amounts switchgrass, which is combustible; increased generation of potentially flammable dust; and the mechanical operations that would be involved in unloading, storing, processing, and co-firing the switchgrass. The increased fire hazard impact would be mitigated by mandatory fire safety design features that would be coordinated with and approved by the fire marshal. These features would include sprinkler systems in the proposed new buildings, dry valve systems, six hose reels and standpipes in the new storage barn, a deluge system in the new process building, spark detection and mist generators in the dust collection systems, and new outside fire hydrants.

With regard to traffic on the plant property under full-scale operations, a recent study concluded that (1) the historic traffic peak at OGS in late summer 1999 is higher than would be expected if switchgrass were supplied to OGS at a rate of 180,000 tonnes (200,000 tons) per year, and (2) traffic expected for the switchgrass project, even at the maximum supply volume, “should be manageable without disrupting other traffic at OGS under most circumstances” (Antares Group 2002a). However, the projected increase of approximately 40 vehicles per day would represent an increase of approximately 50 percent over the historic daily average (approximately 80 vehicles per day) from offsite shipments of C-Stone®, coal, and ash. Moreover, short-term traffic volumes at OGS could exceed the 1999 historic peak if the plant were to experience another transient spike in demand for fly ash or C-Stone®. A changeover from truck to rail for some coal resale shipments could offset the increase in local truck traffic should commercialization be realized.

#### 4.1.6.2 State and County Roads

The Proposed Action would result in increased truck traffic on state and county roads, especially on Power Plant Road, the Wapello County road leading directly to OGS. The Antares Group study estimates that delivery of switchgrass in amounts necessary to support full-scale operations (180,000 tonnes [200,000 tons] per year) would require approximately 40 fully loaded flatbed trucks a day for a 5-day-a-week schedule (Antares Group 2002a). This would represent an increase of approximately 6 percent over the 700 vehicles per day that used Power Plant Road during the Iowa DOT’s 1998 survey (DOT 1998).

Switchgrass transported for the Proposed Action would come to OGS primarily from the west from sources near Rathbun Lake, especially from Monroe, Wapello, Lucas, and Wayne counties. Trucks would use the primary route shown in Figure 12. For full commercial operations, the switchgrass would potentially come from locations within a 110-kilometer (70-mile) or less radius around OGS, and could also use the secondary route approaching OGS from the east.

Traffic starting from the Rathbun Lake vicinity would feed into U.S. Highway 34 and follow it east across Monroe County to the Wapello County line, where the traffic would proceed on Wapello Road northbound (County Road T59/T61) to Power Plant Road east and follow Power Plant Road to the OGS. Under a commercial scenario, switchgrass could also be delivered to OGS from counties located wholly or partially east of the Des Moines River, including Wapello, Mahaska, Keokuk, Jefferson, and Van Buren counties. Traffic coming from these counties would likely approach Chillicothe on State Highway 23, cross the Des Moines River on the single bridge serving Chillicothe, and proceed to the OGS via Power Plant Road.

The exact amount of traffic coming from either direction is uncertain; however, a total of 40 flatbed trucks would deliver switchgrass to OGS daily (Monday through Friday) under the maximum planned volume for commercial operations (180,000 tonnes [200,000 tons] per year). Switchgrass delivery trucks, which would carry a slightly lighter load than the coal trucks that take coal from OGS (19 tonnes [21 tons] versus 20 tonnes [22 tons]), would take similar or identical routes to OGS as do the approximately 60 coal trucks that currently come to the plant each day. This additional switchgrass traffic volume would not present problems or require upgrades to county or state roads (Chariton Valley RC&D 2003b; Redeker 2003).

Because state and county officials do not anticipate any problems on the roads that would experience the greatest traffic volume increases (the roads nearest to OGS), increased traffic volume issues would be even less significant at locations remote from OGS (for example, traffic to and from temporary switchgrass storage barns that would be widely distributed throughout the supply region).

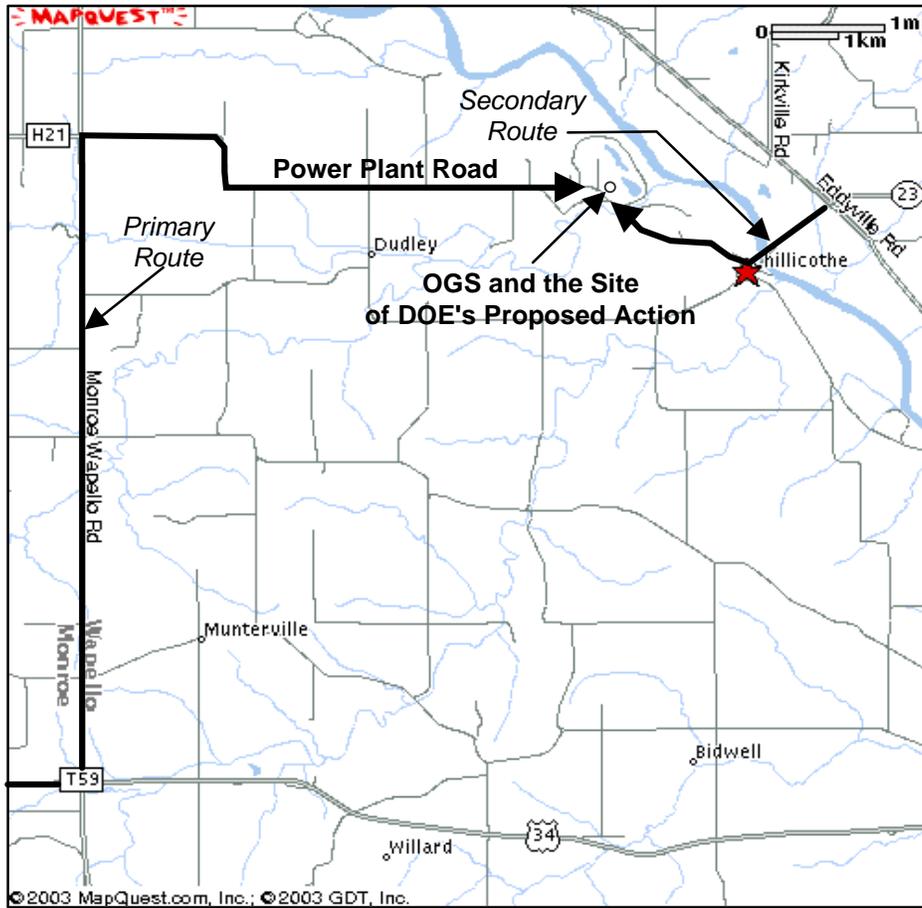


Figure 12. Major Truck Routes

#### 4.1.7 Cultural Resources

##### 4.1.7.1 OGS Site

The proposed new construction at the OGS site would not impact any cultural or historic resources. The proposed new facilities would be constructed entirely on previously disturbed OGS land. The SHPO has indicated that an eligible archeological site, 13WP28, still remains on the facility property. However, this site was avoided by the construction of the original facility and the SHPO agreed with the proposed construction activities at that time (EPA 1977). Site 13WP28 is not located within the area of potential effects for the Proposed Action. No sites on or near the location of the Proposed Action, including the one site that was discovered after the SHPO cleared the site for construction, are considered by the SHPO as eligible for listing in the National Register of Historic Places.

##### 4.1.7.2 Rathbun Lake Watershed

The SHPO has stated that at this time, it would be difficult to assess whether the proposed activities associated with growing and harvesting switchgrass in the Rathbun Lake watershed would affect any significant historical properties. However, the SHPO's opinion also indicated that, based on the personal experience of the cognizant archaeologist, establishing switchgrass tracts actually helps stabilize and preserve archaeological sites and that switchgrass can be harvested under conditions that either would not affect or would not adversely affect significant archaeological sites at all (see Appendix B, SHPO letter dated March 25, 2003).

#### **4.1.8 Land Use**

##### **4.1.8.1 OGS Site**

Under the Proposed Action, onsite land that is currently used primarily for storage would be used for new facility construction. DOE does not consider this change to represent a significant impact on land use or land use planning. The proposed new construction would occur on the OGS plant site, where the land is already dedicated to plant operations.

##### **4.1.8.2 Rathbun Lake Watershed**

Cropland that would generate the switchgrass feedstock for the Proposed Action is currently planted in switchgrass. The Proposed Action would not result in any changes to current land use in the Rathbun Lake watershed.

Under a commercialization scenario (Phase 3), switchgrass would be obtained from farms located within a 110-kilometer (70-mile) radius from OGS, an expanse of land that contains potential switchgrass-producing areas totaling about 1,700 square kilometers (420,000 acres). To meet and sustain the maximum co-firing rate, at least 12 percent of the potentially available land, or about 200 square kilometers (50,000 acres), would have to produce 3.6 tonnes (4 tons) of switchgrass per acre. Some of the required 50,000 acres would be converted from CRP lands, which are typically marginal lands and may currently support native switchgrass, pasture, or row crops. Although the designation of the land as CRP land could change, this change would not impact the basic agricultural use of the land.

#### **4.1.9 Noise**

##### **4.1.9.1 OGS Site**

The Proposed Action would result in a new source of occupational noise above the Occupational Safety and Health Administration's (OSHA's) 8-hour noise threshold limit in the milling rooms of the proposed new process building. Personnel entering the milling rooms would be required to wear hearing protection, similar to Alliant's policy requiring the use of hearing protection when entering the main boiler buildings. Current design plans include noise insulation on all milling room walls and ceilings. The intention is to reduce noise levels outside the milling rooms to levels that would not require hearing protection. Operational noise levels would be tested after installation to determine the need for future modifications or for expanded requirements for mandatory use of hearing protection in the process building. The sound levels from the process building would be minor to workers in adjacent buildings and indistinguishable from current ambient plant noise at the OGS plant site boundaries.

A June 2002 report (Antares Group 2002b) indicates that noise levels in the storage barn from switchgrass deliveries and from bale transfer operations would be well below the OSHA 8-hour threshold level and that hearing protection would not be required.

##### **4.1.9.2 Rathbun Lake Watershed**

Agricultural operational noise from the Proposed Action would be similar to or indistinguishable from current ambient noise from agricultural activity in this region.

#### **4.1.10 Aesthetics**

##### **4.1.10.1 OGS Site**

The Proposed Action would not significantly impact the current aesthetics or views at or near the OGS plant. Although the proposed new buildings would be built on slightly higher ground than the OGS plant, they would be small and low (approximately 11 meters [36 feet] maximum height) compared to the

80-meter (250-foot) high OGS main plant building. The proposed new structures would not be visible from the Des Moines River, because the view would be screened by trees and by the relative position of the OGS main plant. The elevated gallery connecting the two proposed buildings would mitigate the collective visual impact of the new construction. The new buildings would be visible from a short stretch (approximately 400 meters [a quarter of a mile]) of Power Plant Road. Except for this stretch, the two cooling towers, the existing storage barn, and the proposed northeast–southwest longitudinal axis of the proposed new building would largely screen or minimize the view of the proposed buildings from Power Plant Road.

#### *4.1.10.2 Rathbun Lake Watershed*

The Proposed Action would not significantly impact the current aesthetics or viewsapes on the agricultural land that would produce switchgrass for co-fire testing, because new construction would not be required. Under a possible future commercialization scenario, the visual impacts would be limited to construction of offsite storage barns that would be used to store switchgrass prior to shipment to the OGS if onsite storage were temporarily unavailable.

### **4.1.11 Socioeconomics**

#### *4.1.11.1 OGS Site*

Because switchgrass co-fire operations would be largely automated, fewer than eight additional workers would be required at the OGS for the Proposed Action or for full commercial operations. Full construction of the proposed new facilities—including site preparation, building construction, and equipment installation—would begin about October 2003 and take about 13 months. The size of the construction workforce that would commute to the site would vary with the stage of construction. Estimates of the construction workforce size are not available, but based on experience with the construction of the Phase 1 buildings, the workforce would probably not exceed 20 workers.

#### *4.1.11.2 Rathbun Lake Watershed*

Under the Proposed Action, and in particular under a full-scale commercial scenario, there would be both seasonal and year-round labor requirements to produce and deliver 180,000 tonnes (200,000 tons) of switchgrass to the OGS. Antares Group Inc. analyzed the labor requirements for full-scale operations and estimated that approximately 500 to 640 workers would be needed, depending on the degree to which farmers contracted out their work (Antares Group 2002a). Most of this projected demand would be for production activities; less than 15 percent would be for post-harvest transportation activities.

### **4.1.12 Environmental Justice**

DOE applied the environmental justice guidance described in Section 3.12 to determine whether implementing the Proposed Action could result in disproportionately high and adverse human health or environmental impacts on minority or low-income populations. For purposes of assessing environmental justice impacts, “minority population” is defined as a demographic composition of the populace where either the minority population of the affected area exceeds 50 percent or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population. As shown in Table 3, minority populations do not exceed 50 percent of the population in any county or city in the vicinity of the Proposed Action, nor is the minority population meaningfully greater in the vicinity of the Proposed Action than in the general population. Any adverse health or environmental impacts associated with the Proposed Action would not have a disproportionately high impact on a minority population.

The Proposed Action would occur just outside Chillicothe which, based on census 2000 data, had a meaningfully higher percent of families below the poverty level (12 percent) than the statewide average

(6 percent) and the national average (9.2 percent). However, the total population of Chillicothe is very small, only 90. The percent of families below the poverty level in Chillicothe is comparable to that in several neighboring cities, including Ottumwa (10.9 percent) and Centerville (11.3 percent). The percent of families below the poverty level in Chillicothe is also quite comparable to that in Wapello County as a whole (9.4 percent).

Although the Proposed Action would occur in one of Iowa's poorer economic regions, nothing about the Proposed Action nor any demographic clusters would cause low-income residents to suffer impacts to a greater extent than would other residents. DOE believes that any impacts potentially resulting from the Proposed Action would not disproportionately impact minority or low-income populations. In any case, the analyses in Sections 4.1.1 through 4.1.10 conclude that the Proposed Action would not result in adverse human health or environmental impacts.

## **4.2 Impacts from the No Action Alternative**

Under the No Action Alternative, DOE would not partially fund the Phase 2 testing facilities and activities described under the Proposed Action. Alternate funding sources for these activities would, in all likelihood, not be immediately available, and Phase 2 and Phase 3 testing of switchgrass as a biomass energy source at OGS would either be terminated or postponed indefinitely. The existing switchgrass processing and storage facilities would either be decommissioned and disassembled or converted to other uses. The potential long-term environmental benefits from the Proposed Action (less agricultural runoff, increased carbon dioxide sequestration, reduced sulfur oxide emissions) would not be realized. The goal of the CVBP to eventually use switchgrass as a fuel to replace a portion of the coal burned at OGS would be delayed or derailed.

## **5.0 CUMULATIVE IMPACTS**

CEQ regulations implementing the procedural provisions of NEPA require Federal agencies to consider the cumulative impacts of a proposal (40 CFR 1508.25(c)). A cumulative impact on the environment is the impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). This type of assessment is important because significant cumulative impacts can result from several smaller actions that by themselves do not have significant impacts.

### **5.1 OGS Plant**

The OGS is located in an agricultural area with no major existing or reasonably foreseeable industrial or commercial centers near it. Alliant Energy currently has no plans for expanding the plant or for other reasonably foreseeable future actions at the plant other than the possible future expansion of the co-fire testing infrastructure that would be installed under the Proposed Action (schematically illustrated in Figure 7). DOE considers the future expansion illustrated in Figure 7 to be a reasonably foreseeable future action that could result from the Proposed Action, although DOE has no plans to support a possible future expansion. DOE believes that the impacts at the OGS from a possible future expansion to commercial-scale operations would not result in significant cumulative environmental impacts at the OGS. Any cumulative impacts at or near the OGS due to a possible future expansion would be qualitatively identical and quantitatively similar to those described for the Proposed Action in Section 4.0. From an energy security perspective, decreased use of finite coal resources at OGS and potentially at other plants would represent a cumulative impact associated with a future commercial scenario.