5. POLLUTION PREVENTION AND MITIGATION MEASURES

Pollution prevention, minimization, and mitigation measures have been incorporated by Mississippi Power and NACC as part of the conceptual designs of the proposed project facilities. For example, regulated air pollutant emissions would be reduced through the use of advanced technologies and emission controls. In addition, the IGCC power plant would be designed to capture approximately 67 percent of the CO_2 that would have otherwise been emitted. Power plant facilities would be located to avoid impacts to wetlands to the extent practicable. Similarly, the mining **would occur on the least environmentally damaging practicable site**, and linear facility corridors were selected giving consideration to avoiding environmentally sensitive areas. Unavoidable impacts to wetlands **would be minimized and** would **be** mitigat**ed**. Additional measures would be incorporated at subsequent stages of design and engineering. For example, exact placements of pipeline trenches and transmission line structures would be adjusted where practicable to avoid impacts to wetlands or other sensitive areas (such as cultural resources).

The **minimization and** mitigation of potential adverse impacts from project activities would be achieved through implementation of BMPs and compliance with requirements contained in facility permits and other applicable federal, state, or municipal regulations and ordinances. Table 5.0-1 outlines specific pollution prevention and mitigation measures, including those required under federal, state, or local regulations and permitting requirements that would be implemented for each resource area. Permits yet to be obtained by Mississippi Power and NACC would also impose a variety of measures to prevent or minimize pollution and mitigate environmental impacts through the imposition of specific permit conditions. DOE may also consider additional mitigation as a condition of the ROD.

The proposed IGCC power plant would reduce SO_2, NO_x, mercury, and particulate emissions by removing constituents from the syngas. The removal of nearly 100 percent of the fuel-bound nitrogen from the syngas prior to combustion in the gas turbine would result in appreciably lower NO_x emissions compared to existing, conventional coal-fired power plants. The project is expected to remove more than 99 percent of the sulfur and more than 92 percent of the mercury. More than 99.9 percent of particulate emissions would be removed using high-temperature, high-pressure filtration (rigid, barrier-type filter elements).

Approximately 60 percent less CO_2 would be permitted per unit of power generated compared to typical emissions rates at existing, conventional coal-fired power plants. However, there would still be some emissions of CO_2, and these emissions would contribute to a net increase in global atmospheric concentrations of CO_2. This mitigation of CO_2 emissions would be achieved through beneficial use for EOR and geologic storage. The design would incorporate systems to capture approximately 67 percent of the CO_2, which would be delivered via pipeline for use in existing EOR operations in Mississippi. DOE has been studying the use of EOR for sequestration and believes it is "a promising technology to safely store CO_2 underground" (DOE, 2008).

Use of reclaimed municipal effluent and reuse of other water reclaimed from within the power plant for cooling water makeup would greatly reduce the potential withdrawal and consumption of ground water from the Massive Sand aquifer, thereby reducing impacts on ground water resources. The proposed generation facilities would discharge no process liquid effluent from the site. Ash generated by the gasifiers would be made available for beneficial use, managed onsite, or trucked to a permitted landfill. Commercial-grade anhydrous ammonia and H_2SO_4 would be recovered as byproducts and marketed.

Avoidance and minimization of impacts on wetlands and other Waters of the United States to the extent practicable would be **determined by** USACE during **its** review of CWA Section 404 permit applications submitted by Mississippi Power and NACC. If issued, USACE's permits would require impacts to wetlands to be mitigated to offset functional losses to Waters of the United States, including jurisdictional wetlands and streams. The required amounts and types of mitigation would be determined by the USACE district engineer based on practicability, degrees of impacts (e.g., temporary versus permanent), and the appropriate level of compensation given the aquatic resource functions that would be lost as a result of the permitted activity.

As stated elsewhere, the linear facility study corridor widths would allow some flexibility to avoid and minimize wetland impacts. In addition, some impacts associated with pipeline construction would be temporary, not permanent. Estimates of potential impacts to wetlands and Waters of the United States are expected to be conservative; impacts would likely be less than the upper limits presented in Chapter 4. It would, nonetheless, be necessary to provide compensatory mitigation to offset losses of wetland functions relative to Waters of the United States, as described previously.

Table 5.0-1 lists the pollution prevention, minimization, and mitigation measures for the proposed facilities.

In addition to the measures shown on Table 5.0-1 that are either imposed by existing regulations or proposed by the Applicants, DOE would consider, as a condition of the ROD, the following additional prevention or mitigation measures at the power plant and/or lignite mine:

- **Topsoil segregation and reuse in high-quality wetlands approved for mining by USACE and MDEQ to provide a native species seed source for wetland reclamation or mitigation areas.**
- **Upstream and downstream monitoring at the locations shown on Figure 3.6-2 and in Okatibbee Lake of water quality on a monthly basis to assess actual impacts, including TSS, temperature, pH, TDS, total nitrogen, ammonia, orthophosphate, heavy metals, and mercury to ensure state water quality standards are met.**
- **Fish and macroinvertebrate sampling using appropriate EPA- or MDEQ-approved bioassessment protocols to assess whether adverse effects on the aquatic ecosystem are resulting from the Kemper County IGCC Project.**
- **Mitigation of wetland and stream impacts consistent with the requirements of USACE Section 404 CWA permits.**
- **Monitoring of upstream and downstream flows to assess whether adverse flow timing or volume impacts are occurring.**
- **Monitoring to determine whether invasive, exotic, or nuisance species occurrences are increasing as a result of project activities.**
- **Preparation of annual sediment loading estimates to assess the effectiveness of structural and nonstructural BMPs in reducing loadings to Okatibbee Lake.**
- **Limits on the offsite flood elevations, volumes, or velocities allowed to result, based on models approved by FEMA.**
- **Development of an adaptive environmental management plan in consultation with USACE that establishes thresholds for implementation of corrective measures in the event monitoring detects adverse impacts. This plan would require the participants to mitigate project-induced adverse impacts to Okatibbee Lake and surrounding environments.**

Table 5.0-1. Pollution Prevention and Mitigation Measures Developed for the Proposed Kemper County IGCC Project Facilities

Environmental Issue	Pollution Prevention or Mitigation Measure
Atmospheric resources and air quality	During construction, use of modern, well-maintained machinery and vehicles meeting applicable emission performance standards would minimize emissions. Use of dust abatement techniques such as wetting soils, covering storage piles, and limiting operations during windy periods on unpaved, unvegetated surfaces would reduce airborne dust and resulting impacts. The distances of most construction-related activities from the nearest property boundary and residences would mitigate most potential impacts. During operation, a number of means would be employed to prevent or reduce emissions of air pollutants, including: • Application of best available control technology (BACT), as required by PSD permit. • Partial enclosure of coal unloading, transfer and conveying equipment, plus application of water sprays, as needed, and use of baghouses. • Use of high-temperature, high-pressure filters within the gasification process to collect more than 99.9 percent of PM from the syngas. • Use of sulfur removal technology to reduce sulfur concentrations in the syngas by more than 99 percent. • Nearly 100 percent removal of the fuel-bound nitrogen from the syngas, resulting in appreciably lower NO_x emissions. • Use of a reactor containing alumina-based metal sulfide **or sulfide-activated carbon** to remove more than 92 percent of mercury from the syngas. • High-efficiency drift eliminators would reduce water droplet emissions from the cooling towers. Monitoring to ensure compliance with emission limits would be carried out during operation. It is expected that the proposed facilities would be subject to any future CAIR, applicable New Source Performance Standards, and 40 CFR 75 (Acid Rain Program). Continuous monitoring and recording of SO_2, NO_x, and CO emissions would be performed. Monitoring would be subject to stringent quality assurance/quality control (QA/QC) requirements to ensure that the monitored emissions data are accurate and complete. Initial and periodic compliance testing of pollutants emitted by the proposed facilities would be conducted pursuant to MDEQ requirements. This stack testing, using EPA reference methods, would be expected to address the principal air pollutants emitted by the proposed facilities, including NO_x, CO, SO_2, VOCs, and PM_{10}. An extensive network of area gas detectors would continually sample for H_2S and other compounds. Detection would trigger actions to eliminate equipment leaks. Mississippi Power would design the IGCC facility to capture approximately 67 percent of CO_2 that would otherwise be emitted to the atmosphere. The captured CO_2 would be sent by pipeline for use in EOR. **BMPs to minimize fugitive dust emissions during lignite mining operations would include:** • **Minimizing land clearing in advance of mining.** • **Reclaiming land as soon as practicable following ignite extraction.** • **Watering or applying chemical dust suppressants on mine haul roads.** • **Planting temporary cover crops on regarded mined land (e.g., millet or rye grass).** **EPA has recommended measures to minimize diesel exhaust emissions from construction and operating equipment. These measures include using low-sulfur diesel fuel, properly equipping and maintaining diesel-fueled equipment, properly training operators, and employing safe work practices. DOE will encourage Mississippi Power and NACC to adopt EPA's recommendations and will also consider such mitigation as a condition of the ROD.**

Table 5.0-1. Pollution Prevention and Mitigation Measures Developed for the Proposed Kemper County IGCC Project Facilities (Continued, Page 2 of 5)

Environmental Issue	Pollution Prevention or Mitigation Measure
Geological and hydrogeological resources, including soils	Fuel and chemical storage areas would be enclosed to minimize the potential to impact soils in the event of spills. In the unlikely event of a fuel spill or other release, assessment and recovery of the spill or release would be conducted in accordance with MDEQ requirements. Use of reclaimed effluent and other reclaimed water for cooling water makeup would minimize the withdrawal and consumption of ground water from the Massive Sand aquifer, thereby minimizing impacts on ground water resources. Soils removed during construction would be stockpiled for reuse where possible. In the event mine dewatering operations would adversely impact local shallow ground water wells, alternative water supplies would be available. These would include the Lower Wilcox aquifer; connection to a local water supply corporation; and, possibly, tapping deeper or other sand intervals within the Middle Wilcox aquifer. Any impacts to ground water users from mining activities would be mitigated as required by the SMCRA Regulations (e.g., Water Rights and Replacement, etc.). If topsoil substitution were determined to be the best available plant growth material, existing topsoil and subsoil in mined areas would be comingled with overburden during the overburden removal step in the lignite extraction process; it would become fill material for returning the land surface to approximate premining elevations. Within upland soils to be mined, the use of oxidized overburden (having less potential for generating acidic leachates than unoxidized overburden) would be a reasonably similar and practical substitute for the premining surface soils. The use of fertilizer, lime, and tillage; recontouring the land to optimally stabilize slopes; and revegetating the graded surfaces quickly are management procedures that would help ensure successful reclamation. Continual monitoring and lime applications to maintain soil pH levels would be an appropriate management step to further minimize impacts. In the event hydric soils were proposed to be replaced with oxidized overburden to support wetlands created as mitigation for impacts authorized by the CWA 404 Permit, adverse impacts associated with the elimination of the original soil seed bank would dissipate through natural succession processes, assuming proper hydrologic support to sustain the wetlands had been achieved by the reclamation design. Dispersal of native seeds by wind, water, and fauna would cause plant species composition to trend toward premining conditions. **BMPs to minimize impacts at the surface mine would include:** • **Premine testing of overburden and lignite seams to identify AFM or TFM potential and locations within minable areas.** • **Placement of AFMs and/or TFMs at depths in mine excavations that would prevent seepage or oxidation.**
Surface water resources	SWPPPs would be developed and implemented for all project construction programs and facility operations. To reduce the deposition of sediments beyond the construction areas, site-specific BMPs would be selected, potentially including silt fences, hay bales, vegetative covers, and diversions, to reduce impacts to surface water. SPCC plans would be followed to minimize the opportunity for accidental spills and identify the appropriate procedures to be followed in case of an accidental spill. Cooling tower blowdown, process effluents, and runoff generated by/from proposed operations would be discharged to wastewater management and reuse systems. No process wastewater would be discharged to any surface waters. The proposed mine plan would protect the project area hydrologic balance and minimize impacts to streams to the extent practicable.

Table 5.0-1. Pollution Prevention and Mitigation Measures Developed for the Proposed Kemper County IGCC Project Facilities (Continued, Page 3 of 5)

Environmental Issue	Pollution Prevention or Mitigation Measure
Surface water resources (contd.)	Surface water management structures within mining areas, including stream diversion channels, internal runoff capture and diversion channels, and sedimentation ponds, would maintain the hydrologic balance and surface water quality within required limits. Following mining, stream mitigation of the appropriate type and magnitude would be conducted as determined by USACE and required by permit. **BMPs to protect surface water resources at the surface mine would include:** • **Construction of berms and ditches to capture collect stormwater runoff from areas disturbed by mining.** • **Routing of collected runoff to sedimentation ponds for quiescent settling water quality treatment.** • **Use of flocculants to reduce turbidity in sedimentation pond discharges.** • **Construction of division channels designed to safely pass 100-year flood flows at nonerosive velocities.** • **Construction of stream habitat features within the division canals.** • **Reclaim the preliming drainage pattern.** • **Create funcational stream channels sized to communicate with adjacent floodplains at velocities that are neither erosive or accretive in the postmining landscape.**
Ecological resources	Impacts to terrestrial resources would be minimized by implementing the measures described for air quality, geology and soils, and surface water resources (immediately preceding table subject entries). Reclamation of mined areas would restore terrestrial resources following completion of mining. Impacts on wildlife during mining would be temporary in a given area and would be mitigated by the ability of mobile species to move to other areas. Wildlife would return upon completing reclamation. For any listed (including rare, threatened, or endangered) species potentially impacted by construction or operation of project facilities, prevention or mitigation could incorporate a wide variety of options ranging from passive measures (such as construction timing outside of critical breeding periods), permanent protection of known habitats elsewhere that contain the resource to be affected, or more aggressive measures such as complete avoidance of impact. Potential impacts to aquatic resources would be minimized through the USACE CWA Section 404 permit evaluation process. **BMPs to minimize terrestrial resource impacts at the surface mine include:** • **Mining in an orderly sequence to minimize habitat disruption and facilitate gradual movement of wildlife away from the mining areas.** • **Replacement of stream functions during reclamation.** • **Construction of stream habitat features in the diversion canals.** Linear facility final design and engineering would minimize impacts through placement of rights-of-way and structure locations. Restoration of rights-of-way would limit permanent impacts following completion of construction activities. Where possible, use of existing roads for right-of-way access would minimize impacts associated with construction of new access roads.
Floodplains and wetlands	The power plant, mine, and linear facilities would all require coverage under permits issued by USACE under the CWA before impacts to wetlands could occur. USACE and EPA have adopted minimum numerical compensatory mitigation rules designed to completely offset any wetland functional losses. In addition, impacts from the mine would be governed by permits issued in accordance with the federal SMCRA. The proposed mine plan would also reduce impacts through selection of mine blocks to avoid wetlands and floodplains to the extent practicable. Linear facility final design and engineering would minimize impacts through final alignments of rights-of-way and final locations of structures/pipelines.

Table 5.0-1. Pollution Prevention and Mitigation Measures Developed for the Proposed Kemper County IGCC Project Facilities (Continued, Page 4 of 5)

Environmental Issue	Pollution Prevention or Mitigation Measure
Land use and recreation	The project area is largely rural and sparsely populated. Land use incompatibility (e.g., proximity to high-density residential developments) where mitigation might be needed would not be an issue. The construction and operation of the surface mine would temporarily convert the existing, primarily silvicultural use. Original uses might be reestablished after mining and reclamation was complete; however, this would be a matter of choices of the holders of surface rights. Gasification ash would, as the preferred options, be evaluated for beneficial use at the adjacent mine or managed onsite, thereby eliminating or reducing landfill requirements. Corridors for linear facilities would minimize land use impacts by approximating the shortest distances between end points, avoiding developed areas to the extent possible, paralleling existing linear rights-of-way where possible, and co-locating two project linear facilities where possible.
Socioeconomics	As a result of the employment of construction and operational workers, there would be substantial direct and indirect benefits to Kemper County and the surrounding area as a result of the creation of additional jobs and the use of local qualified vendors. Housing impacts would be manageable through the use of per diem, which would tend to increase the sharing of living arrangements during the construction period and mitigate impacts on housing availability. There would be relatively fewer transfers to the area resulting in permanent residents compared to the total numbers of employees during construction.
Environmental justice	DOE has concluded that an environmental justice population exists, and consideration must be given to the potential for "disproportionately high and adverse" health or environmental effects, consistent with Executive Order 12898. Based on an analysis of these potential effects, DOE has determined that construction and operation of the proposed facilities would not place high and adverse impacts and burdens on an environmental justice community, while exporting all of the benefits (e.g., jobs, direct and indirect economic benefits, etc.). Construction and operation of the proposed facilities could have positive economic effects for the environmental justice population by creating employment and direct and indirect income in the area. Minority hiring practices and training programs already used by Mississippi Power and NACC would potentially enhance these positive effects.
Transportation	Construction traffic would have the greatest impact on the local road network in the vicinity of the power plant site. Peak hour trips would increase and would exceed the LOS D on roads closest to the proposed plant site. There would be no degradation of the existing LOS below LOS E. Carpooling would be encouraged to reduce the number of trips and mitigate impacts. Truck deliveries would be encouraged to avoid the a.m. and p.m. peak hours. Potential impacts to bridges and roads resulting from hauling of heavy equipment would be minimized by selection of suitable haul routes. Local authorities would be consulted about ways to prevent unnecessary traffic congestion and increased road hazards and to coordinate and implement transportation measures, especially during the movement of oversized loads, construction equipment, and materials. Where traffic disruptions would be necessary, coordination with local authorities would occur to implement detour plans, warning signs, and traffic diversion equipment to improve traffic flow and road safety. Operational traffic would be well below that experienced during construction. Only the LOS of several local roads would be degraded below LOS D and none below LOS E. Carpooling would be encouraged, and off-peak truck deliveries would also be encouraged. Impacts associated with temporary deliveries of lignite from the Red Hills Mine would be minimized by limiting hauling to daytime hours to the extent possible. **DOE would consider additional mitigation as a condition of the ROD.**

Table 5.0-1. Pollution Prevention and Mitigation Measures Developed for the Proposed Kemper County IGCC Project Facilities (Continued, Page 5 of 5)

Environmental Issue	Pollution Prevention or Mitigation Measure
Aesthetics	There are no unique landforms or visual or scenic features in the area of the proposed power plant and surface lignite mine or the associated facilities. Location of power block and IGCC equipment in the site interior would mitigate aesthetic impacts. Perimeter trees would provide screening to mitigate the potential for visual impacts. Only the taller structures associated with the power plant would be visible from the area and the area roadways. The mine activities would temporarily cover several hundred acres and would be visible from local roads. When complete, reclamation activities would likely result in a landscape similar to that existing premining. Existing roadside vegetation would screen some views of mining. Transmission lines and towers would be visible to the traveling public where roadways intersect the lines and to some local landowners, but would mostly be screened by existing vegetation in the largely rural areas proposed for the new lines.
Cultural resources	Construction of all proposed project facilities and operation of the surface mine would potentially affect some archaeological and historic resources. To the extent possible, mitigation would result from design and layout of facilities to avoid impacts. Where avoidance through design and layout would not be possible, Phase II characterization of affected resources and Phase III recovery consistent with an approved Programmatic Agreement executed by DOE, USACE, and relevant state and tribal agencies and private participants would take place.
Noise	During construction, some activities would result in noticeable noise at the closest receptors. The impacts of these temporary activities would be mitigated by properly maintaining construction equipment and limiting the noisiest of the activities (e.g., pile driving) to daylight hours. Steam blows would potentially cause noise approaching levels of annoyance (at least out-of-doors); the impacts of this necessary activity would be mitigated by the limited duration. Mississippi Power would notify affected receptors in advance of steam blowing events. Sound generated by the operation of the IGCC power plant would result in noise impacts on the closest receptors. The maximum predicted level at one nearby residence would be slightly above the EPA guideline but below the HUD residential guideline. An appropriate level of sound control (baffling, silencers) would be designed into facility equipment to limit operational noise levels. In addition, noise from several of the loudest pieces of equipment would be controlled to mitigate impacts, either through construction of barrier walls or other means to achieve similar levels of reduction. **Mississippi Power is pursuing acquisition of most of the residential properties near the power plant site, including those residences that would experience increased noise levels.**
Human health and safety	As required by law, Mississippi Power and NACC would implement project-specific health and safety-related plans, which would include appropriate training and supervision of employees and enforcement of workplace safety policies in accordance with regulatory standards. All processes and equipment would be designed and constructed for safe operation. An extensive network of area monitors would detect leaks of potentially hazardous chemicals. Mississippi Power would develop and implement a process safety management program to identify hazards associated with each applicable chemical. This program would establish emergency response measures as well as specify training protocols. Commercial-grade ammonia and H2SO4 generated at the proposed facilities would be handled and transported in accordance with the DOT's hazardous materials regulations. Design of the CO2 pipeline with automatic emergency shutoff valves, burial of pipeline to minimize accidental damage, and frequent monitoring and inspections of the pipeline and related equipment are some of the safety measures that would be taken to minimize the chance of an accidental release.

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