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COLBERT FOSSIL PLANT UNITS 1 THROUGH 5 REDUCTION SYSTEMS FOR CONTROL OF NITROGEN OXIDES – ENVIRONMENTAL ASSESSMENT (EA) AND FINDING OF NO SIGNIFICANT IMPACT (FONSI)

In accordance with the National Environmental Policy Act (NEPA) and TVA's implementing procedures, Environmental Policy and Planning is issuing the attached EA and FONSI. This serves as documentation of TVA's environmental review. As stated in the FONSI, we conclude that the proposed action will not have a significant impact on the quality of the environment. This FONSI is contingent upon successful implementation of the commitments included therein.

Original signed by

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Colbert Fossil Plant Units 1 Through 5 Reduction Systems for Control of Nitrogen Oxides Final Environmental Assessment
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FINDING OF NO SIGNIFICANT IMPACT

COLBERT FOSSIL PLANT UNITS 1 THROUGH 5
REDUCTION SYSTEMS FOR CONTROL OF NITROGEN OXIDES

The Proposed Action

TVA has prepared an Environmental Assessment (EA) of a proposal to install and operate nitrogen oxides (NO_x) control systems at TVA's Colbert Fossil Plant (COF) Units 1 through 5. Under this proposal, TVA plans to install either selective catalytic reduction (SCR) systems or a combination of SCR and NO_xTech (control of NO_x as it is formed during the combustion process within boilers) systems at COF. The NO_x reduction systems would be installed and achieve as much as 90 percent NO_x removal beginning in the year 2005. This action would help TVA meet its systemwide goal of reducing NOx emissions by 83,000 tons per year.

Background

COF is located in Colbert County, Alabama, about 10 miles west of downtown Tuscumbia and 3 miles east of Cherokee. The plant site is located on the south side of TVA's Pickwick Reservoir at Tennessee River Mile 245. The plant and its reservation lie north of U.S. Highway 72. The plant is located on a 1,354-acre (548-hectare) reservation. Most nearby land is agricultural, but residential and recreational areas are in close proximity. The closest residences are within 0.5 mile of the plant reservation.

Coal consumption for Colbert is approximately 3.2 million tons per year. To remove fly ash and reduce stack opacity, high-efficiency electrostatic precipitators or ESPs (which are more than 99 percent efficient) were installed on Units 1 through 4 in 1988. The state of Alabama's limit (excluding allowances for startup, shutdown, malfunction, and load changes) for opacity at Colbert is 20 percent as measured by United States Environmental Protection Agency (USEPA) Method 9, but the plant typically operates at less than 12 percent opacity. Prior to 1990, Units 1 through 5 burned Illinois Basin coal. Between 1990 and 1996, Units 1 through 4 switched to low sulfur coal from eastern Kentucky/Tennessee (<2.0 pounds sulfur dioxide/ton), but Unit 5 remained with Illinois Basin coal. During 1996, Units 1 through 4 switched to an even lower sulfur coal (Colorado/Powder River Basin blend coal), and Unit 5 continued to burn Illinois Basin coal.

Gaseous emissions from burning coal are dispersed through a 500-foot stack for Unit 5 and a 600-foot stack for Units 1 through 4. To date, installed environmental controls and operations have reduced particulate emissions by more than 99 percent, and boiler optimization operations have modestly reduced NO_X emissions.

The present flue gas treatment systems for environmental control for COF Units 1 through 5 consist of the following train of components in order of treatment: a high-efficiency ESP-induced draft fan and the unit stack; the air heater (also located in the flue gas stream), which preheats boiler combustion air and is located upstream of the ESP for each unit; and the flue gas ductwork for Units 1 through 4, which passes through older ESPs' hoppers to reach the newer, high-efficiency ESPs.

Alternatives

Under a No Action Alternative, no SCR or NO_XTech systems would be installed. A No Action Alternative would not allow TVA to meet its system wide NO_x reduction goal.

For the reduction of NO_X emissions from COF, TVA is considering three alternative combinations of systems, i.e., installation of SCR on Unit 5 and No Action on Units 1 through 4 (Alternative A); installation of SCRs on all five units (Alternative B); or a hybrid consisting of an SCR on Unit 5 and different combinations of SCR and NO_XTech systems on Units 1 through 4 (Alternative C). Since Unit 5 is the largest unit at COF, Alternative A offers the timeliest way to affect a large decrease in NO_X emissions from COF. Both Alternatives B and C would seek to control NO_x emissions from all five units. However, while Alternative B would have SCRs on all five units, Alternative C includes variations whereby either SCR or NO_xTech might be installed on Units 1 through 4, depending on further evaluation of the effectiveness of NO_xTech systems.

TVA expects up to 90 percent NO_x removal efficiency with both the SCR and NO_xTech systems. SCR systems include the following per unit: a reactor housing and ductwork, catalyst, and ammonia injection system. Multiple units using SCR or NO_x Tech can share a common anhydrous ammonia system for unloading, storage, vaporization, air dilution, and control of ammonia.

A NO_XTech system would theoretically require substantially less construction and modification to existing plant flue gas ductwork than installation of an SCR. The NO_xTech system would involve installation of supply lines, nozzles, and devices within the plant structure to inject controlled amounts of ammonia and natural gas into each of the individual boilers. The NO_xTech installation consists of a natural gas or propane/steam mixture and ammonia supply grid. Each of the grids consists of a number of lances installed at the entry to the particular NO_XTech injection cavity.

Impacts Assessment

An interdisciplinary TVA team reviewed the potential direct and indirect effects of the proposed use of SCR systems and combinations of SCR and NO_xTech at COF for NO_X control. From this review the following environmental issues were identified:

- Beneficial effects to air quality from reducing NO_X emissions
- Potential contamination of coal combustion byproducts with ammonia
- Potential contamination of chemical cleaning pond and Ash Pond 4 with ammonia compounds following periodic air preheater (APH) washes
- Potential contamination of Ash Pond 5 with ammonia compounds leached out of fly ash by rainwater runoff from the active area of the dry fly ash stack
- Potential wastewater and impacts to surface water quality from ammonia in pond discharges
- Public and worker safety issues related to the storage and handling of anhydrous ammonia
- Socioeconomic effects of the project related to increased jobs

These issues were the basis for the evaluations in the EA.

The proposed installation and operation of SCR or NO_xTech systems will have beneficial impacts to regional air quality by reducing the NO_X available in the atmosphere for use in ozone production, and thus locally and regionally reducing ground level ozone.

The impacts evaluation determined that there was a potential for contamination of combustion byproduct (fly ash, scrubber sludge, and bottom ash) and wastewater treatment ponds with ammonia compounds due to ammonia slip past the catalyst in SCR and ammonia slip necessary for operation of NO_xTech. Ammonia slip or excess ammonia is believed to partition between the APHs and the fly ash. Ammonia depositions in the APHs as ammonium bisulfate would be released to the wastewater treatment system at COF when the APHs are washed. Water discharged from the chemical treatment pond to Ash Pond 4 may contain ammonia from APH washes and/or from containment of any accidental release of anhydrous ammonia from either the storage tanks or an unloading tank truck. Ammonia compounds accumulated in the fly ash would be leached by rainwater runoff into Ash Pond 5, the dry fly ash stack stilling pond. Because ammonia is toxic to aquatic life, its discharge concentration must be controlled to avoid adverse impacts.

Ammonia concentrations in the Ash Pond 4 discharge will be controlled by operational controls and additional treatment measures as necessary. For Ash Pond 4, operational controls include managing the washing of the APHs and the resulting wash water to control the ammonia loading on Ash Pond 4. Preliminary studies indicate control of ammonia concentrations in Ash Pond 5 discharge will require enhancements of the capacity of Ash Pond 5 to assimilate ammonia. The most likely enhancement to Ash Pond 5 would be to baffle the pond to promote good mixing and to increase residence time in the pond. Additional treatment measures for the discharges from both ash ponds may include controlling pH levels to assure that discharges meet whole effluent toxicity and effluent discharge limits in the National Pollutant Discharge Elimination System permit. These measures would protect water quality and aquatic life, and no significant impacts to these resources are anticipated.

Fly ash generated at COF is not readily marketable, and the SCR or NO_xTech systems would not alter this situation. Bottom ash would not be subject to ammonia contamination. No significant impacts are therefore expected on the marketing, utilization, or disposal of combustion byproducts. A small quantity, approximately 150 tons of debris, would be created by the demolition of an old pilot scrubber plant lunchroom and the remainder of the foundations of an old concrete mixing plant. This amount of material is approximately one-tenth the permitted daily capacity of the Class D landfill most likely to be used, so the effects on local solid waste resources are insignificant.

Ammonia is a toxic gas, and therefore storage and handling of large quantities of anhydrous ammonia as proposed as part of the SCR systems pose a substantial potential hazard to plant workers and the public. The risk of this hazard was evaluated using methods and criteria consistent with 40 Code of Federal Regulations (CFR) Part 68—Chemical Accident Prevention Provisions. Accidental release scenarios for the USEPA-defined worst-case release and for alternate release scenarios were evaluated for the anhydrous ammonia storage tanks, tanker trucks, and rail cars. It was judged that only tornadoes and major earthquakes could cause a worst-case release.

The earthquake hazard at COF relative to other locations in the United States is low (zone 1 on a scale of 0 to 4 with 4 being highest hazard) based on the 1997 Uniform Building Code. Based on an evaluation of the earthquake potential, TVA committed to design the ammonia facility to be earthquake resistant, thus reducing risk to a minimal level.

The probability of a tornado (about one occurrence every 735 years) coincident with the assumed weather conditions causing poor dispersion of the ammonia gas was found to be

2.04×10^{-4}. This low probability means the likelihood of a tornado causing a catastrophic ammonia release at COF is insignificant.

The requirements under 40 CFR Part 68 for emergency planning would help address the impacts of accidental releases from the ammonia facility. This will include development of emergency response plans coordinated with local agencies, procedures for system operation and maintenance, and worker training. Additionally, a water fogging system included in the project design will reduce the impacts of both worst-case and alternative-release scenarios.

The potential socioeconomic effects of the proposed action were evaluated and found to be minor. The proposed action would involve a minor physical addition to an expansive heavy industry facility having a substantial property buffer area. Environmental justice was evaluated, and based on the demographics of the surrounding area, disproportionate impacts to minority or low-income populations would be unlikely.

Other resources evaluated include transportation, groundwater, archaeological and historic resources, land use, managed areas and ecologically significant sites, visual aesthetics, terrestrial ecology, aquatic ecology, threatened and endangered species, wetlands, and floodplains. The Alabama State Historic Preservation Office has concurred with TVA's determination that the proposed action would not adversely affect historic properties. None of the proposed permanent facilities would be located within the 100-year floodplain, and the ammonia unloading and storage facility is located above the 500-year floodplain. The project is consistent with Executive Order 11988 and would not affect flooding. Impacts to wetlands, transportation, groundwater, land use, managed areas and ecologically significant sites, visual aesthetics, terrestrial ecology, aquatic ecology, and threatened and endangered species would be insignificant.

Mitigation

The following environmental commitments and mitigative measures were identified as necessary to ensure that environmental impacts are insignificant:

1. Compliance with 40 Code of Federal Regulations (CFR) 68 prior to filling of the ammonia storage tanks or transport on site of ammonia in a quantity exceeding 10,000 pounds.

2. Substantive compliance with the provisions of 29 CFR 1910.111 (Storage and Handling of Anhydrous Ammonia) and 29 CFR 1910.119 (Process Safety Management of Highly Hazardous Chemicals) including those for proper equipment design, hazard assessment, operating procedures, employee training, and emergency planning.

3. Seismic hazards to the selective catalytic reduction (SCR) facility would be addressed by compliance with the seismic provisions of the 1997 version of the International Conference of Building Officials Uniform Building Code and the 1997 National Earthquake Hazards Reduction Program.

4. If installed, the SCR system(s) shall not be routinely operated with an ammonia slip exceeding 2 parts per million (ppm). Brief system process excursions or process upsets would be an exception to this limit.

5. If installed, the NO_xTech systems shall not be routinely operated with an ammonia slip exceeding 5 ppm. Brief system process excursions or process upsets would be an exception to this limit.

6. TVA would monitor impacts on fly ash and fly ash leachate from ammonia additions involving other TVA projects. Ash Pond 5 would be evaluated to determine optimum means of ensuring that adequate mixing and assimilation of ammonia compounds occur within the pond. Ash Pond 5 would be modified as necessary, most probably by baffling, to ensure adequate mixing and ammonia compound assimilation.

7. Effluent pH of both Ash Pond 4 and Ash Pond 5 would be adjusted as necessary to meet National Pollutant Discharge Elimination System (NPDES) permit requirements.

8. Air preheater wash water would be routed to the chemical pond and then discharged to Ash Pond 4 in stages to allow the assimilative capacity of Ash Pond 4 to reduce ammonia concentrations to acceptable levels at Outfall 001. Existing guidelines for managing the chemical treatment pond would be modified to ensure appropriate management of ammonia-bearing APH wash water.

9. The maximum area of exposed ash at any particular time during the stacking period would not exceed 10 acres (4.05 hectares).

10. In order to contain and control an accidental spill of ammonia, the area around the ammonia unloading and storage area would be configured into a spill retention basin. The spill retention basin would be sized to retain the contents of an entire tank, the anticipated water flow from the fogging system, and the rainfall from the 10-year, 24-hour rain event. The spill retention basin at a minimum would be lined with compacted in-situ earth or low permeability clay liner. Following pH testing, spilled material would be released to the ash pond at a rate sufficient to maintain compliance with NPDES permit requirements for Ash Pond 4.

11. To ensure that local residential wells are not adversely affected by dry stacking of ammoniated ash, future groundwater samples collected semiannually from private wells P2 and P8 would be analyzed for an expanded list of water quality parameters including ammonia, total nitrate-nitrite, and total Kjeldahl nitrogen. In TVA's judgment, should the water quality of any private well be impaired by ammoniated ash leachate such that water is no longer suitable for its intended use, the owner would be provided either a water treatment system, a connection to the local public water system, or a new well.

12. Catalyst disposal would be managed by a catalyst contractor in compliance with applicable regulations.

13. A water fogging system with both automatic and manual activation would be installed at the ammonia storage and unloading facility to limit the hazard from large ammonia leaks or catastrophic tank failure.

14. The COF site storm water pollution prevention plan would be revised to include management of precipitation into secondary containment for ammonia tanks as described in Section 2.2.1 of the EA.

15. During construction, areas subjected to soil disturbance and/or vegetation removal would be replanted and/or reseeded with native plant species as soon as possible.

16. During construction, portable toilets would be provided and appropriately maintained for the construction workforce.

17. Appropriate Best Management Practices for erosion control and stabilization of disturbed areas, including dust suppression, would be utilized and all construction activities would be conducted in a manner to ensure that waste materials are contained and that introduction of polluting materials into receiving waters are minimized.

18. The crane at the barge unloading area would be relocated if a high-water event is anticipated while the barge unloading area is in use. No materials subject to flood damage would be stored within the 100-year floodplain.

External Review and Comments

In November 2002, a notice of availability for the Draft EA was published in two newspapers which serve northwest Alabama, *The Times Daily* and *The Colbert County Reporter*. A news release was also sent in November 2002 to the news media. This notice and the news release informed interested persons that copies of the Draft EA were available for review at the Helen Keller Public Library in Tuscumbia (Colbert County), Alabama, the Cherokee Public Library in Cherokee (Colbert County), Alabama, and the Chattanooga-Hamilton County Bicentennial Library in Chattanooga, Tennessee. Copies of the Draft EA were sent to the Alabama Department of Environmental Management (ADEM), the United States Fish and Wildlife Service, and the United States Army Corps of Engineers. The comment period for public and agency input on the Draft EA spanned from November 5 to December 6, 2002.

Among the comments received was a request from ADEM to assess impacts to the drinking water intakes for Colbert County and Cherokee, Alabama, which are on the Tennessee River in the vicinity of COF. ADEM's comments were addressed in the Final EA. Comments received from other external agencies have also been addressed in the attached EA.

Conclusion and Finding

Environmental Policy and Planning's National Environmental Policy Act Administration staff reviewed the Colbert Fossil Plant Units 1 Through 5 Reduction Systems for Control of Nitrogen Oxides EA and determined that the potential environmental consequences of TVA's proposed action to construct and operate the SCR or NO_xTech systems have been addressed and that the proposed action is not a major federal action significantly affecting the quality of the environment. This finding is contingent upon successful implementation of the commitments listed above. Accordingly, an Environmental Impact Statement is not required.

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Date Signed