CHAPTER 2: ALTERNATIVES INCLUDING THE PROPOSED ACTION

The Proposed Action

TVA proposes to install and operate SCR systems to meet the SIP limits under section 110 of the CAA. The SCR systems would have the capability to achieve 90 percent NO_X removal for ALF. Unit 3 outage for installation of the SCR is planned for fall 2001; Unit 2 for late winter-spring 2002 and Unit 1 for fall 2003. The proposed SCR systems include a reactor housing and ductwork, catalyst, and an anhydrous ammonia system for unloading, storage, vaporization, air dilution, injection and control of ammonia.

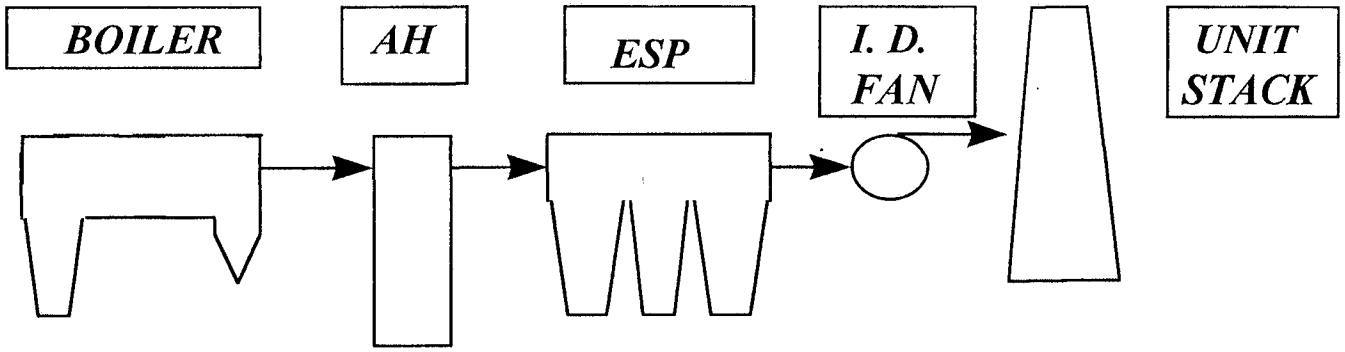
SCR System

The present flue gas treatment systems for environmental control for Allen Units 1, 2, and 3 consist of the following train of components in order of treatment: a high efficiency electrostatic precipitator (ESP), induced draft fan, and the unit stack (see Figure 2). Also, located in the flue gas stream is the air heater which preheats boiler combustion air and is located upstream of the ESP for each unit (see Figure 2).

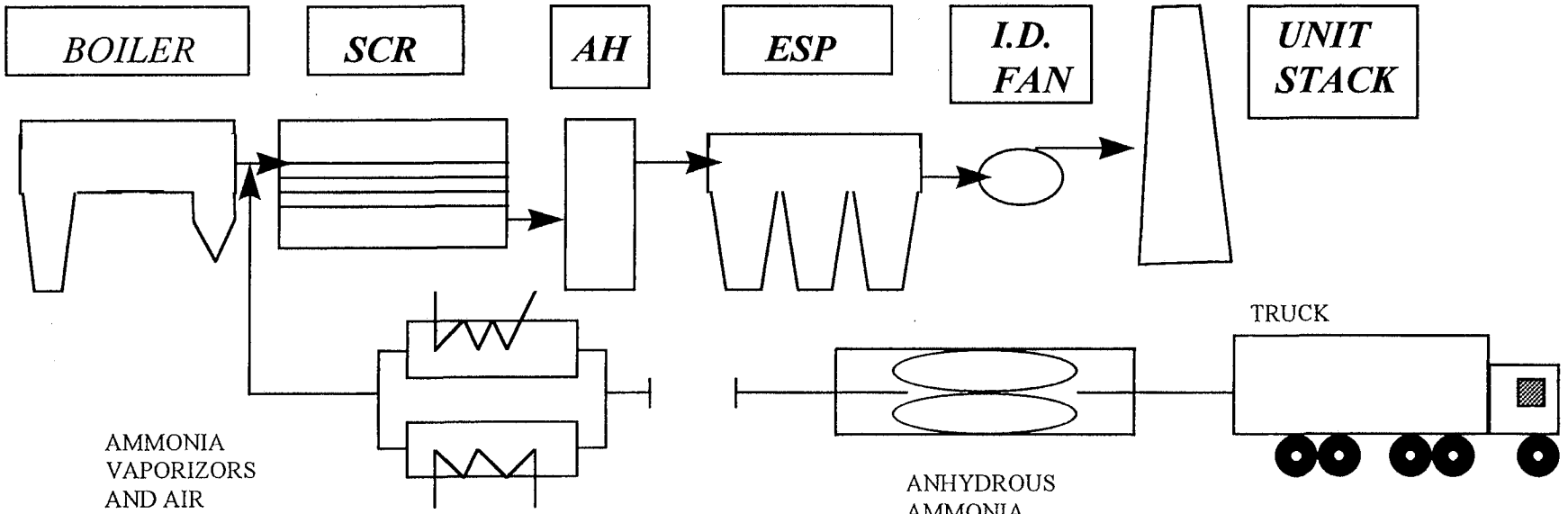
The SCR reactors would be physically installed upstream of the air heater in the gas path. The existing flue gas ductwork would be modified to accommodate the SCR reactors. The ESPs would remain the primary particulate control device providing compliance with the particulate emission standard for the units.

An ammonia system capable of serving the unit SCRs would be installed and would consist of an area for truck parking and unloading; storage tanks; feed pumps; vaporizers and dilution air mixing units; and necessary controls. The location of the SCR reactors, and ammonia storage tanks and unloading area are shown in Figure 3. Additionally, a water fogging system activated both automatically and manually would be installed to limit the hazard from any accidental release of anhydrous ammonia from either the storage tanks or an unloading tank truck. The fogging system would combine water with a portion of the anhydrous ammonia vapor to form aqueous ammonia liquid which would be contained within the chemical treatment pond capturing spills from the tank storage area that receives runoff from the unloading area.

Other attendant activities include a demolition scrap laydown area, and a temporary or permanent office building. Unloading of equipment from barges would be accomplished with a barge-mounted crane at an existing U. S. Army Corps of Engineers (USACOE) barge unloading facility, so that no associated crane pads would be needed. To eliminate the potential for water quality impacts to McKellar Lake from ammonia slip entering the wastewater stream, the West Ash Pond (Figure 4) would be reactivated and expanded (by approximately 1100 by 700 feet) to accept fly ash and extend its life expectancy. When reactivated the West Ash Pond would discharge to the condenser cooling water flow which discharges to the Mississippi River.



EXISTING FLUE GAS TREATMENT TRAIN (UNITS 1, 2, AND 3)



PROPOSED FLUE GAS TREATMENT TRAIN (UNITS 1, 2, AND 3)

Figure 2. Existing and Proposed Flue Gas Treatment Trains for Allen Fossil Plant Units 1, 2, and 3.

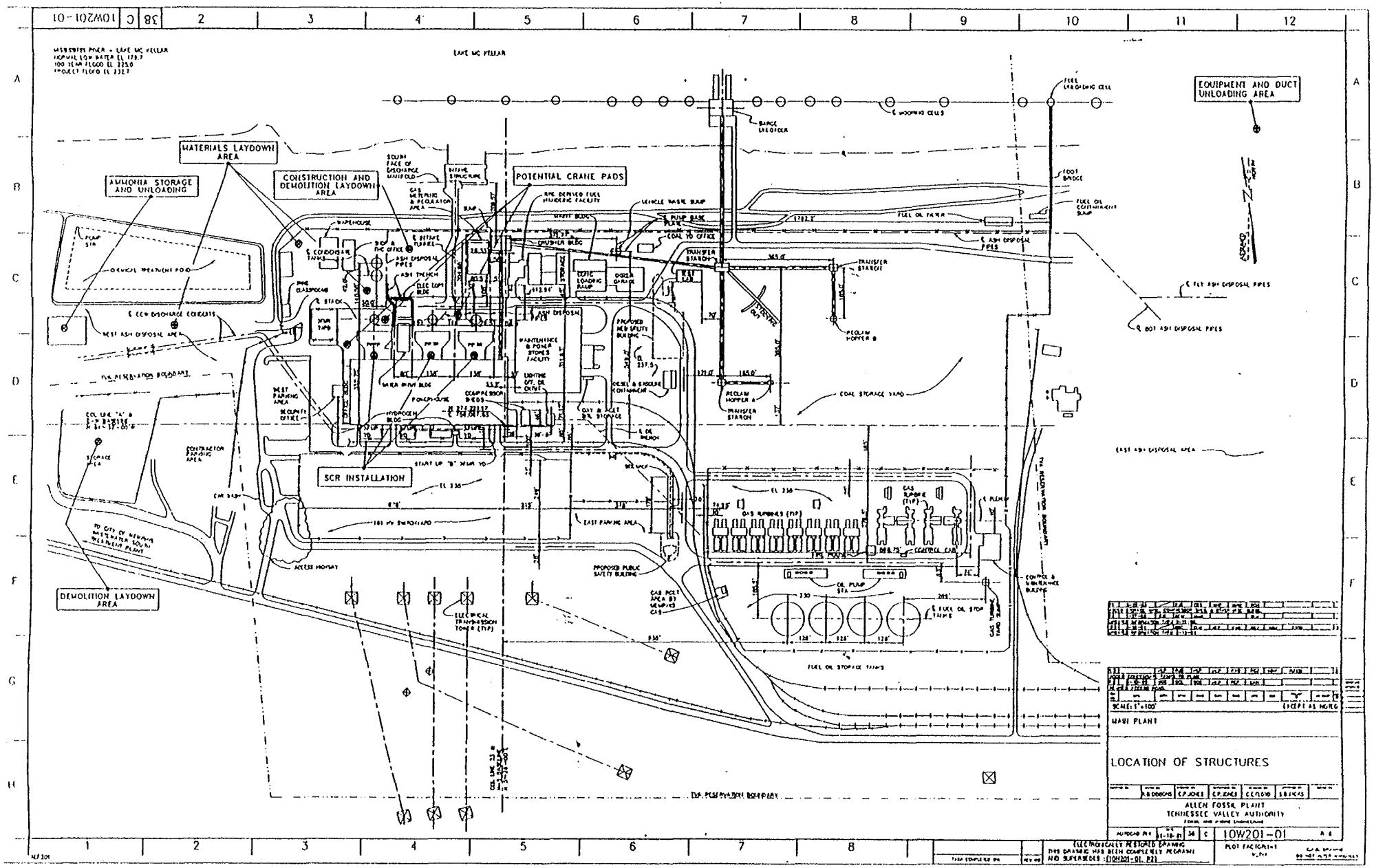
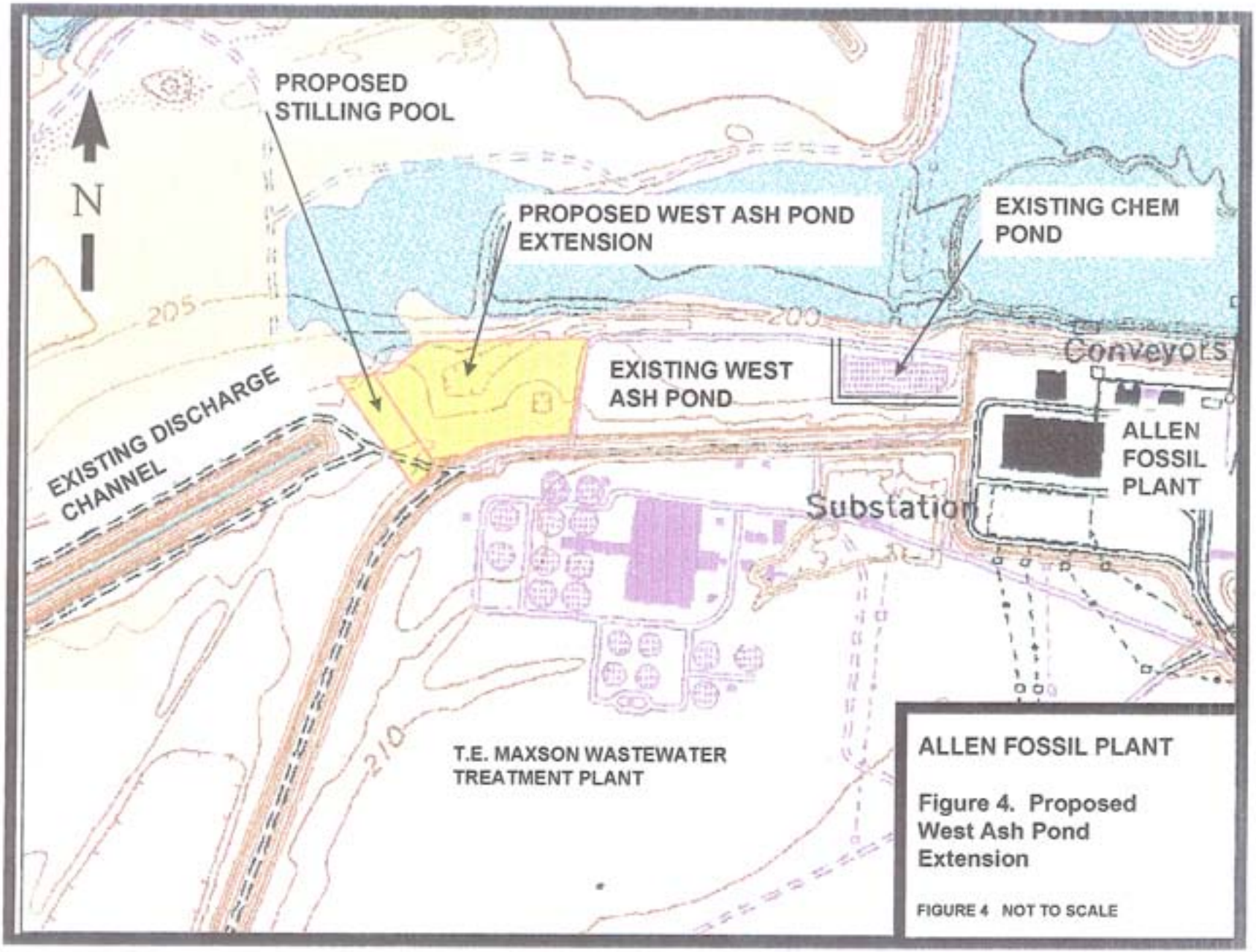


Figure 3. Allen Fossil Plant site with location of proposed SCR system, ammonia storage and unloading facility, crane pads and laydown areas.


PROPOSED
STILLING POOL
N
PROPOSED WEST ASH POND
EXTENSION
EXISTING CHEM
POND
205
200
Conveyors
EXISTING WEST
ASH POND
EXISTING DISCHARGE
CHANNEL
ALLEN
FOSSIL
PLANT
Substation
T.E. MAXSON WASTEWATER
TREATMENT PLANT
210
ALLEN FOSSIL PLANT
Figure 4. Proposed
West Ash Pond
Extension
FIGURE 4 NOT TO SCALE

Alternatives to the Proposed Action

No Action

Under a No Action alternative, no SCR systems would be installed. A No Action alternative would not enable TVA to meet the SIP limits for NOx under section 110 of the CAA. NO_X emissions from the Allen Plant are meeting year 2000 Title IV controls for cyclone-fired units by use of overfired air technology. NO_X emission limits for plants with cyclone-fired boilers are 0.86 lb/mm Btu.

Other Alternatives Not Considered in Detail

Technology Alternatives

Other commercially available technologies described under **Background** can not provide the high NO_X removal rate of 90% needed to meet TVA's system-wide NO_X reduction goal of 75,000 metric tons (83,000 tons/yr) beginning in 2005. As a result, other NO_X control technologies are not considered further in this EA.

NO_X Reductions From Energy Efficiency, Renewable Energy and Nuclear Generation

Reduced fossil fuel use made possible by energy efficiency, use of renewable energy, and nuclear power generation are alternatives that would also reduce TVA's NO_X emissions. These alternatives are being implemented according to the short-term and long-term plans defined in the preferred alternative of *Energy Vision 2020—An Integrated Resource Plan and Programmatic Environmental Impact Statement.* The effect of these measures are already reflected in TVA's NO_X reduction requirements. Thus, these measures, by themselves would not be adequate to achieve the NO_X reduction requirements under the CAA. Together with the NO_X reductions from the proposed action, these alternatives would help TVA achieve its overall NO_X reductions requirements.

Additional nuclear power generation could offset fossil generation and thus reduce NO_X emissions. TVA has 3 partially completed nuclear units: Watts Bar 2, and Bellefonte 1 and 2. Also, Browns Ferry Unit 1 remains shut down and would require considerable refurbishment prior to restart. Any decision to pursue additional nuclear power generation could have some influence on long-term NO_X reduction requirements but falls beyond the time frame for the required completion of TVA NO_X reductions which is estimated to be 2003.

TVA has also recently begun a pilot Green Power program. This program would provide power from renewable energy sources with little or no NO_X emissions. However, the NO_X reduction contributions would be small compared to the NO_X reductions requirements under the CAA. Another alternative is the purchase of NO_X allowances from a market—if the EPA model rule is adopted by all states. This approach, however, is not expected to satisfy the need for NOx reductions under CAA Title 1.

Comparison of Alternatives

The potential for effects by either the proposed action or no action alternatives on terrestrial ecology, wetlands and floodplains, land use, visual aesthetics, noise, archeological and historic resources, transportation and socioeconomics is minor and insignificant.

Air Quality

The proposed action of installing and operating SCR 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 the ground level ozone. Other possible minor changes in plant emissions include an increase in SO_3 particulate emissions, a decrease in secondary NO_X particulate emissions (leading to an overall decrease in fine particulate), and a decrease in plume coloration from NO_X. Also, acid precipitation caused by secondary particulate NO_X emissions would be reduced.

The no-action alternative would result in no changes to the plant air emissions and thus no beneficial reduction in NO_X emissions.

Water Quality and Aquatic Life

The storage, handling, and use of anhydrous ammonia for the proposed SCR system would result in the potential for ammonia contamination of surface water and impacts to aquatic life. One pathway for impacts is a direct accidental release of ammonia to surface waters. The engineered features of the SCR systems including a retention basin (the chemical treatment pond) for spills and emergency water fogging minimize this risk. Another pathway for surface water impacts is ammonia contamination of combustion by-products including fly ash. Water discharged from the fly ash storage pond may contain ammonia. Management of water treatment system flows through measures such as the reactivation, reconfiguration and expansion of the West Ash Pond (see commitments) would maintain discharge ammonia concentrations below levels necessary to safeguard water quality and protect aquatic life. Until the West Ash Pond reactivation is completed, interim management of ammonia slip (see commitments) would minimize impacts to water quality and aquatic life. If necessary to meet National Pollutant Discharge Elimination System (NPDES) permit limits, additional operational controls and water treatment measures would be employed.

The no-action alternative would result in no changes to water quality or impacts to aquatic life.

Solid Waste

Some construction wastes would result from construction of the SCR systems. These wastes could include metal scrap, lumber, masonry, asbestos, polychlorinated biphenyl (PCBs), and hazardous wastes. These wastes would all be properly managed and disposed of, as necessary, in appropriately permitted disposal units. These wastes would not occur for the no-action alternative.

Under the proposed action, the character of combustion solid waste and by-product including fly ash may be changed due to ammonia contamination. These changes may constrain some future potential uses of this by-product. However, no present by-product uses would be affected. Bottom ash (boiler slag) which is currently marketed would not have the potential for ammonia contamination. The no-action alternative would not affect combustion by-products.

Ammonia Storage and Handling Safety

The storage and handling of large quantities of anhydrous ammonia creates potential hazards to plant workers and the public. Accidental releases of ammonia have the potential to create, depending on their extent and emergency response actions, a substantial hazard to plant workers, or for more extensive releases, the public.

The estimated impacts from worst case releases assume complete failure of an ammonia storage tank followed by a complete failure of the emergency water fogging system as well as no response by emergency personnel. Additionally, the most unfavorable weather conditions limiting dispersion of the ammonia vapor must occur. The complete tank failure and water fogging system failure could possibly result from a tornado or major earthquake. The occurrence of a tornado at the very location of the ammonia tanks is unlikely. Additionally, unfavorable weather conditions not associated with weather following a tornado must also occur. The probability of these events occurring simultaneously is very unlikely resulting in a low risk of such a worst case release.

The occurrence of a major earthquake which could result in complete tank failure and failure of the water fogging system is unlikely. To minimize this risk, the ammonia storage and handling facility will be designed to be earthquake resistant (see **Summary of Environmental Commitments** below).

The no-action alternative would pose none of these potential hazards.

Summary of Environmental Commitments

1. Compliance with 40 Code of Federal Regulations (CFR) 68 prior to filling of the ammonia storage tanks or transport onsite of ammonia in a quantity exceeding 10,000 lb.
2. Adherence to substantive 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. Until the West Ash Pond is brought back into service, the ammonia slip would be controlled by catalyst management, such that ammonia discharged from the East Ash Pond does not exceed 0.85 mg NH_3-N/L. Upon reactivation of the West Ash Pond, the SCR systems will not be routinely operated with an ammonia slip exceeding 2 ppm. Brief system process excursions or process upsets would be an exception to these interim and final limits.
4. Seismic hazards to the ammonia facility will be minimized by adhering to the seismic provisions of the 1997 version of the International Conference of Building Officials (ICBO) Uniform Building Code (UBC).

5. Use of appropriate operational controls and treatment measures to meet whole effluent toxicity (WET) and effluent discharge limits in the NPDES permit. The types of operational controls and treatment measures include:
    - Reactivation and expansion of the West Ash Pond to receive fly ash, with its discharge configured to combine with condenser cooling water and to discharge away from McKellar Lake.
    - The ammonia slip rate referred to above, pH control of discharges from the ash and chemical treatment ponds to meet NPDES permit requirements; and
    - the discharge from DSN 006 reconfigured to combine with condenser cooling water and to discharge away from McKellar Lake.
6. In order to contain and control an accidental spill of ammonia, the area around the ammonia unloading and storage area will be configured to drain to the existing, immediately adjacent chemical treatment pond (Figure 3) which has an impermeable liner.

Environmental Permits and Applicable Regulations

The new or modified environmental permits and applicable environmental regulations for the proposed project are listed in Table 1.

Table 1. Permits and Applicable Regulations.

Permits
Modification to NPDES permit TN0005355 for outfalls DSN 001, DSN 001A, DSN 003, and DSN 006 as required
No modification to air permits required; reflect SCR in subsequent operating permit renewals
Regulations
40 CFR 423
40 CFR 68
29 CFR 1910.111 and .119