CHAPTER 2: ALTERNATIVES INCLUDING THE PROPOSED ALTERNATIVE ACTIONS

Proposed Alternative Actions

TVA is considering two alternative systems, i.e., installation of SCRs on all nine units (Alternative A), or a hybrid installation of SCRs on Units 1 through 4 and non-catalytic NO_XTech technology on Units 5 through 9 (Alternative B) for reduction of NO_X emissions from KIF. A limited demonstration test of the NO_XTech technology is being conducted by the commercial provider January to May 2002. Only one of the two alternative systems will be selected for installation.

<u>Selective Catalytic Reduction System</u>

Under this alternative, TVA proposes to install and operate SCR systems to meet the State Implementation Plan (SIP) limits under Section 110 of the Clean Air Act (CAA). The SCR systems would have the capability to achieve 90% NO_X removal for KIF Units 1 through 9. Installation of the SCRs for Units 1 through 4 would begin in June 2002 and be completed no later than November 2003. Construction of the SCRs for Units 5 through 9 would begin October 2002 and be completed no later than April 2004. Operation of the SCRs would begin in May 2004. The maximum on-site construction workforce would be approximately 600. 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.

The present flue gas treatment system for environmental control for KIF Units 5 through 9 (Figure 2-1) consists of the following train of components in order of treatment: unused (de-energized) electrostatic precipitator (ESP), induced draft fan, high efficiency ESP, and a common stack. The order of components for Units 1 through 4 are similar except that the induced draft fans are located downstream of the high efficiency ESPs). Also located in the flue gas stream is an air heater which preheats the boiler combustion air. It is located between each boiler unit and the de-energized ESPs. The current duct arrangement at KIF allows flue gas from each of the nine boiler units to flow independently of the other units until it reaches a common plenum downstream of the high efficiency ESPs. The flue gas from Units 1 through 5 discharges into one common plenum and stack, while the gas from Units 6 through 9 discharges into a separate common plenum and stack.

<u>Alternative A Selective Catalytic Reduction System (SCR)</u>

The proposed arrangement for a KIF "high dust" SCR system (i.e., on the high dust side of electrostatic precipitators), includes a total of nine SCR reactors (one per unit). The SCRs serving Units 1 through 4 would be installed first and will be physically located (Figure 2-2) upstream of the high efficiency ESPs in the vicinity of the existing two large chimneys. The flue gas would be routed through the SCR and returned to the existing ductwork. The newer high efficiency ESPs would continue to provide compliance with the particulate emission standard.

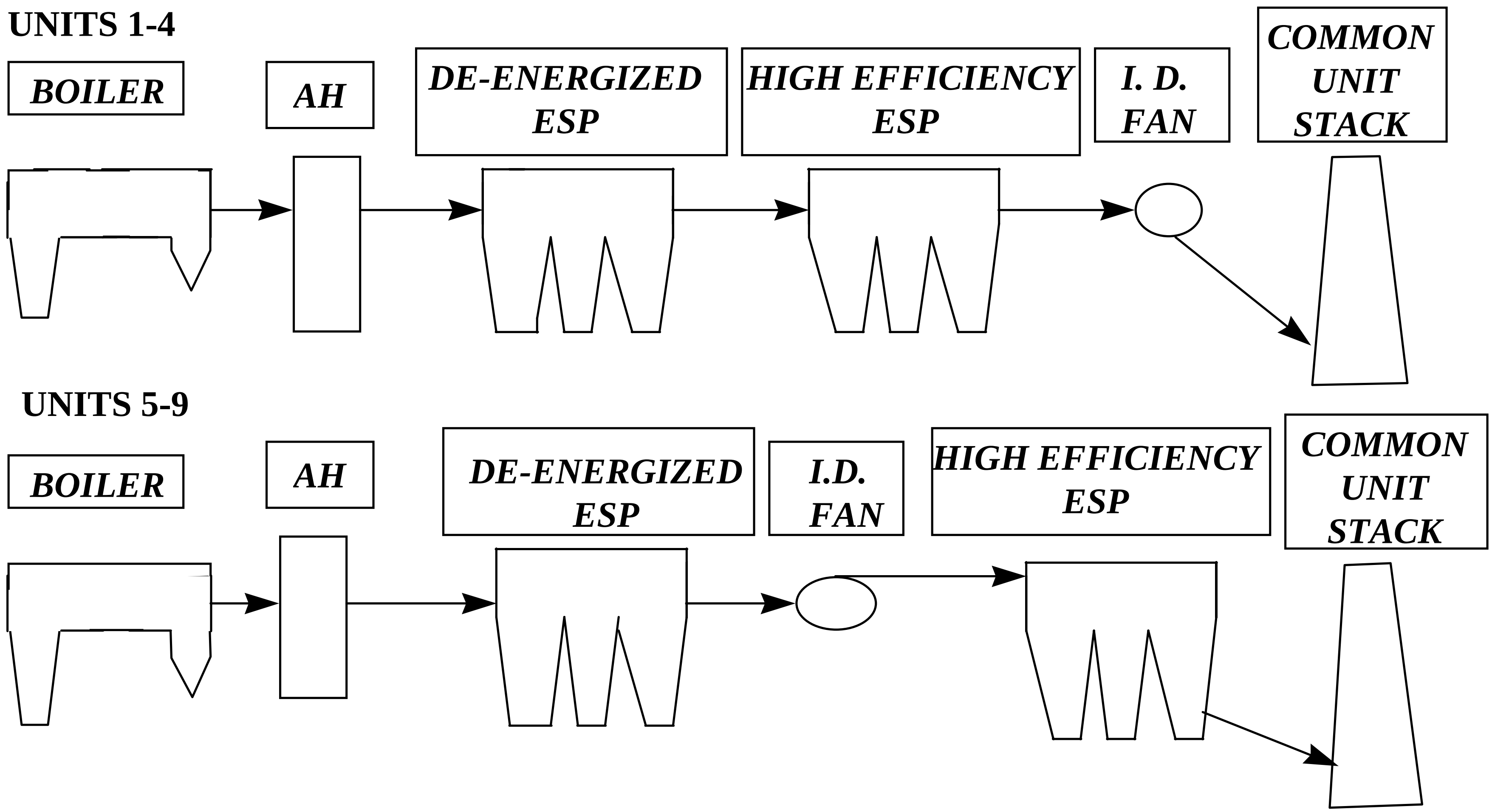


Figure 2-1. Existing Flue Gas Treatment Trains for Kingston Fossil Plant Units 1-4 and 5-9.

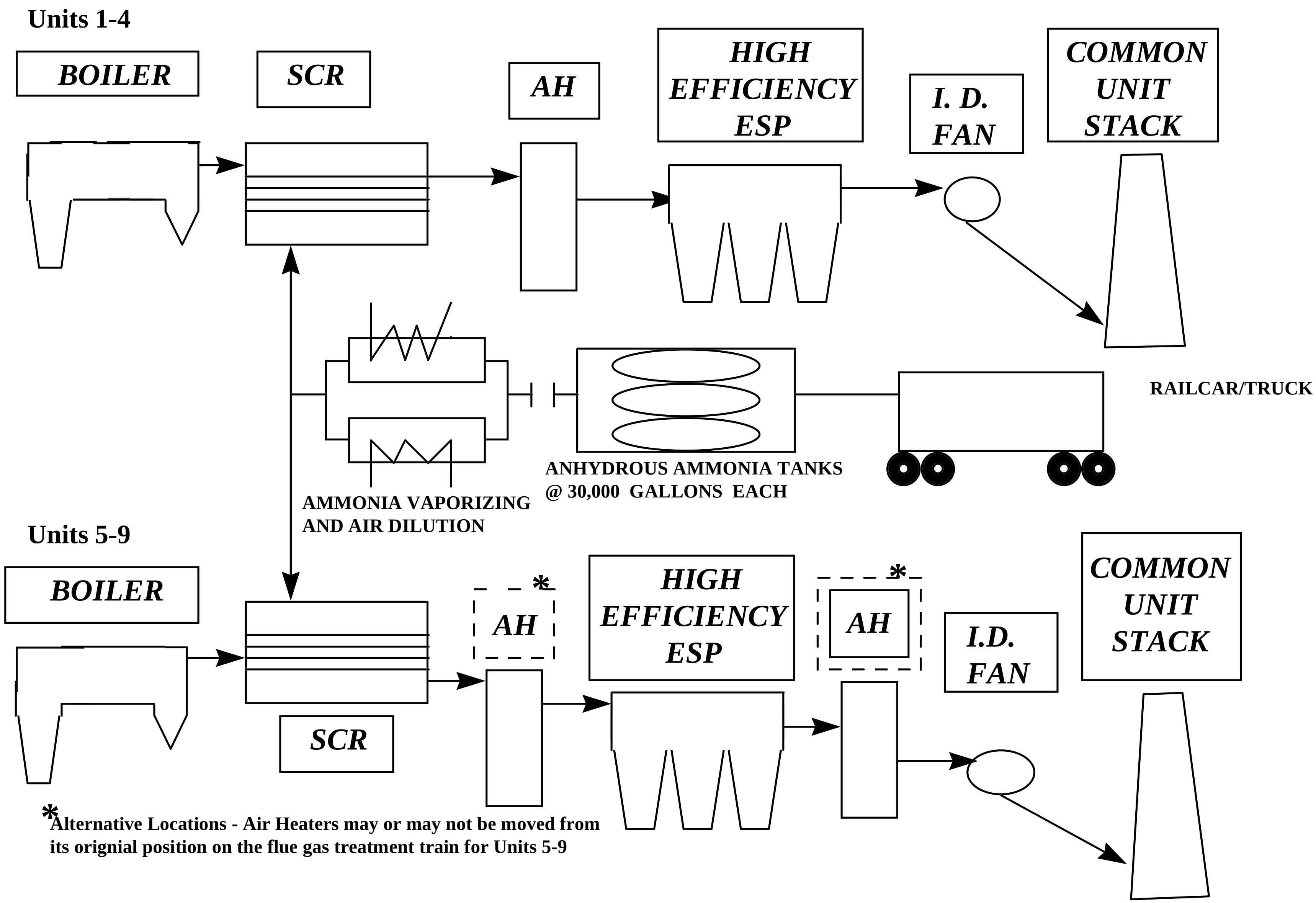


Figure 2-2. Proposed Alternative A - Flue Gas Treatment Trains Incorporating SCRs for Kingston Fossil Plant Units 1-4 and 5-9.

The proposed SCR arrangement would utilize most of the existing ductwork, including the common plenums for Units 1 through 5, and 6 through 9, but would require some additional duct, i.e., duct going from the boiler economizers to the SCR, duct from the SCR to the air preheater (APH), duct coming from the APH outlet to the ID fan (for Units 5 through 9) or directly to the high efficiency ESP (for Units 1 through 4). Once the flue gas exits the ESP the flue gas would be discharged to the common plenum discharging to the chimneys.

The SCR modules are designed to accommodate three levels of honeycomb catalyst beds. The honeycomb catalyst is an extruded ceramic structure with high geometric surface area per unit volume. Composition of the catalyst is a titanium-tungsten material that is highly reactive to NO_X. Initially two layers would be installed, with a third layer added as dictated by the Catalyst Management Plan.

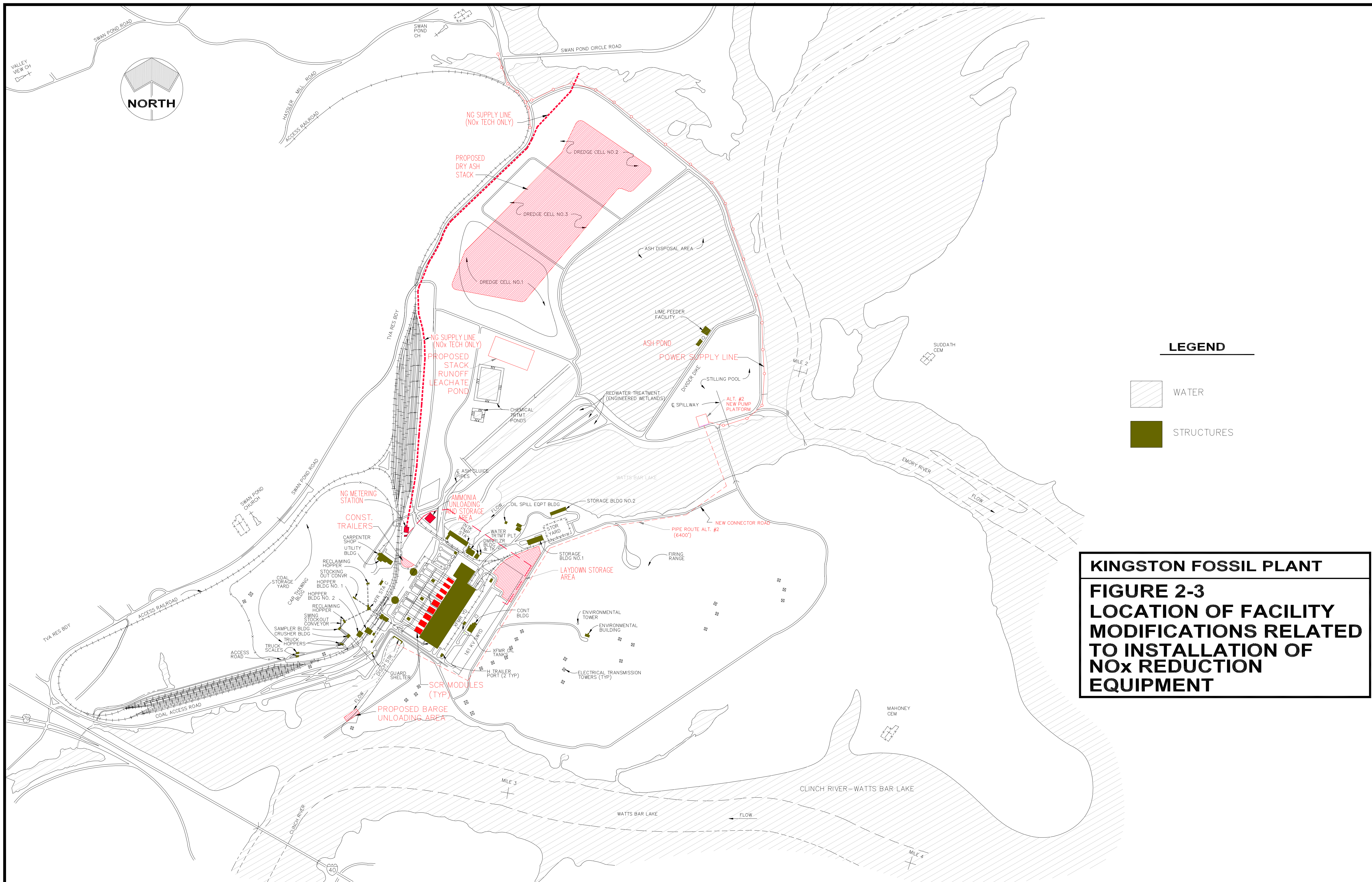
During the months of May through September ammonia would be injected into the system from NO_X removal as the flue gas passes through the SCRs. During the months of October through April, ammonia would not be injected.

Other attendant activities (Figure 2-3) include construction laydown areas, use of an existing temporary barge unloading area, temporary office buildings, permanent material storage warehouses of the type and size, consistent with, and in the area of the existing "warehouse row" along the north of the plant, and temporary crane pads located between the Units 1 & 2, 3 & 4, 5 & 6, and 7 & 8 SCR modules. Large components of the SCR systems would be transported to KIF by barge, and unloaded by crane at an existing barge unloading area. Other components would be delivered to KIF by truck. Large bulk deliveries of materials would include steel; duct; insulation; lagging; cables; pipe; machinery, vaporizers and pumps; switch gear; breakers; and ammonia storage tanks.

Alternative B Hybrid NO_XTech (Units 5 through 9) and SCR (Units 1 through 4) System

The NO_XTech system is a proprietary technology. Installation of the NO_XTech system would require substantively less construction and modification to existing plant flue gas ductwork than installation of SCRs (Figure 2-4). An temporary installation of a NO_XTech system is planned for November 2001 on KIF Unit 9 to test it's feasibility and effectiveness in January/May 2002. If successful and installation of NO_XTech is chosen as a portion of the preferred alternative, this installation would become permanent. Installation of NO_XTech systems on Units 5 through 8 would occur at intervals beginning soon thereafter and installation on five units completed prior to May 2004. The approximately fifty day outage per unit would be preceded by two months of pre-outage work. The maximum construction workforce on-site during the outage would be approximately 250.

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 comprises two similar natural gas or propane/steam mixture and ammonia supply grids. One is installed in the superheat side of the boiler convective banks and one is installed in the reheat side.



KINGSTON FOSSIL PLANT

FIGURE 2-3 LOCATION OF FACILITY MODIFICATIONS RELATED TO INSTALLATION OF NOx REDUCTION EQUIPMENT

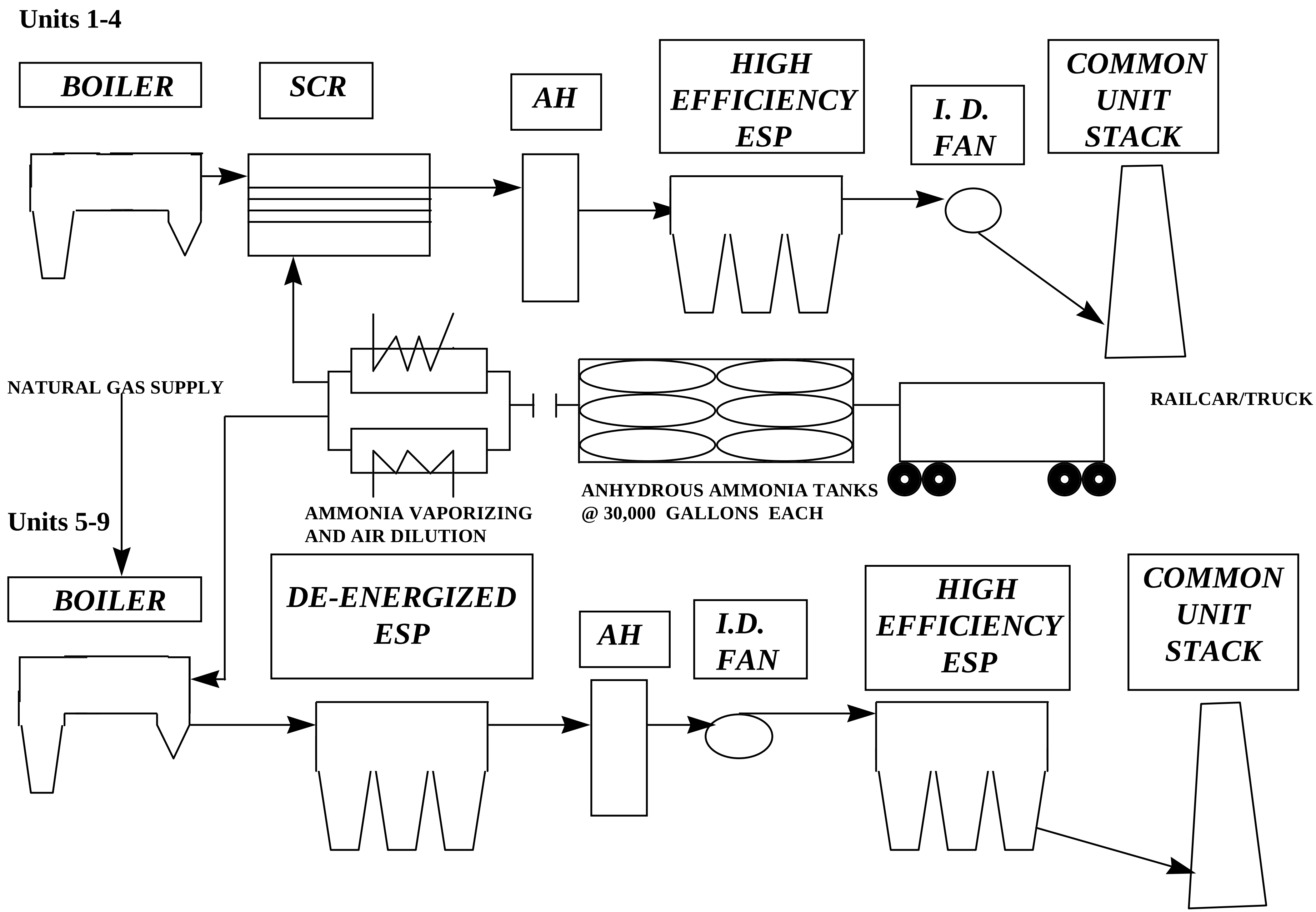


Figure 2-4. Proposed Alternative B - Flue Gas Treatment Trains Incorporating SCRs for Units 1-4 and NO_X Tech for Units 5-9 at Kingston Fossil Plant.

Each of the grids comprises twenty two top-supported lances installed at the entry to the particular NO_XTech injection cavity. Minor support modifications may occur due to design refinements resulting from the initial tests on Unit 9.

Supply lines for natural gas and ammonia would be constructed through the plant structure to the injection points on the boilers. Laydown areas for the NO_XTech system would be in the vicinity to the boilers and within the areas previously disturbed for construction of the existing plant structure. Unlike for the alternative installation of SCRs, there would not be a need for use of the temporary barge unloading area. No temporary buildings are needed for the NO_XTech installation, and as for the SCR installation a few warehouse-type storage buildings would be erected in the area currently occupied along the existing “warehouse row” north of the plant. These warehouses would be consistent in appearance and size with the buildings currently found there.

The SCR installation on Units 1 through 4 would be identical to those described under Action Alternative A.

Project Components Common to the Action Alternatives

<u>Ammonia Storage and Handling System</u>

For either of the two action alternatives an ammonia system capable of serving either the SCR systems or NO_XTech installations would be installed and would consist of an area for rail car and truck parking and unloading (except for special circumstances rail unloading would occur); storage tanks (nominal capacity of 30,000 gallons each); feed pumps; vaporizers and dilution air mixing units; and necessary controls. If an SCR system is installed, three storage tanks would be installed. If the NO_XTech system is installed up to a maximum of six tanks may be required. The NO_XTech system would require an ammonia usage rate approximately twice that of installation of the SCRs. Rail deliveries of ammonia would be proportional. Use of SCRs would require approximately 1-2 railcar deliveries of ammonia per week, whereas NO_XTech/SCR alternative would require approximately 2-3 railcar deliveries per week.

The location of SCR reactors, rail spur, and ammonia storage tanks and unloading area are shown in Figure 2-3. Also included in the system would be the necessary utility supply lines for electrical power, potable water, raw water, instrumentation and controls. These would be routed through and along areas previously highly disturbed for plant construction. 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 rail car or tank truck. The fogging system would combine water with a portion of the anhydrous ammonia vapor (the remainder would off-gas) to form aqueous ammonia liquid. This liquid along with any runoff from the unloading operations area, would be contained within the compacted-earth catch basin surrounding the storage tank and unloading area. This containment is sized for storm water runoff from a 10-year, 24-hour event, one tank's contents and deluge system associated with catastrophic release. Discharge from the containment basin would be sent to the ash pond via a manually-controlled-start pump with automatic low level cutoff or equivalent (and a low level annunciated alarm to protect the pump).

Natural Gas Supply Line

Alternative B (NO_XTech/SCR Installation) would require construction of a new supply line for natural gas. A natural gas pipeline would not be required for Alternative A (high dust installation). For the NO_XTech installation, natural gas is required for direct injection into the boilers.

For Alternative B, TVA would construct, own and operate a six inch line from the existing East Tennessee Natural Gas (ETNG) Company gas supply line located in Harriman, TN to the KIF. A metering station would be located at the tie point with the ETNG supply line. The proposed route segments for the natural gas pipeline are shown in Figure 2-5. The pipeline route is approximately 5.5 miles in total length. Stream crossings are shown in Table 2-1 below. Directional boring technique would be used for crossing the pipeline beneath two water bodies (the Emory River and Swan Creek Embayment). If Alternative B is chosen, pipeline construction would be scheduled to occur from about June through December 2002 and be in service May of 2003. Access road easements will include both temporary and permanent right-of-way (ROW) and will be necessary to provide access to the pipeline during construction and for routine maintenance of the pipeline. Once on the plant site, the pipeline would follow the underground route indicated on Figure 2-3 to a regulating station and on to the NO_XTech injection points on the boilers through the area which underwent extensive ground disturbance during construction of the KIF.

Table 2-1. Kingston Fossil Plant - Natural Gas Pipeline – Listing of Stream Crossings.

	Stream	Method of Crossing
1.	Swan Pond	Directional drill
2.	Unnamed tributary to Swan Pond (near cemetery)	Flume*
2.	Swan Pond (northern crossing)	Flume
3.	Unnamed tributary to Swan Pond	Flume
5.	Unnamed tributary to Emory River	Flume
6.	Emory River	Directional drill
7	Other wet weather conveyances	Dry Stream crossing*

*Note: The flume crossing technique would be used where water is present, where water is not present, the dry stream crossing techniques would be used.

A new meter station is proposed to be constructed immediately adjacent to the North side of an existing ETNG meter station near the proposed pipeline connection point. The station would be rectangular in shape and approximately 35 feet by 75 feet. The area would be cleared, graded level, and covered with crushed stone. An existing access road for the existing ETNG meter station would be utilized from Crowe Road to permit access for maintenance during operation. The road consists of crushed limestone base. The road is wide enough to accommodate only one lane of traffic with turnaround at the terminus. A small building or shelter at the meter station would be constructed to house electronic monitoring and control equipment for instrumentation and flow meters. This meter site facility would also consist of above and underground piping. All aboveground equipment would be enclosed in a chain link fence of suitable

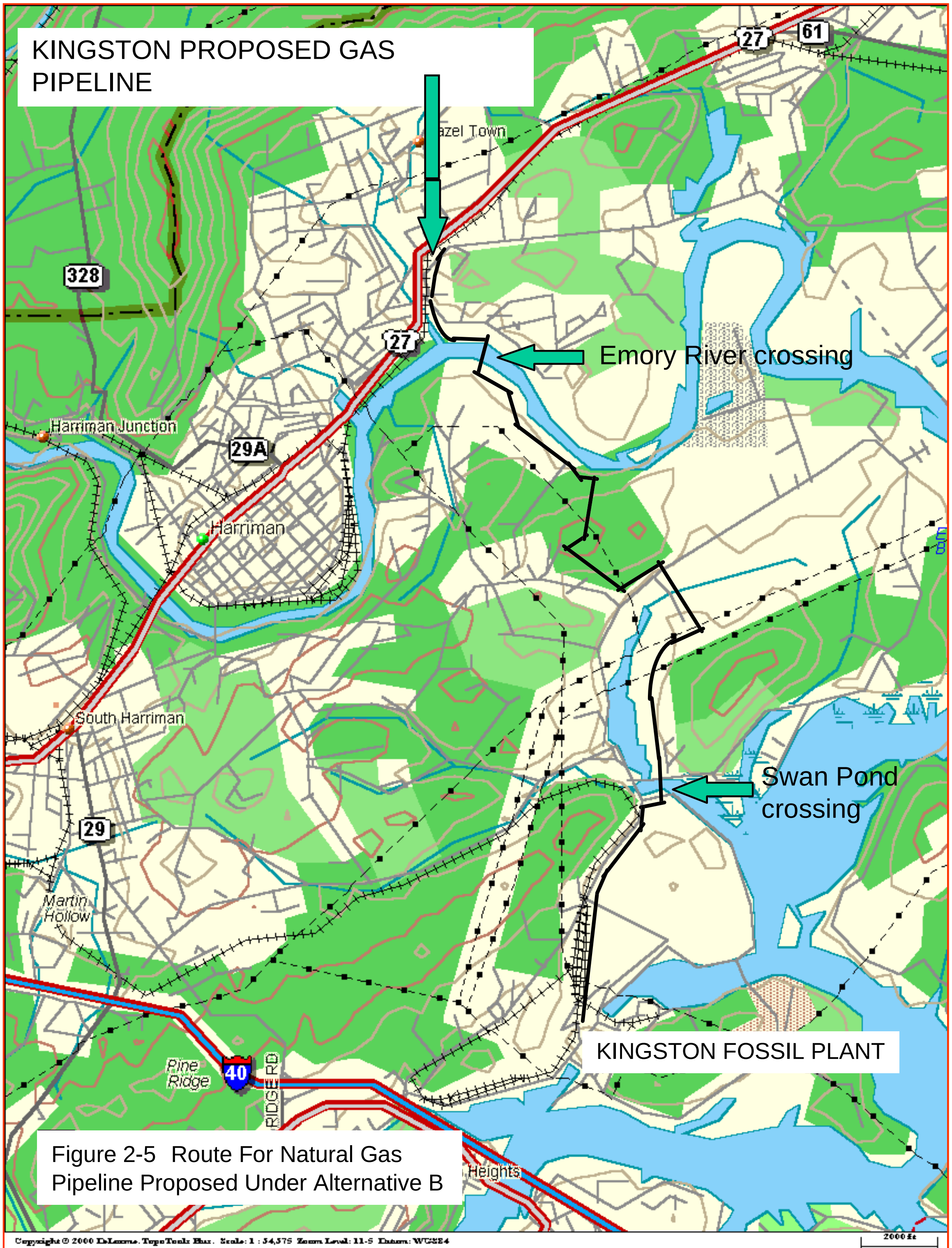


Figure 2-5 Route For Natural Gas Pipeline Proposed Under Alternative B

height to prohibit access by unauthorized personnel, members of the public, or large farm animals/wildlife. Equipment used would meet Department of Transportation (DOT) guidelines and design requirements for metering and transporting natural gas. An existing single pole electrical distribution line to supply power to the meter station is available at the existing ETNG meter station. It is anticipated that an area of less than one acre would be needed, depending on the complexity and number of pipeline connections. However, it is probable that the entire fenced area could be disturbed during site prep and excavation activities, and the impact analysis reflects this assumption.

Mitigation of Potential Impacts to Wastewater and Surface Water from Either Alternative

For Alternatives A (high dust SCRs) or B (NO_XTech/SCR hybrid) the project will include mitigation for management of ammonia entering the wastewater stream and limiting releases of ammonia from the ash pond to levels below those toxic to aquatic organisms (see Surface Water section) and to ensure compliance with National Pollutant Discharge Elimination System (NPDES) permit limits for pH and total suspended solids (TSS). The potential for impacts under either Action Alternative associated with ammonia discharges from the ash pond is exacerbated at KIF because 1) the ash pond discharges directly into the plant intake channel and 2) under some river flow conditions, discharge flows from the plant re-circulate into the intake water for the plant. This situation could potentially cause a build-up of ammonia in ash pond discharge to levels sufficiently high enough to be toxic to aquatic organisms, damage plant equipment or induce algal blooms in the plant intake channel.

Either of two methods of mitigation allow management of the ammonia entering the wastewater stream adequate to protect water resources. TVA will select one or the other of these two methods as part of implementing either action alternative. The first mitigation method that achieves the desired control of ammonia concentrations in ash pond effluent is to reconfigure the ash pond outflow to discharge into the condenser cooling water (CCW) discharge channel upstream of the outfall monitoring point. Reconfiguring of the ash pond discharge would involve pumping and piping of the discharge flow, as shown in Figure 2-3. Along a portion this proposed re-route pipeline a short graveled service road would be constructed from the firing range access road at the base of Pine Ridge to the east end of the intake channel bridge. A power supply line required for the pumps required would be routed along this road and the pipeline (Figure 2-3). Moving of the iron pond discharge would also be required to eliminate the ammoniated source of water to the ash pond. This discharge would be re-routed through the portion of the plant which has previously been heavily disturbed.

Under the alternative option for mitigating potential water wastestream impacts to surface waters, dry ammoniated ash would be deposited in an engineered facility having a clay bottom liner and an ash leachate collection system (LCS). The facility would encompass the 63 acre area now occupied by ash dredge cells (Figure 2-3). Stack development would proceed in 21-acre parcels with each parcel having its own LCS. As the final design elevation of each parcel is achieved, the stack would be capped with one foot of clay having hydraulic conductivity of 10^{-7} cm/s or less, followed by one foot of vegetated topsoil. Ash leachate captured by the LCS would be routed, along with surface runoff from the dry stack, to a lined retention pond bordering the southwestern side of the dry stack (Figure 2-3). Effluent from the retention pond would subsequently be metered into the CCW intake to achieve the desired ammonia dilution (see **Wastewater**).

Alternatives to the Proposed Action

No Action

Under a No Action alternative, no SCR or NO_XTech systems would be installed. A No Action alternative would make it difficult for TVA to meet its system-wide NO_X reduction goal. NO_X emissions from the KIF are meeting year 2000 Title IV NO_X emission limits.

Other Alternatives Not Considered in Detail

Technology Alternatives

Other commercially available technologies described under **Background** can not provide the high NO_X removal rate needed to meet TVA's systemwide 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 given further consideration 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 consistent with 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 TVA's system-wide NO_X reduction goal. 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. In February 2001, TVA formally announced that it is considering restarting Browns Ferry Nuclear Plant (BFN) Unit 1, which has been shut down since the 1980s. A Final Supplemental Environmental Impact Statement for relicensing of the plant and potential restart of Unit 1 was released in March 2002. A decision regarding BFN Unit 1 could come as early as May 2002. Considerable refurbishment would be necessary prior to restarting this unit. Any decision to pursue additional nuclear power generation could have some influence on long-term NO_X reduction strategies but falls beyond the time frame for meeting TVA's system-wide NO_X reduction goal.

TVA has also recently begun a Green Power program. This program provides 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 states. This approach, however, is not expected to satisfy TVA's systemwide NO_X reduction goal.

Use of Urea in Lieu of Anhydrous Ammonia

The use of urea, a solid compound formed from ammonia and carbon dioxide, as a substitute source of ammonia was considered and rejected. Two recently developed commercial processes exist for the on-site production of ammonia from urea. One process dissolves granular urea in demineralized water to make a 40 to 50 percent solution, hydrolyzes the solution and then injects it into a 450^{o}F flashing chamber to obtain a vapor mix of ammonia, carbon dioxide and water. This vapor mix would then be diluted by mixing with air, and injected into the SCR. The other process is similar but utilizes a reactor in place of the hydrolyzer and flashing unit. Operating experience with both these processes is very limited and there have been problems with pluggage of equipment and deposition of carbon. These processes would also result in increased particulate and carbon dioxide emissions due to the carbon in urea, in addition to the ammonia emissions from slip that occur from the unused ammonia in the SCR reactors. The cost of a urea conversion system is about twice the cost of an anhydrous ammonia system and 20 to 40 percent more than an aqueous ammonia system. Because urea is made from ammonia, there is an overall net energy penalty to use the urea conversion system because of the energy required to produce urea and then convert it back to ammonia. For all of these reasons, TVA has determined that the use of urea in lieu of anhydrous ammonia is not feasible at this time. TVA will monitor developments in the use of urea, and may reevaluate its potential use in future NO_X projects.

Comparison of Alternatives

Potential impacts from either of the proposed actions or the no action alternative on terrestrial ecology, wetlands and floodplains, land use, visual aesthetics, noise, archeological and historic resources, groundwater, transportation and socioeconomics would be insignificant. No federally-listed threatened or endangered species would be affected by the action alternatives under consideration.

<u>Air Quality</u>

The proposed actions of either installing and operating SCR systems or the NO_XTech system will have beneficial impacts to regional air quality by reducing the NO_X available in the atmosphere for ozone production and thus 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_2 emissions. 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.

<u>Water Quality and Aquatic Life</u>

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 include a retention basin for spills and emergency water fogging to minimize this risk.

Because of the proposed installation of SCRs into the flue gas stream, there is potential for contamination of fly ash and thus a pathway for ammonia to enter surface waters from the SCR alternative. The hybrid alternative includes NO_XTech installation requires injection of ammonia into the boilers, and SCRs on some units; therefore, a pathway for surface water impacts also exists for ammonia contamination of combustion by-products including fly ash. Water discharged from the fly ash storage pond may contain ammonia. For either action alternative, operational controls, water treatment measures and management of wastewater would maintain discharge ammonia concentrations below levels that would safeguard water quality and protect aquatic life, as well as meet NPDES limits. The method to ensure protection (see **Summary of Environmental Commitments**) would be either to implement re-routing of the ash pond discharge to the CCW discharge, or to initiate dry fly ash stacking with a LCS that would include a collection pond with discharge routed to the CCW. 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 activities associated with either of the action alternatives. 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 be produced under the no-action alternative.

For either of the action alternatives of installing SCRs or a hybrid SCR/NO_XTech system in the flue gas stream, there is potential for contamination of fly ash. No additional solid waste above that resulting from normal operations, would be generated from the coal combustion process at KIF, but the character of combustion solid waste and by-product including fly ash may be changed due to ammonia contamination. If the decision is made to choose dry fly ash stacking for disposal of this material at KIF (see **Summary of Environmental Commitments and Wastewater**), the existing dredge cells would be converted to receive dry fly ash for some period of time before developing a new stacking area. Conversion of the dredge cells or siting of a new dry fly ash stacking area would require a Class II solid waste disposal permit from the State of Tennessee Division of Solid Waste Management.

Bottom ash marketing is not expected to be impacted by the SCR or NO_XTech installation at KIF since the bottom ash is collected in the boiler. For the No Action alternative KIF could continue to handle fly ash by sluicing to the pond and dredging to the dredge cells until capacity in these cells is exhausted. Under the No Action Alternative, bottom ash marketing would continue without being affected.

The catalyst for the SCR system would be vanadium pentoxide. This chemical falls in a unique class of hazardous waste under the Resource Conservation and Recovery Act (RCRA). The classification is as a listed P120 RCRA waste, which refers only to unused product. If it is a used product (spent catalyst), normal special waste rules apply. Any unused product, other than a *de minimis* amount, must be treated as a hazardous waste. There is also some potential that spent catalyst could have an accumulation of heavy metals found in coal combustion flue gas.

TVA has a catalyst management contract with the catalyst vendor. These services would include acceptance and ownership of spent catalyst by the vendor. If the spent catalyst is classified as a hazardous waste, TVA would have responsibility for proper disposal. It is common practice to recycle the catalyst thus minimizing the need for waste disposal. Should TVA become the custodian of any hazardous waste associated with the catalyst, a qualified hazardous waste disposal facility would be used for ultimate disposal.

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 hazard to plant workers, or for more extensive releases, the public. 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. The occurrence of a major earthquake which could result in complete tank failure and failure of the water fogging system is also very unlikely. To minimize the risk from the impact of an earthquake, 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 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. The SCR systems shall not be routinely operated with an ammonia slip exceeding 2 ppm. Brief system process excursions or process upsets would be an exception to this limit.
4. 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.
5. Seismic hazards to the SCR 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) and the 1997 National Earthquake Hazards Reduction program.
6. To achieve the desired control of ammonia concentrations in ash pond effluent either a) the ash pond outflow will be reconfigured to discharge into the CCW channel upstream of the outfall monitoring point, or b) dry stacking of fly ash would be implemented.
7. The discharge from the chemical pond will be managed (e.g., staged) such that the assimilative capacity of the receiving stream or pond will not be overwhelmed.

8. If the dry fly ash stacking option is implemented for managing ammonia contaminated ash, the stacking area would be configured in compliance with the state Class II Solid Waste permit.
9. The total area designated for dry stacking is approximately 63 acres. Stack areas will be developed in approximately 21-acre parcels with each parcel having its own leachate collection system.
10. Ash leachate captured by the LCS will be routed, along with surface runoff from the dry stack to a retention pond bordering the southwestern side of the dry stack. The retention pond will be lined with either a geomembrane or compacted clay. Effluent from the retention pond will subsequently be metered into the CCW to achieve the desired ammonia concentrations stipulated in the Wastewater section of the Environmental Assessment.
11. No more than 10 acres of dry ash will be exposed at any time during the stacking period. The ash stack will ultimately be capped with one foot of clay having hydraulic conductivity of 10^{-7} cm/s or less, followed by one foot of vegetated topsoil.
12. Catalyst disposal will be managed by a catalyst contractor in compliance with applicable regulations.
13. A water fogging system with both automatic and manual activation will be installed at the ammonia storage and unloading facility to limit the hazard from large ammonia leaks or catastrophic tank failure.
14. Drainage around the proposed ammonia unloading and storage facility would be re-configured to sufficiently contain the aqueous ammonia generated by operation of the fogging system within a basin of compacted *in situ* earth at least 1 foot in depth.
15. The containment area around the ammonia facilities will be periodically drained of excess precipitation as necessary to retain adequate storage capacity. If rainwater is thought to be contaminated it will be tested prior to drainage/disposal and managed appropriately.
16. During construction, areas subjected to soil disturbance and/or vegetation removal will be replanted and/or re-seeded with native plant species as soon as possible.
17. Appropriate best management practices (BMPs) for erosion control and stabilization of disturbed areas will be utilized and all construction activities will be conducted in a manner to ensure that waste materials are contained and that introduction of polluting materials into receiving waters are minimized.
18. For construction of the natural gas pipeline (if implemented) TVA will implement the BMPs outlined in TVA's guidelines for construction of natural gas pipelines (TVA 2000).

Environmental Permits

The new or modified environmental permits for the proposed project are listed in Table 2-2.

Table 2-2. Required New or Modified Environmental Permits.

Permits
Modification to Tennessee NPDES permit TN 0005452 for outfalls DSN-001 and DSN-002 as required
No modification to air permits required; reflect SCR or NO_XTech installation in subsequent operating permit renewals
NPDES General Permit for discharge of stormwater from construction activity may be required depending on acreage disturbed
Conversion of the dredge cells or siting of a new dry fly ash stacking area would require a Class II solid waste disposal permit from the State of Tennessee Division of Solid Waste Management.