CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. The Proposed Action

The addition of an FGD (scrubber) system on Unit 3 at PAF involves the construction of several subsystems and integration of these subsystems into plant operations and connection to various utilities that support their operation. Most of the plant and its operation would remain the same after the new scrubber is in place. Higher-sulfur coal would likely be burned in Unit 3, which could also mean changes in ash and heat content of the coal. The scrubber would be placed in service downstream of the current ESPs and include a new stack.

The project is intended to reduce SO_2 emissions by at least 95 percent at full load conditions. Unit 3 at PAF consists of a single-furnace, once-through, balanced-draft, cyclone-fired boiler, with a maximum capacity of 1,056 MW gross. The boiler was manufactured by Babcock & Wilcox. The unit has three forced draft fans feeding a two-gas pass/one-air pass tubular air heater manufactured by Babcock & Wilcox. The unit is a base load unit and is equipped with an SCR system and precipitator. The four existing induced draft fans and drives were upgraded when the SCR was added. The SCR operates in the "ozone season" which extends from May 1 through September 30. The assessment of ammonia slip on water quality is a conservative one based upon year-round operation of the SCR.

The FGD system would be constructed in such a way as to allow flue gases leaving the ESPs to bypass the scrubber. This feature would enable generation of power to continue in the event of a scrubber malfunction that required shutdown of the scrubber. A scrubber bypass would allow repairs to be made on scrubber system components without a unit outage.

Since discussions with the state have not been completed, it is not possible to say with certainty how and under what conditions scrubber bypass would be allowed. However, the bypass could be accomplished by routing flue gases around the scrubber to either the new stack or the current stack. Several options are being evaluated from both economic and environmental points of view. Among the criteria being used to compare options are the revenue penalty (i.e., estimated cost of replacement power) if Unit 3 must be shut down unexpectedly, the probability of forced outages occurring, the cost of constructing dampers and duct work, the cost and location of emissions analyzers, and the SO_2 and NO_x allowances which would be consumed while operating at the higher emission rates. Based on preliminary results, the preferred method for bypassing the scrubber would be to place dampers in the flow stream downstream of the precipitators to isolate the scrubbers and thereby divert the effluent to the old stack, as is currently done.

The proposed Unit 3 wet LSFO FGD system (Appendix A, Figure A-1) would consist of one or two absorbers, a system which receives bulk limestone and prepares a limestone slurry for use in the absorber, a gas handling system that would transport flue gas from the existing precipitators, the new stack, and a new gypsum handling system. These facilities are supported by a myriad of pumps, fans, utilities, ductwork, piping, and control systems.

Following is a brief description of the major components and systems of the proposed scrubber and its operational aspects.

2.1.1. The Absorber

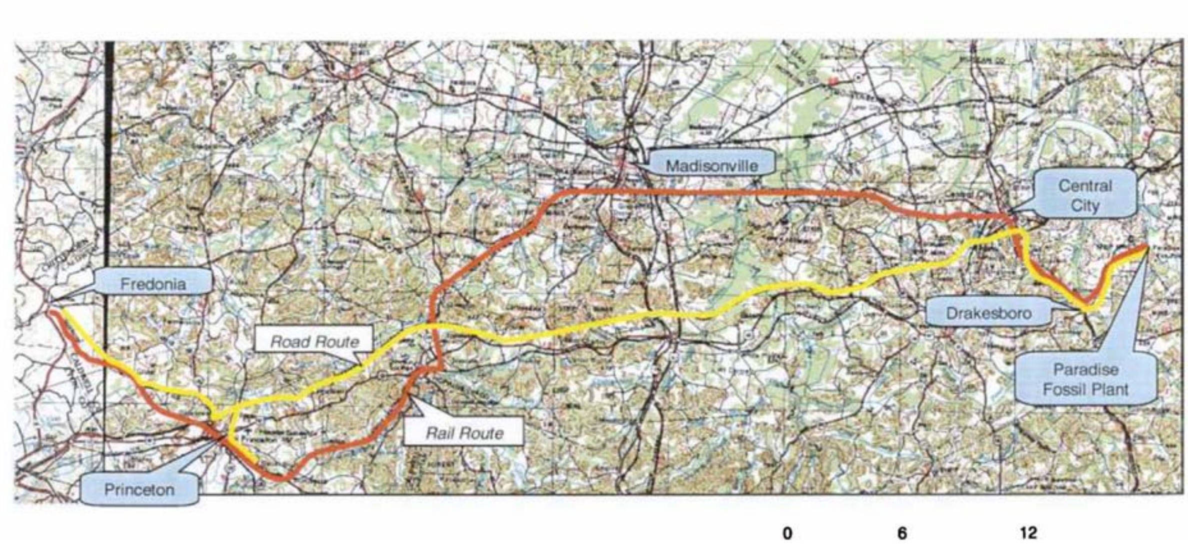
The typical absorber (Appendix A, Figure A-2) consists of a limestone slurry/flue gas contact area and mist eliminators. A single absorber, using typical vendor data, could be 150 feet tall and 84 feet in diameter and hold nearly 15,000,000 gallons (although never filled to this level). The absorber, by far, dwarfs all other tanks used in connection with scrubbing. Limestone slurry occupies the lower portion of the absorber (sometimes called the reaction tank). It is kept in motion by mechanical agitators and the agitation caused by injection of oxidation air. The oxidation air, which is sparged or blown into the absorber liquid, converts the dissolved calcium sulfite to calcium sulfate (gypsum). As the gypsum crystallizes, the heavier particles sink to the bottom of the tank where the concentration reaches about 15 to 30 percent; a bleed stream is extracted to maintain equilibrium, which is pumped to the gypsum stack. The absorber would be designed for the introduction of flue gas above the level of the slurry liquid where it passes through one or more layers of slurry sprays. The treated flue gas then passes through mist eliminators, then to the stack. The stack height would be determined by Good Engineering Practice standards, regulatory requirements, computer dispersion modeling using United States Environmental Protection Agency- (USEPA) approved Industrial Source Complex 3 (ISCST3) model, and computer and/or physical flow modeling. Booster fans would be added to maintain the necessary flow through the absorber.

2.1.2. The Limestone Reagent Preparation System

This system consists of the equipment used to receive, store, and process the limestone, resulting in the limestone slurry used in scrubbing. Process water and crushed limestone are fed to a ball mill. A propylene glycol based antifreeze solution may be added to the limestone and/or conveying system when moisture content and extremely cold conditions warrant. However, because of procedural and structural enhancements in the limestone handling system, not more than 50 gallons of antifreeze is expected to be used during any 24-hour period and not more than 2 days at a time. This use results in insignificant concentrations of propylene glycol entering the FGD and subsequently the fly ash pond systems. The resulting slurry is sent to a holding tank, where it is pumped to a hydro cyclone classifier, where unacceptably large limestone particles are recycled to the ball mill. The slurry enters product tanks, where it is held for pumping to the absorber. The grinding would be accomplished by one or more additional ball mills. Site preparation for the limestone handling facility or other portions of the FGD system may require obtaining borrow material or spoiling of excess soil material. Borrowing and spoiling would be conducted only from or on existing on-site areas at PAF previously identified and used for those purposes. Borrow is available from materials previously spoiled from the intake embayment and placed near the existing dredge cell at PAF. A spoiling area is available where construction debris from the earlier completed project for installation of SCR equipment at PAF was placed.

2.1.3. Limestone Purchase and Transport

Limestone would be purchased from one or more quarries located in the vicinity. Since TVA's purchase of limestone for PAF constitutes only a small fraction (less than 5 percent) of the total limestone production capacity of existing quarries in the vicinity, and since multiple uses of limestone are present in the general area, the demand for this commodity is fungible, and TVA's purchase of limestone for Unit 3 would likely not result in the mining of additional areas. The exact source of limestone is not known since limestone purchases are competitively bid. A new Request for Proposals (RFP) for limestone would not be released until 2005-2006 to replace/extend the current contract which supplies the Units 1 and 2 scrubbers. Using the best information available at this time, TVA has evaluated the impacts of transporting (Figure 2-1) limestone along representative delivery routes in the vicinity of the plant. This evaluation identifies the potential range and types of possible impacts that are likely to occur. The transportation analysis assesses the impacts of the total tonnage received for use by all three units and the incremental impact caused by the addition of the Unit 3 scrubber. This approach has allowed cumulative along with incremental impacts to be defined.



Note: Example is for bounding range and types of possible impacts (see text Section 2.1.3).

Figure 2-1. Representative Routes for Moving Limestone to Paradise Fossil Plant by Rail and Truck

Limestone deliveries to the plant are expected to more than double because of the addition of the Unit 3 scrubber. TVA is currently purchasing up to 330,000 tons of limestone per year for Units 1 and 2. TVA could need up to 410,000 additional tons of limestone per year for Unit 3, for a total of as much as 740,000 tons/year for the plant.

Although rail delivery is not currently possible (see Section 2.1.4 below), TVA will entertain proposals including the options of delivering either by rail or by truck. PAF is not equipped to handle limestone deliveries by barge (and there are no plans to construct such facilities). For the purposes of the transportation impacts analysis, in order to bound the range and types of possible impacts, purchase and delivery of limestone was evaluated for representative routes originating from large quarries within about 75 miles of the plant. Primary truck routes evaluated were from the vicinity of Princeton, Kentucky, to the plant along the Western Kentucky Parkway (Parkway) to Central City, U.S. Highway 431/70 to

Drakesboro, and the access road to the plant and the length of highway from Fredonia, Kentucky, along U.S. Highway 641 to the Parkway, then to PAF as noted for the route from Princeton.

Rail delivery from quarries in the vicinity would likely involve the Paducah and Louisville Railroad. The rail route from Princeton to PAF passes through Cedar Bluff, Scottsburg, Claxton, Dawson Springs, Charleston, Richland, Madisonville, Sandy, to Central City. In Central City, the train would change over to the CSX system for the remainder of the trip, passing through Cleaton and Drakesboro. The rail between Fredonia and Princeton is owned by Fredonia Valley Railroad, a short-line railroad that leads to the P&L Railroad in Princeton. The railroad passes through Crider, White Sulphur, and Crowton on its way to Princeton, about 10 miles to the southeast. From Princeton on to PAF, the route would be the same as above.

The transportation impacts analysis for this activity reflects both rail and road deliveries of limestone. Assuming 25 tons per truck and 410,000 tons/year usage, the impacts assessment addresses the incremental impacts of approximately 45 trucks per day. Since deliveries would likely occur only on weekdays (during the day shift), a conservative estimate has been 63 trucks making round trips per day. This would be in addition to the current deliveries for Units 1 and 2, which are calculated similarly. For rail delivery, assuming 100 tons per rail car, approximately 16 cars would arrive at the plant each weekday. Actual rail deliveries are likely to involve a larger number of cars, as many as 100 cars for a single-unit train, so a train transporting limestone would typically arrive at the plant about once per week. Limestone handling facilities are typically operated 24 hours per day, 7 days per week, but activities outside the day shift, weekday scenario would be on an emergency basis only.

Modifications to the PAF rail delivery system would be needed to reestablish safe and reliable use for this project. The scope of these modifications is expected to be minor based on their approximate dollar value, as noted below:

Shipments originating on the CSX require the following necessary physical changes:

- Track upgrades from Madisonville to Drakesboro
- Track upgrades from Drakesboro to PAF
- Equipment to dump, locomotive or use railroad power

Shipments originating on the P&L require the following necessary physical changes:

- Track rights agreement between the CSX & P&L
- Track upgrades from Central City to Drakesboro
- Track upgrades from Drakesboro to PAF
- Equipment to dump, locomotive or use railroad power

2.1.4. On-Site Rail Refurbishment

The rail facilities located on the PAF reservation are presently unsuitable for receiving limestone deliveries by rail. The plant track leading to the proposed on-site limestone unloading facility has suffered deterioration due to poor drainage in the immediate area. Modifications to the rail facilities on the plant would be necessary before limestone could be delivered by rail. These upgrades involve roadbed, crosstie and rail upgrades, road/rail intersection improvements, upgrades to signaling equipment, some rebuilding of the existing subgrade rail bed over and along the existing track alignment and a short rail section near the new limestone handling equipment. No new areas would be disturbed; no new access would need to be developed, and changes to drainage would occur only in the area of the existing track roadbed. Approximately 3,000 feet of the track would need refurbishment.

2.1.5. Gypsum Slurry Storage and Transfer System

Because of the higher quality of the gypsum expected from Unit 3 (since it would not contain appreciable fly ash), the gypsum stream would be piped and stacked separately to facilitate marketing. Gypsum slurry from the absorber would be pumped or gravity fed through piping to a holding tank and then pumped or gravity fed to the gypsum stack. Typically, the solids' content is 15 to 30 percent.

TVA estimates the gypsum volume for using a 5.0 lb SO_2/MBtu coal in Unit 3 is approximately 450,000 cubic yards annually. Optional routes for the gypsum slurry lines are shown in Figures 2-2 and 2-3. Adding this quantity once the scrubber is operational in 2006 would cause the available storage pond area to decrease at a faster rate. Despite the increased gypsum generating rate, TVA predicts that existing rim ditch stacks would accommodate the additional gypsum for 14 years (assuming none is marketed), or until about 2020.

Since the gypsum from Unit 3 would be of higher quality and more marketable than the gypsum from Units 1 and 2, it would be stored in a separate portion of the rim ditch stack to preserve and facilitate its marketability. This would mean making a few minor changes in the way the rim ditch stack is now operated, but no new land would be involved.

At this time, no marketing plans or markets have been established for the sale of the gypsum from Unit 3; consequently, the impacts of transporting the material from PAF to the point of delivery are not evaluated in this EA. In the interim, TVA is making provisions in concept design for various gypsum handling and transfer equipment to enable it to be transported from the site via barge. However, none of these facilities would be constructed as part of the currently proposed project. If and when these markets materialize, or if a production facility is constructed on or near the TVA reservation, an appropriate environmental review would be performed.

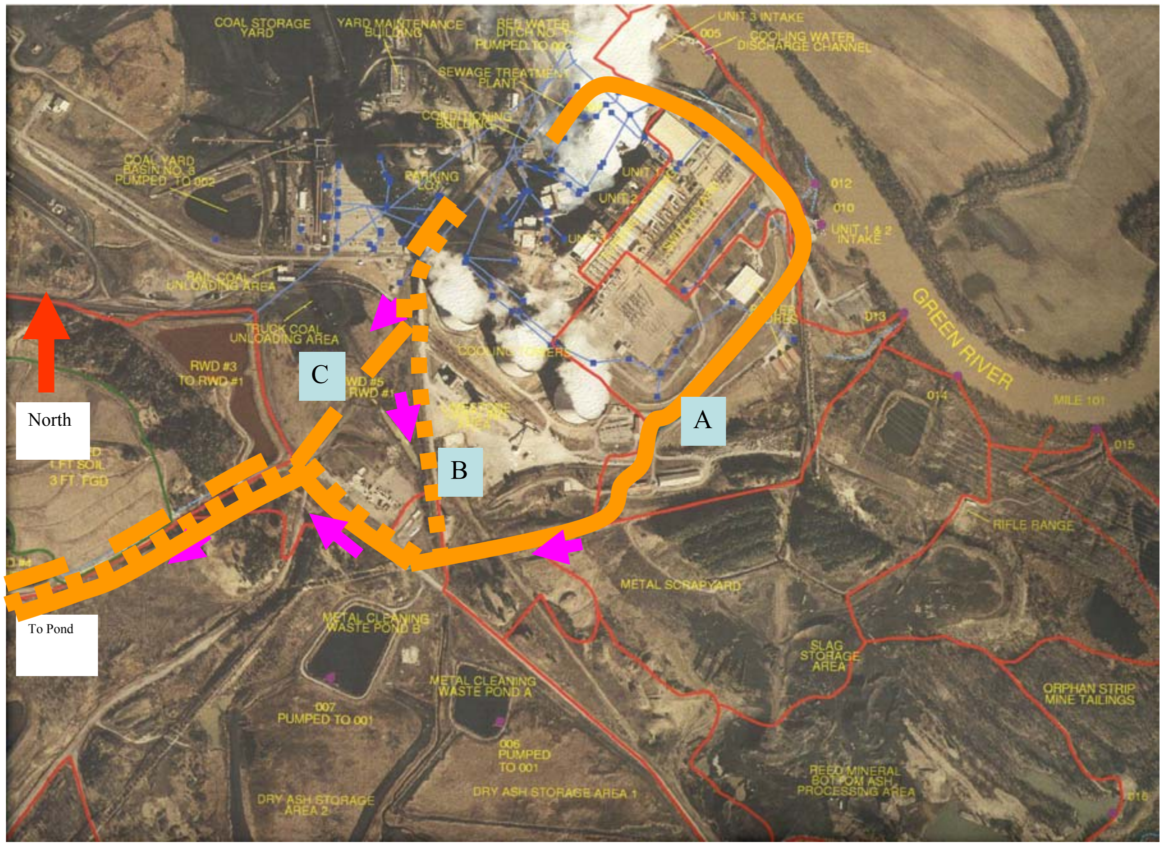


Figure 2-2. Gypsum Sluice Lines Near the Plant

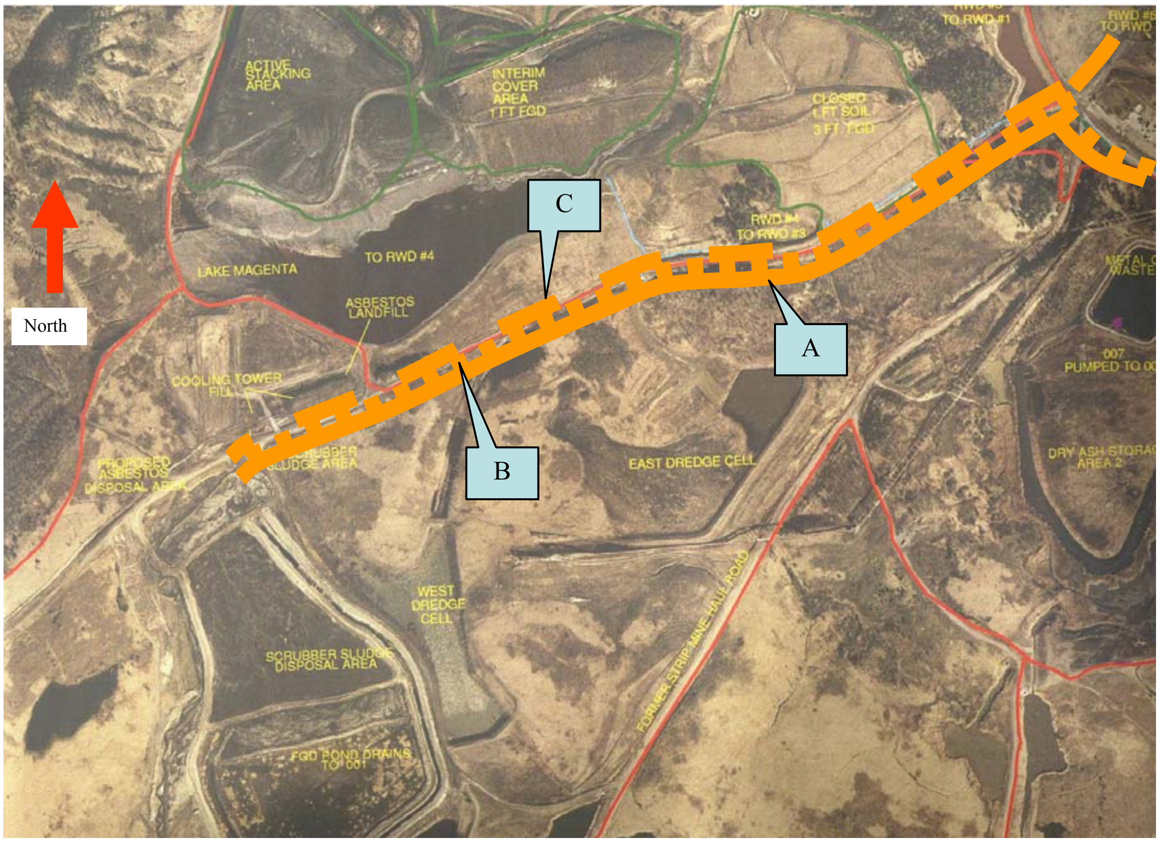


Figure 2-3. Gypsum Sluice Lines to Pond A

2.1.6. Utility Connections and Laydown Areas

The color-coded drawing in Figure 2-4 shows alternative utility connections for power, water supply, and gypsum sluicing. Probable equipment laydown areas are shown in Appendix A (Figure A-3). Typically, laydown areas are nearby and are not currently used for other plant functions but have been cleared and/or previously disturbed by industrial activities.

Water supply is expected to be obtained from the Green River, either directly or indirectly, through use of water sources that would have flowed back into the river. The following seven water source alternatives will be evaluated:

- Option 1 - New pumps at Units 1 and 2 intakes for both process water and cooling water.
- Option 2 - Upgrade the cooling tower make-up pumps that pump from the Units 1 and 2 discharge area, or install new pumps that pump from this source.
- Option 3A and 3B - Split the source of process and cooling water. Option 3A would do a small upgrade of the cooling tower make-up pumps as done in Option 2 for supplying process water. Option 3B would upgrade the Unit 3 auxiliary cooling water pumps to supply cooling water needs or would install new 1,000 gallons per minute (gpm) pumps.
- Option 4 - Upgrade the Unit 3 auxiliary cooling water pumps to supply both process and cooling water.
- Option 5 - Install new intake pumping station at the Unit 1 and 2 outfall area.
- Option 6 - Install new pumps at the bottom ash pond stilling pumps location.
- Option 7 - Utilize the existing Unit 1 and 2 fly ash pumps.

Estimates of the volume of water needed for process and equipment-cooling needs are presented below.

Options 1, 3B, and 4 involve modifications or additions to the intake pumping station that is utilized to serve the needs of Units 1 and 2 (located northeast of the plant near the tugboat dock). Options 2, 3A, and 5 utilize water that is discharged from Units 1 and 2 (located directly north of the plant). Option 6 involves pump additions to the bottom ash water stilling pump area. All of the area affected by the proposed routes has been previously disturbed by industrial activities.

Power for operating scrubber fans, pumps, and other equipment would be supplied by new 161-kilovolt (kV) feed and new transformers. The routes for both Alternatives A and B (blue lines) would proceed southeast along the cooling towers. At a point near where the road turns, the lines diverge taking slightly different routes to the switchyard, passing beneath existing power lines. All of the affected switchyard areas and routes have been previously disturbed by industrial activities.

The approximate switchyard termination points for both alternative routes are shown in Figure 2-4. Two connection options within the switchyard were considered. Option 1 would involve connections in Switchyard Bays 20 and 23, and Option 2 would connect in Bays 20 and 27. The 161-kV structures would be of double-circuit or single-circuit design. Structures for line segments passing beneath existing transmission lines would likely be of double-circuit design and slightly shorter.

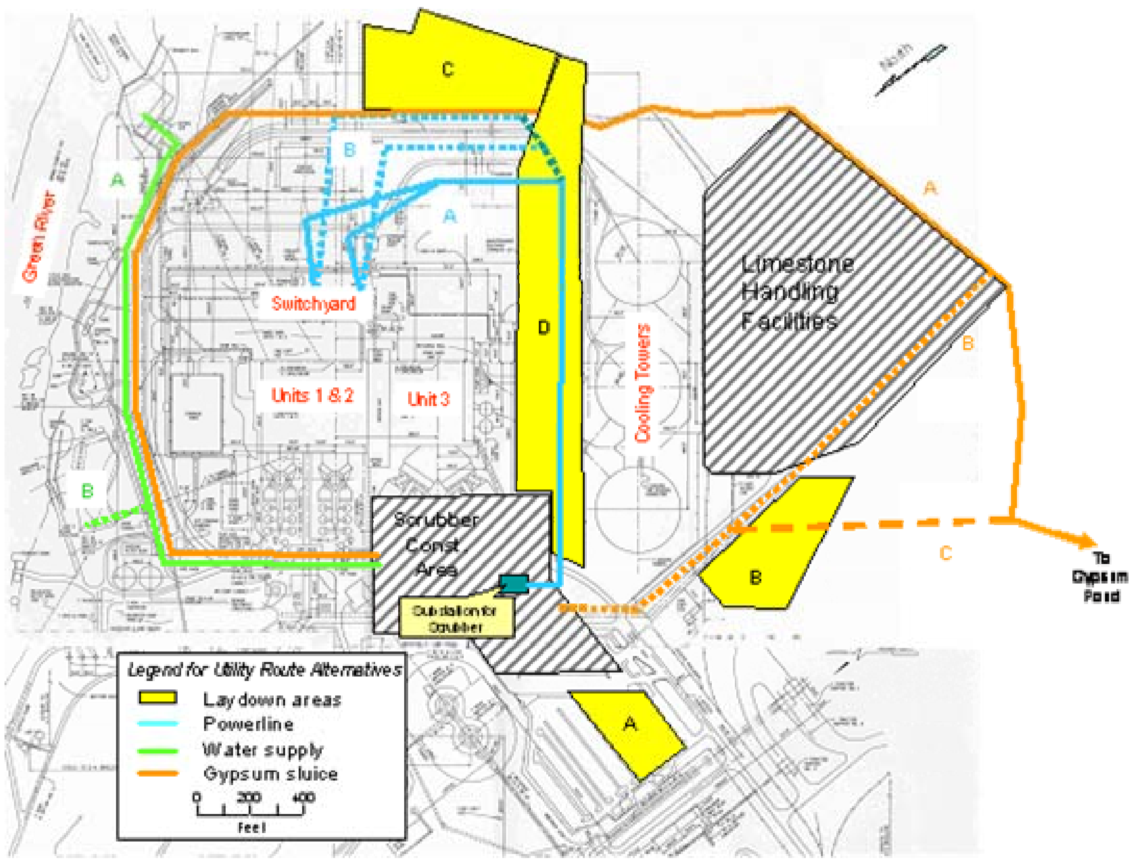


Figure 2-4. Scrubber Utility Route Alternatives

Gypsum sluice pipelines would convey the Unit 3 absorber bleed to a slurry discharge tank for discharge to the existing scrubber gypsum byproduct disposal area located about 2 miles to the southwest of the plant. It is expected that the new pipeline would coincide where possible with the existing gypsum pipelines for Units 1 and 2, which consist of three 12-inch pipes (of which only two are in use at any one time). The existing pipes originate at the "Gypsum Ponding Pumping Station" located just north of the Unit 1 scrubber. From that point, the three pipes proceed above ground southeasterly, then southerly, turning southwesterly along the cooling water flume and eventually reach a road marked "County Road" on the Spill Prevention Control and Countermeasures map. The three pipes follow this road for about 1,200 feet before turning southwest for the remaining segment to the disposal area. The pipe rack goes beneath several roads but rests on top of the ground for the vast majority of its length.

Alternative Gypsum Sluice Line A assumes that the bleed from Unit 3 would be piped to the same Gypsum Ponding Pumping Station used for Units 1 and 2. For this alternative, new pipes (probably two 12-inch pipes or one 18- to 24-inch pipe) would be constructed immediately adjacent to the existing pipe rack for the entire distance to the disposal area. Alternative A is marked with a solid orange line on Figure 2-2. Alternative B assumes a new gypsum slurry holding tank would be constructed near Unit 3 to serve only Unit 3. In this case, the route to the existing pipe rack would be southerly along an existing road bordering the limestone handling area. The existing fly ash sluice pipes from all three units are along this road, and any new gypsum lines in this area would probably be constructed adjacent to the fly ash lines. Alternative B from Unit 3 to the point where it intersects the existing gypsum sluice pipes is marked with a dashed orange line in Figure 2-3 (short dashes). Alternative C is a variation of Alternative B, but involves a shorter pipe run (approximately 1,500 feet shorter) to its point of intersection with the common line. Alternative C would be constructed along a dirt road passing southwesterly along the western side of the Red Water Ditch # 5, diverging from Alternative B at about the existing limestone handling area (orange line, long dashes). Alternatives A, B, and C are one-and-the-same from the point at which they converge to the disposal area. All three alternative routes have been previously disturbed by industrial activities.

2.1.7. Power Consumption

Unit 3 would continue to produce about the same amount of gross power as it does now. However, the new scrubber would be a power consumer. Table 2-1 provides an approximate breakdown of the power consumed by various scrubber system components.

Table 2-1. Projected Power Consumption

Parameter	Number	Value Each (kWh)	Value Total (kWh)
Booster Fans	4	1,140	4,560
Recycle Pumps	10	740	7,400
Oxidation Blowers	2	460	920
Limestone Grinding (Ball Mill)	1	1,230	1,230
Agitators	3	400	1,200
Total			**15,310**

kWh – kilowatt-hour

2.1.8. Water Intake and Usage

Both process and equipment cooling water would be needed by the proposed scrubbing system. Available vendor projections are presented below. Generally, vendors supplied projections of process water demand but not on the quantities needed for equipment cooling. Some process water is recycled at various points, but equipment-cooling water is generally released to floor and ground drainage collection sumps after use and not recycled. Process water demand for the Unit 3 scrubber ranged from 2,617 to 3,010 gpm. Cooling water demand is expected to be 1,000 gpm. A typical scrubber balance is presented in Table 2-2 below. These estimates should be considered illustrative only, since they are based on preliminary design data.

Table 2-2. Scrubber Water Balance

	Parameter	Flow (lb/hr)	Flow (gpm)
Inlet			
	Absorber make-up	720,300	1,439
	Mist Eliminator Wash	88,200	177
	Wet-dry Interface Wash	9,500	19
	ARS Sparger Wash	7,300	15
	Limestone Grinding	204,800	409
		1,030,100	**2,059**
Outlet			
	Evaporation	685,100	1,369
	Carryover	900	2
	Bleed	317,300	634
	Gypsum Crystals	26,786	54
Total		**1,030,100***	**2,059**

lb/hr - pounds/hour
gpm – gallons per minute
*Total rounded

Suitable equipment, as explained above under “Utility Connections and Laydown Areas” would provide this water. The impacts of modifying the existing intake facilities and the new lines that would supply the Unit 3 scrubber are evaluated in this EA. Likewise, the impacts of withdrawing an additional 4,000 gpm from the Green River are evaluated. The Wastewater Flow Schematic for PAF indicates 2,192 gpm now being used by the Units 1 and 2 scrubbers; thus, the 4,000-gpm estimate for Unit 3 is probably conservative and should account for both scrubber systems’ use and equipment cooling.

Cooling water (which represents about one-fourth of the total demand and is ideally of lower temperature than the water used for process purposes) may be obtained as a slipstream of the process supply or from a closed-loop system that serves just the equipment associated with the Unit 3 scrubber. The slipstream would need to be chilled before being used to cool equipment. The closed-loop approach may involve use of chemicals to prevent corrosion, scaling, etc.

It is possible that a new intake pipe and/or new pump may be needed to supply the Unit 3 water needs. For temporary construction use, a new road, approximately 400 feet in length and 12 feet wide, would need to be constructed through the previously disturbed plant area to the intake area. Some "in-stream" construction activity could be needed to place structures or to create room for new structures. Work in the water/land interface would be likely conducted during summer when water levels in the Green River are lowest. Best Management and Best Engineering Practices, such as use of silt curtains or a cofferdam, would be used to limit sediment migration from the construction area.

2.1.9. Staffing and Workforce Management

The plots below (Figures 2-5 and 2-6) show preliminary construction staffing projected in vendor proposals. The projections initially appear to be somewhat different, but the total on-site efforts are quite similar, with Vendor A yielding a total of 4,771 person-months, as opposed to 4,243 for Vendor B. The peak number of workers on site in any one month range from 265 to 292, reflecting differences in work scheduling and construction philosophy of the two firms. These estimates do not reflect work done by TVA on those project elements for which TVA is responsible, such as power lines to the scrubber substation. Outages that coincide with the construction schedule would involve additional personnel coming to the site. The impacts analyses in this EA assume another 100 people would be visiting the site during these outages. A conservative peak estimate for workers on site at any one time during the scrubber project is 815—400 for scrubber construction (all day shift), 315 permanent plant staff (day shift), plus an additional 100 people for a plant outage that could occur during a peak month. Approximately 54 permanent staff members are employed on the night shift at PAF, and 39 on midnight shift. However, most work on the scrubber is scheduled to occur during an 8-hour day shift, 5 days per week (except when the plant must be taken offline to integrate the scrubber system into the plant, in which case, work would be conducted 7 days/week), thereby avoiding overlap with these periods.

Operations personnel added to the site following construction were also projected by vendors. Several of the proposals suggested sharing some types of staff with the staff currently operating Units 1 and 2 scrubbers, namely supervisors and engineers. However, approximately 10 to 15 new day shift operating and maintenance positions could be added as a result of the Unit 3 scrubber, predominantly operators, mechanics, and electricians. A smaller number of positions could be added to other shifts, depending upon need.

2.2. Alternatives to the Proposed Action

Commercially available technologies were initially considered for application at PAF. Compatibility with existing operating and maintenance systems at the plant and the fact that no new types of byproducts or wastes would be introduced at the site were the major considerations resulting in selection of wet limestone scrubbing as the proposed application at PAF. No other FGD system was a possible candidate for proposed installation at PAF.

No Action

Under a No Action Alternative, no FGD or other system for SO_2 reduction from PAF Unit 3 would be installed. A No Action Alternative would not meet TVA's goal to reduce SO_2 emissions from PAF. The No Action Alternative for PAF would likely result in the need to reduce SO_2 emissions from other TVA fossil plants or require purchase of additional pollution credit allowances.

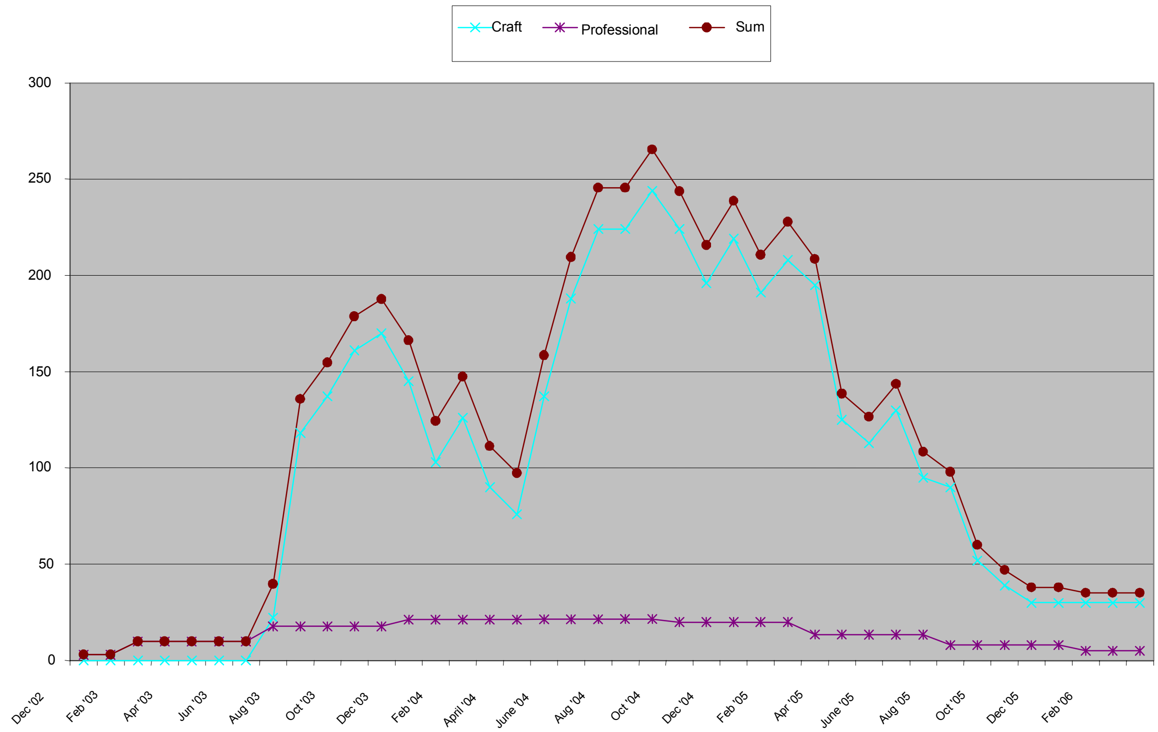


Figure 2-5. Vendor A On-Site Manpower Projections

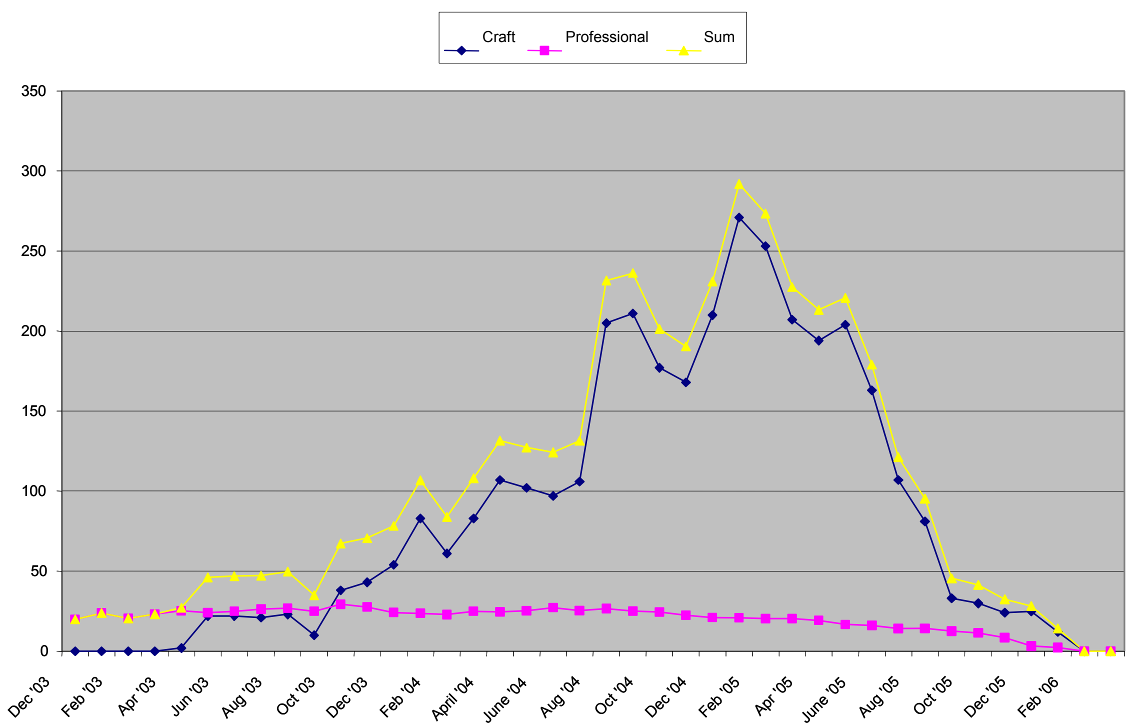


Figure 2-6. Vendor B On-Site Manpower Projections

2.3. Comparison of Alternatives

The FGD system for Unit 3 would be an addition to an expansive, heavy industrial facility having a significant property buffer, located in an area that has been heavily disturbed by previous plant development activities. No new facilities would be required to unload equipment transported to the site. Therefore, the potential would be small for on-site construction impacts to terrestrial ecology, aquatic ecology, noise, land use, air quality, visual aesthetics, and archaeological and historic resources. Operational impacts are primarily dependent upon the engineering features and safeguards included in the design of the FGD system and the environmental commitments. These features and safeguards would minimize the probability and extent of release of pollutants to the environment.

A decision not to build an FGD or other SO_2 reduction system would result in no new environmental impacts. Table 2-3 provides a summary and comparison of the impacts of the proposed Action Alternative and the No Action Alternative, by resource area, including commitments.

Table 2-3. Summary and Comparison of Alternatives By Resource Area

Issue Area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative With Commitments
Air Quality	• Continuation of current air emissions from the plant; no additional impacts.	• Insignificant, transient air pollutant emissions from construction-related activities including land clearing, site preparation, and vehicular traffic. • Operational impacts due to emissions of SO_2, PM, and NO_x. SO_2 would be reduced by the FGD by 95 percent.
Vegetation and Wildlife	• None to vegetation. • Insignificant direct impacts to wildlife.	• No significant, adverse impacts to terrestrial ecology of state or region. • Impacts to terrestrial animals would be insignificant. Minor beneficial effects to terrestrial animals both locally and regionally could result from air quality improvements.
Protected and Sensitive Species	• None to plants or aquatic animals. • Insignificant indirect or cumulative impacts to protected terrestrial animals would persist.	• No federal-protected or sensitive plants or animals are present. No impacts to federal- or state-protected species. • No adverse impacts to state-listed terrestrial animals are expected. Minor benefits may result from air quality improvements. • No direct impacts on sensitive or federal- or state-protected aquatic animals or their habitats.

Table 2-3. Summary and Comparison of Alternatives By Resource Area

Issue Area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative With Commitments
Wetlands and Floodplains	• Insignificant	• Approximately 2.2 acres of wetlands previously degraded by mining activities may be impacted. If a USACE permit/state water quality certification is required, TVA must comply with mitigation requirements. Impacts would be insignificant. • TVA would implement a road configuration that minimizes impacts to the small remaining scrub-shrub headwater wetland area. • Minor floodplain impacts from possible construction of an underground water line. New pumps/electrical equipment must be elevated above or flood proofed to the 500-year flood elevation 404.9.
Visual Aesthetics and Noise	• None	• Visual aesthetic impacts at the plant site would be insignificant. Visual discord of construction activities would be temporary and minor. • Visual aesthetic impacts along truck delivery routes would have moderately low adverse impacts from originating sources to the Parkway. • Visual aesthetic impacts along rail delivery routes would be minimal. • Noise impacts from construction and operation would be minimal and insignificant.
Cultural Resources	• None	• No archaeological or historic resources would be affected by the construction of the FGD and associated facilities. • Selection of at least one potential route for truck delivery of limestone would involve coordination with the Kentucky State Historic Preservation Officer and possible mitigation. See Section 2.4.
Coal Combustion Byproduct Generation, Handling, and Disposal	• None	• The effects of disposal in the existing stacking area would be insignificant.
Surface Water and Wastewater	• None	• Minor, insignificant impacts to receiving stream from construction.

Table 2-3. Summary and Comparison of Alternatives By Resource Area

Issue Area	Impacts from No Action Alternative	Impacts from Proposed Action Alternative With Commitments
		• No direct (toxic) impacts to Jacobs Creek or Green River are expected from construction or operational activities because the Jacobs Creek Ash Pond and boiler slag ash pond effluents would be required to meet National Pollutant Discharge Elimination System Whole Effluent Toxicity limits. See Section 2.4.
Groundwater Quality	• None	• Minor impacts to groundwater from construction activities and operational activities. No private wells would be affected. • No significant impact on river water quality is expected from proposed land disposal of gypsum generated by the Unit 3 FGD system.
Aquatic Ecology	• None	• Insignificant impacts are anticipated due to increases in volume or sediment load and construction wastes. • Proposed operational changes would not have a significant adverse impact on aquatic life in Jacobs Creek or the Green River.
Socioeconomics	• None	• Impacts to employment and income would be beneficial. • Impacts to population and community services would be insignificant. • No environmental justice impacts are anticipated.
Transportation	• None	• Impacts from construction would be temporary and minor.

2.4. Summary of Environmental Commitments

1. Unless or until TVA begins use of FGD slurry thickeners, as described in the subsection titled, *Use of Chemical Additives (DBA or AA) and/or Thickeners Under Normal, Expected Operating Flows and Low Flow Conditions* in Section 3.8.2 of this EA, TVA will meet limits of the PAF National Pollutant Discharge Elimination System (NPDES) permit and avoid aquatic toxicity by implementing **one** of the following conditions, as appropriate:

- Operational controls for providing additional boiler slag (bottom ash) water to the main ash pond to reduce FGD effluent concentration at the ash pond outfall to nontoxic levels (i.e., less than or equal to 20 percent FGD effluent), or

- Baffling of the ash pond to increase retention time adequately to assimilate FGD effluent concentration at the ash pond outfall to nontoxic levels, or

- Use of other appropriate, comparably effective, operational, or technological means that may be identified.

2. If the use of chemical additives (dibasic acid or adipic acid) to the scrubber for Units 1 and 2 slurry is implemented, TVA would also incorporate the use of thickeners on these units to increase the efficiency of chemical additives and to reduce the volume of FGD effluent to a concentration that would not result in exceedances of the Whole Effluent Toxicity (WET) limits of the NPDES permit.

3. TVA would complete all appropriate coordination under Section 106 of the National Historic Preservation Act (NHPA) when more specific information becomes available and prior to making a decision on the purchase of limestone in 2005-2006.

4. TVA would obtain coverage under the construction storm water permit as needed and would implement Best Management Practices (BMPs) during construction to minimize erosion and migration of sediment off site.

5. Portable toilets would be provided for use by FGD project construction personnel.

6. If “in-stream” construction activity is needed to modify or place structures or to create room for new intake structures, BMPs and Best Engineering Practices would be used to limit sediment migration from the construction area.

7. If new pumps and/or electrical equipment are installed at the existing intake structure, they would be elevated above or flood proofed to the 500-year flood elevation 404.9.

8. If during construction, soil is removed that exhibits a noticeable diesel odor, then the soil would be tested for Total Petroleum Hydrocarbons and Diesel Range Organics and then disposed of, or managed on site, in accordance with applicable Kentucky regulations.

9. Prior to alteration of wetlands, TVA would coordinate with the USACE to obtain a jurisdictional determination. If USACE determines the wetlands to be jurisdictional, TVA would obtain the necessary USACE permit/state water quality certification and must comply with all mitigation requirements, if any. TVA would site and design the limestone haul road such that the configuration minimizes impacts to the small remaining (although already heavily disturbed) scrub-shrub headwater wetland area.

10. Hydrostatic test discharges would be handled in accordance with BMPs developed in accordance with the Kentucky Pollutant Discharge Elimination System (KPDES) permit.

11. The Kentucky Division of Water (KDOW) would be notified about the modification or expansion of the intake structure for a determination pertaining to Section 316(b) of the Clean Water Act.

2.5. Environmental Permits and Applicable Regulations

Implementation of the proposed action would result in the need to modify the KPDES permit for Outfall Discharge Serial Number (DSN) 001 and the appropriate air permits issued by the state of Kentucky. Modification of the water intake could require coordination with the USACE for a Clean Water Act Section 404 Permit; state water quality 401 certification would be obtained as needed for work on the intake. Alteration on wetlands requires coordination with the USACE for a Clean Water Act Section 404 Permit. Prior to alteration of wetlands, TVA would coordinate with the USACE to obtain a jurisdictional determination. If USACE determines the wetlands to be jurisdictional, TVA would obtain a USACE permit/state water quality certification as needed and comply with all mitigation requirements. Coverage under the storm water construction permit would be obtained from the KDOW to ensure all construction-related activities comply with applicable regulatory requirements. Hydrostatic test discharges would be handled in accordance with the BMP developed in accordance with the KPDES permit. Modification or expansion of the intake structure could result in a need to upgrade its features in order to meet regulatory requirements of Section 316(b) of the Clean Water Act. The KDOW would be notified of the changes and asked for concurrence with assessment of minimal impact.