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SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

**PARADISE FOSSIL PLANT
DISPOSAL OF COAL WASH FINES
MUHLENBERG COUNTY, KENTUCKY**

TENNESSEE VALLEY AUTHORITY

APRIL 2004

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Supplemental Environmental Assessment

April 2004

Proposed project: Paradise Fossil Plant Disposal of Coal Wash Fines
Muhlenberg County, Kentucky

Lead agency: Tennessee Valley Authority

Cooperating agencies: None

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Abstract: In October 1986, an Environmental Assessment (EA) and Finding of No Significant Impact were completed for "Purchase and Development of Land for Disposal of Coal Wash Fines and Miscellaneous Dredge Materials." Since that time, Paradise Fossil Plant (PAF) has utilized 360 of the 500 acres identified in the EA for the disposal of coal wash fines. Of the remaining 140 acres, 45 acres are occupied by a radio tower and a cemetery and 95 acres are undeveloped. This Supplemental EA will update the environmental consequences of using the remaining undeveloped acreage for disposal of coal wash fines and alternatives to continued operation of the coal wash plant.

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TABLE OF CONTENTS

1	PURPOSE OF AND NEED FOR ACTION	1
1.1	The Decision.....	1
1.2	Purpose and Need	1
1.3	Background.....	1
1.4	Other Pertinent Environmental Reviews or Documentation.....	1
1.5	The Scoping Process.....	2
1.6	Necessary Permits or Licenses.....	2
2	ALTERNATIVES INCLUDING THE PROPOSED ACTION.....	5
2.1	Alternatives	5
2.1.1	Alternative A, The No Action Alternative	5
2.1.2	Alternative B, Shut Down the Coal Wash Plant and Associated Coal Refuse and Fines Disposal Areas	7
2.1.3	Alternative C, Idle the Coal Wash Plant.....	7
2.1.4	Alternatives Considered but Dismissed	8
2.2	Comparison of Alternatives	8
2.3	The Preferred Alternative	10
3	AFFECTED ENVIRONMENT	11
3.1	Terrestrial Ecology	11
3.1.1	Terrestrial Plants	11
3.1.2	Invasive Plant Species	11
3.1.3	Terrestrial Animals	11
3.2	Threatened and Endangered Species.....	12
3.2.1	Plants	12
3.2.2	Terrestrial Animals	12
3.2.3	Aquatic Animals.....	13
3.3	Wetlands.....	13
3.4	Aquatic Ecology	14
3.5	Managed Areas.....	15
3.6	Recreation	15
3.7	Groundwater	15
3.8	Surface Water.....	17
3.9	Air Quality	18
3.10	Solid Waste.....	18
3.11	Coal Refuse Areas.....	18
3.12	Socioeconomics.....	18
3.13	Environmental Justice.....	19
3.14	Visual Effects	19
4	ENVIRONMENTAL CONSEQUENCES	21
4.1	Terrestrial Ecology	21
4.1.1	Terrestrial Plants	21
4.1.2	Invasive Plant Species	21
4.1.3	Terrestrial Animals	21
4.1.3.1	Alternative A.....	21
4.1.3.2	Alternatives B and C.....	21
4.2	Threatened and Endangered Terrestrial Species.....	21
4.2.1	Plants	21

4.2.2	Terrestrial Animals	22
4.2.2.1	Alternative A.....	22
4.2.2.2	Alternatives B and C	22
4.2.3	Aquatic Animals	22
4.2.3.1	Alternative A.....	22
4.2.3.2	Alternatives B and C	22
4.3	Wetlands	22
4.3.1	Alternative A.....	22
4.3.2	Alternatives B and C	23
4.4	Aquatic Ecology.....	23
4.4.1	Alternative A.....	23
4.4.2	Alternatives B and C	24
4.5	Managed Areas	24
4.5.1	Alternative A.....	24
4.5.2	Alternatives B and C	24
4.6	Recreation	24
4.7	Groundwater.....	24
4.7.1	Alternative A.....	24
4.7.2	Alternatives B and C	25
4.8	Surface Water.....	25
4.8.1	Alternative A.....	25
4.8.2	Alternatives B and C	26
4.9	Air Quality.....	26
4.10	Solid Waste	26
4.11	Coal Refuse Areas	27
4.11.1	Alternative A.....	27
4.11.2	Alternatives B and C	27
4.12	Socioeconomics	29
4.12.1	Alternative A.....	29
4.12.2	Alternatives B and C	29
4.13	Environmental Justice.....	29
4.14	Visual.....	29
4.14.1	Alternative A.....	29
4.14.2	Alternatives B and C	30
4.15	Cumulative Effects.....	30
4.16	Summary of TVA Commitments and Proposed Mitigation Measures.....	30
4.16.1	Routine and Compliance Measures	30
4.16.1.1	Alternative A.....	30
4.16.1.2	Alternatives B and C	31
4.16.2	Special Mitigation Measures	31
4.16.2.1	Alternative A.....	31
4.16.2.2	Alternatives B and C	31
5	SUPPORTING INFORMATION	33
5.1	List of Preparers	33
5.2	List of Reviewers	35
6	LITERATURE CITED.....	37

LIST OF APPENDICES

APPENDIX A – ENVIRONMENTAL ENGINEERING DIKE CONSTRUCTION SPECIFICATIONS.....	A-1
APPENDIX B – SUMMARY OF INTERIM MANAGEMENT AND PERMANENT CLOSURE PLAN FOR COAL REFUSE AREAS.....	B-1

LIST OF FIGURES

Figure 1-1. Map of Disposal Area for Coal Wash Fines at Paradise Fossil Plant.....	3
Figure 2-1. Paradise Fossil Plant Fines Pond Expansion Design	6
Figure 3-1. Paradise Fossil Plant Monitoring Well Locations	17
Figure 4-1. General Plan for Fines Pond Complex.....	28

LIST OF TABLES

Table 2-1. Alternatives Not Considered in Detail.....	8
Table 2-2. Comparison of Potential Impacts.....	9
Table 3-1. Rare Terrestrial Animals Reported From Areas Within a 3-Mile Radius of Paradise Fossil Plant.....	12
Table 3-2. Federally and State-Listed Aquatic Animal Species Known From the Green River Near Paradise Fossil Plant in Muhlenberg and Ohio Counties, Kentucky	13

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CHAPTER 1

1 PURPOSE OF AND NEED FOR ACTION

1.1 The Decision

Tennessee Valley Authority (TVA) must decide whether (1) to continue to operate the coal wash plant at Paradise Fossil Plant (PAF) and develop 88 acres previously designated as an expansion pond for disposal of coal wash fines, (2) to shut down PAF coal wash plant operations after exhausting the existing coal fines storage space, or (3) to idle the coal wash plant and retain the ability to restart the wash plant in the future if events dictate this need. With the latter two alternatives, TVA would have to purchase prewashed coal for PAF rather than washing the coal at the plant.

1.2 Purpose and Need

Washing coal improves its environmental and operational characteristics. Washing removes a substantial percentage of the impurities in coal and improves its combustibility. Washing coal also reduces the sulfur content of coal and other elements that when combusted result in higher levels of emissions. Use of washed coal has been an important part of the air pollution control strategy at PAF. Currently there are approximately 720,000 tons of coal fines and 600,000 tons of coarse and medium refuse generated each year from coal washing operations at PAF. In addition, the generated coal wash refuse numbers (both coal fines and coarse and medium refuse) are anticipated to double by 2006 due to the anticipated higher volume of coal washing from having scrubbers on all three units at PAF. Without development of an additional area for coal wash fines storage capacity, it would be necessary for TVA to cease PAF coal wash plant operations once the existing coal wash fines disposal ponds have reached capacity. Because PAF will exhaust the existing fines storage capacity by the fall of 2004, a decision needs to be implemented before this happens.

1.3 Background

In October 1986, TVA completed an Environmental Assessment (EA) and Finding of No Significant Impact for "Purchase and Development of Land for Disposal of Coal Wash Fines and Miscellaneous Dredge Materials." Since that time, Paradise Fossil Plant (PAF) has utilized 360 of the 500 acres (Figure 1-1) identified in the EA for the disposal of coal wash fines. Of the remaining 140 acres, 45 acres are occupied by a radio tower and a cemetery and 95 acres are undeveloped. The current area developed for coal wash fines disposal is reaching its full capacity level. Therefore, the disposal area would either need to be expanded, another means of disposal would need to be developed, or additional prewashed coal would need to be purchased to support continued operation of PAF. This Supplemental EA reviews the environmental consequences of utilizing 88 of the 95 undeveloped acres to continue to dispose of coal wash plant fines and addresses other environmental issues. This Supplemental EA will also look at alternatives besides expansion of the coal fines pond into the remaining area, which was previously reviewed, and continued operation of the wash plant (Alternative A, the No Action Alternative). These alternatives are to shut down the wash plant and associated coal refuse and fines disposal areas (Alternative B) or idling the coal wash plant (Alternative C).

1.4 Other Pertinent Environmental Reviews or Documentation

National Environmental Policy Act (NEPA) documents prepared by TVA related to PAF are listed below:

- Environmental Assessment for the Purchase and Development of Land for Disposal of Coal Wash Fines and Miscellaneous Dredge Materials (TVA, 1986)
- Environmental Assessment – Development of Dredged Ash Disposal Area Paradise Fossil Plant (TVA, 1989)
- Energy Vision 2020. Integrated Resource Plan Environmental Impact Statement, Volumes 1 and 2 (TVA, 1995)
- Environmental Assessment – Development of Ash Disposal Capacity at Paradise Fossil Plant (TVA, 1996)
- Environmental Assessment – Paradise Fossil Plant Units 1, 2, and 3 Selective Catalytic Reduction Systems (TVA, 1999)
- Environmental Assessment - Installation Of Flue Gas Desulfurization System On Paradise Fossil Plant Unit 3 (TVA, 2003)

1.5 The Scoping Process

A TVA interdisciplinary team reviewed the proposed project for potential direct, indirect, and cumulative effects as a result of expanding the coal fines disposal pond area by utilizing 88 of the 95 undeveloped acres and other alternatives. Potentially affected resources include: terrestrial ecology, threatened and endangered terrestrial and aquatic species, wetlands, aquatic ecology, managed areas, recreation, groundwater, surface water, air quality, solid waste, socioeconomics, environmental justice, and visual effects.

1.6 Necessary Permits or Licenses

Alternative A - the No Action Alternative would require the following permits:

- TVA would request a final jurisdictional determination from the United States Army Corps of Engineers (USACE) for the waters of the United States in the 88 acre proposed expansion to determine whether a permit/state certification would be required.
- Construction of the 36-inch storm water pipe may require modification to the Integrated Pollution Plan required by the Kentucky Pollutant Discharge Elimination System (KPDES).

Alternatives B and C

- If TVA decides to permanently close the wash plant and cease using the coal wash fines disposal area, additional approvals may be needed from the state.

All Alternatives

- If, any of the alternatives would disturb more than 1 acre of land during construction activities, a construction storm water permit would be required.

Location of 500 acres coal wash fines disposal area, 95 acres additional capacity area at Paradise Fossil Plant



Figure 1-1. Map of Disposal Area for Coal Wash Fines at Paradise Fossil Plant

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CHAPTER 2

2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the No Action and Action Alternatives and discusses the environmental consequences of each of these alternatives.

2.1 Alternatives

There are three alternatives discussed in this Supplemental EA: (1) the No Action Alternative (Alternative A), (2) shut down the coal wash plant and associated coal refuse and fines disposal areas (Alternative B), and (3) idle the coal wash plant and preserve the ability to restart it in the future (Alternative C). Under the latter two alternatives, TVA would have to purchase coal that has already been washed before it is shipped to Paradise. Coal suppliers have substantial capabilities to provide washed coal, and TVA would be able to purchase sufficient supplies of washed coal to serve the plant on a long-term basis if the final decision calls for this. Based on current economic data, idling the coal wash plant and purchasing washed coal would save TVA approximately \$17 million over the first three years. Shutting down the wash plant would result in similar savings minus the cost of securing the actual plant facility and closing the disposal area. This EA also discusses other alternatives that were initially considered, but failed to meet the immediate needs of PAF.

2.1.1 *Alternative A, The No Action Alternative*

Under the No Action Alternative, TVA would continue to operate the coal wash plant and implement its preexisting plan to expand the coal fines disposal pond area. Coal fines are currently sluiced to coal fines pond #3 for disposal. Current operating conditions and environmental impacts would continue in the interim, and there would be additional environmental impacts associated with expanding the fines disposal area.

Under this alternative, TVA would build four dikes that would expand the area for coal fines disposal by 88 acres (Figure 2-1). The 88-acre expanded site would result in filling in of 17-acre, flooded strip-mine excavation that was stocked with a regional fish assemblage by the Kentucky Reclamation Association in 1980, an organization funded by coal companies in the Paradise area to perform reclamation work. Dike material for the north, west, and south dikes would come from within the area that would be impounded. The material for the east dike would be taken from within the stilling pond (part of the original fines pond #2). Dikes would be constructed according to environmental engineering specifications listed in Appendix A that take into account various safety factors including the potential for seismic activity. To reroute storm water runoff from a 178-acre off-site area and a 29-acre on-site area currently being drained through a constructed wet weather ditch into the 17-acre flooded strip-mine excavation, TVA would install a 36-inch pipe to convey the storm water through the 88-acre area and discharge into the original channel downstream of the 17-acre, flooded strip-mine excavation. The original channel below the pipe discharge would be undisturbed and continue to flow into an off-site lake just above the confluence with Daniel Run Creek. The existing 7,000 feet of Daniel Run Creek bank around the periphery of the dikes would not be damaged or cleared by construction of the dikes.

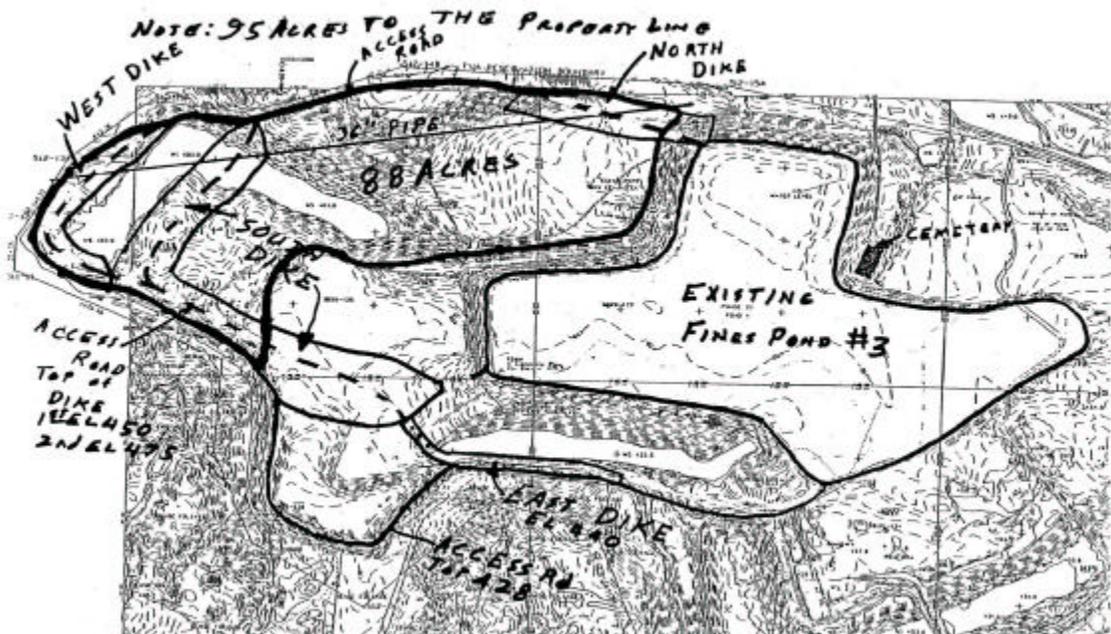


Figure 2-1. Paradise Fossil Plant Fines Pond Expansion Design

2.1.2 Alternative B, Shut Down the Coal Wash Plant and Associated Coal Refuse and Fines Disposal Areas

Under this alternative, TVA would continue to operate the coal wash plant for the time frame that existing storage capacity would allow, and, then, due to the lack of coal wash fines storage capacity, PAF would be required to shut down coal wash plant operations. TVA would have to secure the coal wash plant and close the coal refuse and fines disposal areas, assuming some viable use of the coal refuse and fines is not found in the interim. Securing the coal wash plant would involve removing equipment and materials that could be used at other TVA locations or sold. The coal wash plant structure would likely be left in place for some period of time to preserve the ability to convert the structure to some other use. If other uses of the structure are not found or developed, it would likely be demolished. Demolition would comply with all applicable notification and regulatory requirements.

Closures of the coal refuse and fines disposal areas would conform to relevant closure requirements and likely involve revegetating the area. Closure would require that TVA at a minimum implement the following:

- (1) Use 4 feet of the best available material for cover (3 feet of scrubber sludge [or other suitable material] and 1 foot of soil) and establish and maintain vegetative cover.
- (2) Ensure mass stability and prevent mass movement during and after construction.
- (3) Ensure that foundation materials are stable under all conditions of construction. Sufficient subsurface investigation and laboratory testing would be conducted to determine adequate stability.
- (4) Provide a long-term stability static factor of safety of 1.5.

2.1.3 Alternative C, Idle the Coal Wash Plant

Under this alternative, TVA would idle the coal wash plant at PAF by the fall of 2004. Idling the wash plant would involve securing the structure with the equipment in place. This would preserve the ability to restart the facility in the future should events dictate this (e.g., the price of prewashed coal increases substantially). TVA would also put in place measures to maintain the stability of the existing fines disposal ponds that would allow them to be used and expanded in the future. Under this alternative, TVA would implement measures to reduce the risk that coal refuse could spontaneously combust. If this Alternative were implemented, TVA would likely cover the coarse and medium refuse piles with a minimum of 1 foot of cover (soil or scrubber sludge). The coal fines ponds would either have a minimum of 1 foot cover placed over them or could be sprayed with a binding agent once a year (or more frequently if needed). Alternatively or in combination with these measures, the fines from the fines pond could be dredged and burned in the units at PAF. Based on TVA's experience with coal fines it is not anticipated that this material would spontaneously combust. As a precautionary measure, these areas would be inspected weekly to ensure that combustion is not occurring and that the areas are not sources of fugitive emissions or contaminated runoff. If combustion occurs, sufficient cover would be

added to prevent combustion, or a water blanket would be maintained over the exposed fines.

This period of interim management is expected to last five years, and would provide TVA the opportunity to study alternative disposal methods for the material. After the five year period, a decision would be made to either permanently close the coal refuse and fines disposal areas, expand the fines disposal area (Alternative A), continue interim management for another five-year period, or implement some other method of handling coal refuse and fines disposal. Options that currently are being studied include underground injection of the refuse or underground injection of the refuse in combination with dredging and burning the fines in the units at PAF. Prior to deciding whether to implement either of these options, additional environmental review would be conducted.

2.1.4 Alternatives Considered but Dismissed

There were several alternatives considered but determined not currently feasible to address immediate needs. These alternatives and the reasons they were rejected are listed in Table 2-1. Some of these rejected alternatives may be viable alternatives for consideration after additional requirements are met at a future date and following additional environmental review.

Table 2-1. Alternatives Not Considered in Detail

Alternative	Reason Dismissed
Use a blend of Powder River Basin coal and raw coal	This alternative would require TVA to make physical changes to PAF equipment that would take at least a year and exceed the remaining expected life of the coal fine pond.
Inject coal fines into underground mines	A feasibility study is underway to determine if this could be a viable option. The study could take up to 18 months to complete and exceed the remaining expected life of the coal fine pond.
Obtain a mining permit and sell the fines	It would cost \$300,000 to \$500,000 to obtain a permit and take at least 2.5 years (this cost does not include the unknown cost of coal fines recovery). This option is not economically attractive and would not solve the current problem because of the implementation time.
Sub-Alternative (for Alternatives B and C)	Reason Dismissed
Create a wetlands in the coal fines pond	This option would not be feasible because once water is not pumped to the pond, the fines would dewater and the pond would not provide the proper hydrologic setting for wetland formation.

2.2 Comparison of Alternatives

The comparison of potential impacts for the three alternatives is presented in Table 2-2. The potential impacts from any of the alternatives on floodplains, land use, transportation, terrestrial ecology, managed areas, environmental justice, solid waste, and noise would be minor and insignificant. Because the coal fines pond was previously stripped-mined, there is no potential to affect historic properties.

Table 2-2. Comparison of Potential Impacts

Resource Area	Potential Impacts		
	Alternative A (No Action)	Alternative B (Shut Down the Coal Wash Plant)	Alternative C (Idle the Coal Wash Plant)
Terrestrial Ecology, Terrestrial Plants	None	None	None
Terrestrial Ecology, Invasive Plant Species	None	None	None
Terrestrial Ecology, Terrestrial Animals	Temporary impact to habitat; beneficial creation of additional wetland habitat	None	None
Threatened and Endangered Terrestrial Species, Plants	None	None	None
Threatened and Endangered Terrestrial Species, Terrestrial Animals	Destruction of pond would affect foraging habitat	None	None
Threatened and Endangered Terrestrial Species, Aquatic Animals	None	None	None
Wetlands	Filling of 17-acre, flooded strip-mine excavation; filling of a 0.75-acre emergent fringe wetland; filling of 0.3-acre emergent wetland	None	None
Aquatic Ecology	Fish and other aquatic life in 17-acre pond would be lost	None	None
Managed Areas	None	None	None
Recreation	None	None	None
Groundwater	There would be some leakage from the pond due to the pond site being underlain by unconsolidated mine spoil	None	None
Surface Water	Erosion; sediment delivered downstream by the 36-inch pipe	Erosion	Erosion
Air Quality	Temporary fugitive dust emissions	Temporary fugitive dust emissions	Temporary fugitive dust emissions

Resource Area	Potential Impacts		
	Alternative A (No Action)	Alternative B (Shut Down the Coal Wash Plant)	Alternative C (Idle the Coal Wash Plant)
Solid Waste	Construction solid waste and scrap metal	Construction solid waste and scrap metal	Construction solid waste and scrap metal
Coal Refuse Areas	Excavating, storing and burning fines	Combustion	Excavating, storing and burning fines; combustion
Socioeconomics	Small, short term, positive economic impacts from construction activities	Loss of 44 jobs	Loss of 44 jobs
Environmental Justice	None	None	None
Visual	Visual Character altered; changes in topography on the site during dike and pond construction	Short-term increase in personnel and equipment during construction activities; landscape changed	Short term increase in personnel and equipment during construction and inspection activities; landscape changed
Cumulative Effects	None	None	None

With the commitments and measures identified in Section 4.16, impacts to air quality, water quality, aquatic life, and socioeconomics would be insignificant.

2.3 The Preferred Alternative

TVA's preferred alternative is Alternative C, Idle the Coal Wash Plant.

CHAPTER 3

3 AFFECTED ENVIRONMENT

PAF is located in Muhlenberg County, Kentucky. The original 500 acres (including the 88 acres for pond expansion) reserved for disposal of coal wash fines have been severely altered by past land use including mining and mine land reclamation. As a result, there are no prime farmlands, unique natural features, or archaeological and cultural resources on the land affected by this project. Due to mining and subsequent reclamation, the land surface at this site is composed largely of a conglomerate of subsoil and rocky overburden. Little, if any, of the land in question retains its natural soil profile or original topography.

3.1 Terrestrial Ecology

3.1.1 Terrestrial Plants

PAF is located in the Interior Low Plateaus Physiographic Province (Fenneman, 1938). Botanically, it occurs in the Shawnee Hills Section of the Western Mixed Mesophytic Forest Region as described by Braun (1950). Native forests in the area were generally dominated by various species of oak (particularly white oak) and hickory, but these forests have been extensively modified since the time of human settlement. Throughout the region, areas of remaining old growth as well as secondary forests vary in composition in relation to topography and soil moisture conditions. These forests include representatives of oak-hickory, beech-dominated, and mixed mesophytic communities (Bryant, et al., 1993).

The proposed project activities would occur entirely within the existing PAF Reservation boundary and be confined to an area where the surface has been previously altered by earthmoving equipment. Existing vegetation is common and typical for such disturbed areas. *Sericea (Lespedeza cuneata)* covers much of the site with scattered areas of trees and shrubs. Principal species at the site are honey locust (*Gleditsia triacanthos*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), black willow (*Salix nigra*), and sumac (*Rhus* sp.). Typical shrubs present are coralberry (*Symphoricarpos orbiculata*) and blackberry (*Rubus* sp.). Common reed (*Phragmites australis*) forms dense stands mostly in wetlands but also occurs on drier sites.

No uncommon plant communities or otherwise sensitive plant habitats occur on the land to be affected by the proposed project activities.

3.1.2 Invasive Plant Species

PAF has been previously subjected to varying degrees of ground disturbance resulting in invasive plant species already existing at the site location.

3.1.3 Terrestrial Animals

The proposed project area under review within PAF has been heavily impacted and altered due to past activities and current operation of the existing facility. Despite the continual disturbance of much of the area, the open habitat and the ponds provide foraging and resting habitat for waterfowl, raptors, and some species of mammals, as well as breeding habitat for common amphibian species. Regionally and locally common black ducks (*Anas rubripes*), mallards (*Anas platyrhynchos linnaeus*), and beavers (*Castor Canadensis kuhl*) have been identified within the project area. Some animals may also find suitable habitat and foraging opportunities within small patches of early successional vegetation near the

existing ponds. These areas are heavily disturbed, however, and consequently offer limited wildlife habitat.

3.2 Threatened and Endangered Species

3.2.1 Plants

The TVA Natural Heritage and the Kentucky Natural Heritage databases revealed that no federally or state-listed plant species have been reported from within 5 miles of PAF. Additionally, no federally listed plant species have been reported from the surrounding vicinity of PAF in Muhlenberg or Ohio Counties, Kentucky.

Because of the extent of prior disturbance within the proposed project area, no occurrences of rare plant species are anticipated within the areas to be affected by the proposed project. Neither rare plant species nor rare plant habitats were found during a field visit.

3.2.2 Terrestrial Animals

TVA's Natural Heritage database indicated that five state-listed species have been reported within a 3-mile radius of PAF (Table 3-1). No federally listed as protected species have been reported from Muhlenberg or Ohio Counties, Kentucky.

Table 3-1. Rare Terrestrial Animals Reported From Areas Within a 3-Mile Radius of Paradise Fossil Plant

Common Name	Scientific Name	State Status	Federal Status
Bank Swallow	<i>Riparia riparia</i>	Special Concern	—
Bell's Vireo	<i>Vireo bellii</i>	Special Concern	—
Common Moorhen	<i>Gallinula chloropus</i>	Threatened	—
Great Blue Heron	<i>Ardea herodias</i>	Special Concern	—
Northern Harrier	<i>Circus cyaneus</i>	Threatened	—

Bell's vireos often nest in thickets near water but may also nest among vegetation in any successional stage with a dense understory. Common moorhens generally nest in marsh plants over water, primarily in areas of emergent vegetation and grassy borders. The aquatic areas at the project location, however, are unlikely to provide sufficient nesting habitat for Bell's vireo and common moorhens.

Bank swallows generally nest in steep sand, dirt, or gravel banks and pits in open or partly open habitats. They often dig a new burrow each year but tend to return to the same nesting area in successive years. Approximately 150 nest burrows of this species are located in a coal refuse pile in the southeast portion of PAF, just south of Reed Mineral Processing area. These birds actively forage over the on-site ponds, but nest burrows are not present within the immediate project area. Great blue herons typically forage in shallow water, and their colonial nests are commonly located near rivers and reservoirs. These large, wading birds forage in the ash disposal ponds within the fossil plant. A heron-nesting colony has been reported southeast of the fossil plant along the Green River, but there are no colonies within the project area. Northern harriers forage in open habitats, often near cattail marshes, shrub uplands, or wet meadows. Although this species has been reported foraging within the project area, they are not expected to nest on site. Some of these protected species may find suitable foraging habitat within the proposed project site; however, the area does not meet their nesting requirements.

3.2.3 Aquatic Animals

The TVA Natural Heritage database and data from the Kentucky State Nature Preserves Commission indicated that in the vicinity of PAF, one federally and ten state-listed aquatic animal species are historically known from the Green River (Table 3-2). Although not recently reported, these species could still exist in the Green River near the proposed project. None of these species, however, are likely to occur in ponds or small lakes on the PAF site, nor are they likely to occur in Daniel Run Creek or the wet weather ditch that would be rerouted as part of this proposed action. The 17-acre pond proposed to be removed is not known to contain any of these species and no suitable habitat for any of these species is present in that pond.

Table 3-2. Federally and State-Listed Aquatic Animal Species Known From the Green River Near Paradise Fossil Plant in Muhlenberg and Ohio Counties, Kentucky

Common Name	Scientific Name	State Status	Federal Status
Mussels			
Fanshell	<i>Cyprogenia stegaria</i>	Endangered	Endangered
Pyramid pigtoe	<i>Pleurobema rubrum</i>	Endangered	-
Purple lilliput	<i>Toxolasma lividus</i>	Endangered	-
Little spectaclecase	<i>Villosa lienosa</i>	Special Concern	-
Fish			
Longhead darter	<i>Percina macrocephala</i>	Threatened	-
Chestnut lamprey	<i>Ichthyomyzon castaneus</i>	Special Concern	-
Eastern sand darter	<i>Ammocrypta pellucida</i>	Special Concern	-
Lake chubsucker	<i>Erimyzon sucetta</i>	Threatened	-
Black buffalo	<i>Ictiobus niger</i>	Special Concern	-
Cypress minnow	<i>Hybognathus hayi</i>	Endangered	-

3.3 Wetlands

A wetland survey was conducted in January 2003 on the 88-acre parcel on the PAF Reservation. This 88-acre site is part of the original 500 acres purchased by TVA in the mid-1980s for disposal of coal wash fines. As a part of the environmental review assessment for the original purchase, a wetland survey was conducted and the findings were reported in an EA (TVA, 1986). Wetland determinations were performed according to USACE standards (Environmental Laboratory, 1987) and classified according to the Cowardin system (Cowardin, et al., 1979).

During the 2003 wetland survey, wetlands were identified in two separate areas of the project site (W1, W2) with a combined area of less than 0.3 acre. Both of these wetland areas meet USACE wetland determination standards. Environmental functions of these wetlands include flood and storm water reduction, erosion control, wildlife habitat, and maintenance of species and landscape diversity.

Consistent with the 1986 survey, a narrow (5- to 6-foot-wide) emergent (marsh) wetland (W1), with a total area of less than 0.75 acre, exists as a fringe along the shoreline of a permanently flooded strip-mine excavation. Referred to as A-3 in the 1986 survey, this approximately 17-acre excavation was allowed to fill with groundwater, and the resulting

water body was stocked with sport fish as part of site reclamation. After a beaver dam at the pond outlet increased the water level 3.5 feet, a shallow water zone around the excavation developed a fringe wetland. Depths of 40 to over 100 feet occur just beyond the shallow water zone (Joel Paris, TVA, personal communication, February 5, 2003). The dominant vegetation species in the fringe wetland are common reed (*Phragmites australis*), soft rush (*Juncus effusus*), sallow sedge (*Carex lurida*) and spikerush (*Eleocharis* sp.).

Additionally, several small patches of emergent wetland (W2) occur in small (less than 0.10 acre) wet depressions scattered within a 2-acre area, roughly 600 to 1,200 feet south of the flooded strip-mine (A-3). These depressions, resulting from past strip-mining and reclamation activities, appear to have perched water tables and lack surface connection to other water bodies. The dominant vegetation species include common reed, cattail (*Typha latifolia*), and sedges (*Scirpus atrovirens*, *Carex* sp.), with scattered specimens of young, green ash (*Fraxinus pennsylvanica*).

3.4 Aquatic Ecology

Surface waters on the PAF site have previously experienced extensive nonpoint source pollution from strip-mining. Past channelization and relocation of stream segments severely altered in-stream habitats that altered the natural flow regime, leading to increased flows during rain events. The removal of substantial portions of riparian-zone vegetation eliminated buffer strips necessary for the prevention of erosion. These impacts to Jacob's Creek, the primary Green River tributary on the PAF site, have been well documented (TVA, 1998).

Aquatic life in ponds on the PAF site would vary in abundance and diversity depending on the morphology of a given pond and the chemical constituents and water quality parameters of the inflow. Generally, ponds that would be incorporated into the additional capacity pond would not be expected to provide unique or high quality habitat for fish or other aquatic life (e.g., aquatic insects). The 17-acre pond that would be incorporated into the additional storage capacity was stocked with sport fish (bass, bluegill, and catfish) by the Kentucky Reclamation Association in 1980. In the past, it received considerable use by anglers, but has not been accessible to the public in some time. The wet weather ditch that flows through this pond has resulted in siltation and turbidity during runoff events.

The Green River adjacent to PAF exhibits steep banks with little suitable spawning habitat for fish. The river is very turbid due to runoff from coalfields and intensive barge traffic. Surface elevation is subject to rather drastic short-term fluctuations. The fish community is dominated by warm water species with the exception of two cool water species, sauger (*Stizostedion canadense*) and walleye (*Stizostedion vitreum*). TVA aquatic monitoring surveys from 1961-1971 collected 40 fish species (TVA, 1999).

Results of the TVA aquatic monitoring survey near PAF in 1970 collected ten native mussel species (TVA, 1999). More recent surveys, that focused on native mussels near the Green River navigation dams, did not include collection sites downstream of PAF but did document the presence of at least 23 mussel species within 7 river miles upstream of PAF. During this recent study, mussel abundance was found to be as high as 16 mussels per square meter; however, there was little evidence of recent recruitment (Miller, et al., 1994).

Listed on the Kentucky Department of Fish and Wildlife Resources Web site (2003) are 117 fish species and 42 mollusk species in Muhlenberg and Ohio Counties. Although not all of these species would be expected to occur in the immediate vicinity of PAF, most of them

could inhabit areas of suitable habitat in either the Green River or small tributaries in the project vicinity.

3.5 Managed Areas

PAF lies between the Sinclair and Ken Hopewell tracts of the Peabody State Wildlife Management Area (WMA). The Sinclair tract is directly south of PAF, while the Ken Hopewell tract lies to the east on the opposite side of the Green River. Peabody WMA is a rough terrain of reclaimed coal-mined land. Waterfowl and small and big game frequent swampland, high ridges, and deep pits. Fishing and hunting opportunities are excellent. Such activities, including primitive camping, are administered by the Kentucky Department of Fisheries and Wildlife Resources. Agency-backed projects on WMA land include wetland enhancement, grassland conversion, and bird monitoring.

Both the Sinclair tract of the Peabody WMA and the PAF ash basin are known for their birding opportunities. During the summer, a wide variety of songbirds including Bell's vireo, a species of special concern in Kentucky, can be seen in the grassland, ponds, and sapling stands of the Sinclair tract. Throughout the year, various waterfowl and shorebirds are attracted to Goose Lake, just southwest of PAF. In winter, a large raptor population of northern harriers, rough-legged (*Buteo lagopus*) and red-tailed (*Buteo jamaicensis*) hawks and short-eared owls (*Asio flammeus*) visits the area for its abundance of small mammals. Nesting bank swallows also of special concern in Kentucky, have been recorded at the PAF ash basin.

PAF is located on the west bank of the Green River, that serves as the boundary between Muhlenberg County and Ohio County. There are no streams listed on the Nationwide Rivers Inventory in either of these counties.

3.6 Recreation

The current wetland lakes in the affected area are former strip-mine pits that were reclaimed when mining was completed. The lakes were stocked with black bass, bluegill, and catfish by the Kentucky Reclamation Association. In the past, these lakes have received considerable use from local anglers, but there is presently no use of the affected area by anglers. The EA (TVA, 1986) provided for a commitment (#04) that TVA would provide a crushed stone access road to the Green River across the north boundary of the affected area. The road would access a newly constructed concrete boat ramp and crushed stone parking lot. The ramp and lot would be maintained by TVA. Work on this commitment was completed in 1989 (Joel Paris, TVA, personal communication, March 25, 2003).

3.7 Groundwater

Groundwater resources were addressed in the original EA. Additional hydrogeologic information obtained for the coal fines pond area since the EA was issued in August 1986 does not conflict with information provided in that EA.

The original EA contained two groundwater-related commitments. The first (EA Commitment #02) was to conduct a field hydrological water balance study for pond A-1 lasting up to one year in order to determine the rate of pond leakage into the underlying aquifer(s). If leakage were found to be significant, further engineering evaluations would be performed to provide appropriate leakage mitigation. The second commitment (#05)

required a site-wide assessment of groundwater resource impacts for the PAF Reservation. Both commitments were subsequently addressed and documented.

To fulfill Commitment #02 in the original EA, a pond A-1 field hydrological water balance study to determine the rate of pond leakage into the underlying aquifer(s) was performed between June 6 and December 18, 1988. The results were presented in a report by Vadnal (1989). Estimates of pond leakage during this period ranged from 130 to 1,090 gallons per minute (gpm) and averaged about 560 gpm (or 0.81 million gallons per day). The Vadnal report did not address the "significance" of the rate of pond leakage, and there were no recommendations for further engineering studies to address leakage mitigation.

A groundwater assessment report (Lindquist and Danzig, 1997) was issued in October 1997 in fulfillment of EA Commitment #05. This report addressed groundwater quality issues associated with solid waste disposal and materials storage facilities at the PAF site, including the coal wash plant facility that had been in operation since 1987. As part of the study, groundwater quality was monitored at four wells surrounding the coal fines pond area on six occasions between December 1995 and June 1997. These monitoring wells included 9534A, 9550B, 9551A, and 9552A as shown on Figure 3-1. Results for wells located downgradient of the coal fines pond showed relatively good groundwater quality compared to wells in other areas of the PAF site, including upgradient well 9534A. No exceedences of primary drinking water standards were observed at any of these wells. All four wells exhibited secondary maximum contaminant level (SMCL) exceedences for pH, sulfate, total dissolved solids, aluminum, iron, and manganese. However, these particular SMCL constituents typically occur at elevated concentrations in background (unaffected) groundwater of the region and do not necessarily indicate contamination from the coal wash plant facility.

Taken together, results of the pond A-1 water budget analysis and the coal fines pond groundwater monitoring study indicate that while leakage rates from the coal fines pond are relatively high, pond leachate does not appear to have had an adverse effect on local groundwater quality during the first ten years of operation.

No private off-site wells are known to exist on the north side of the PAF Reservation. A query of the Kentucky Geologic Survey water well database in 2002 indicated a well located about 0.5 mile northeast of the coal fines pond area. However, field examination of the area revealed no evidence of this well, indicating that the well did not exist or had been closed.



Figure 3-1. Paradise Fossil Plant Monitoring Well Locations

3.8 Surface Water

Currently, the coal wash plant is operated in a hydrologically closed-loop system. During operation, the process water and runoff from the coal wash fines pond area are recycled. There is no direct discharge to surface waters due to the closed-loop system's operation, but there could be a potential for surface water impact due to storm water discharge. However, the existing coal fines ponds are in an area that has been mined for coal, and this area has been extensively disturbed. The soil, that originally included alluvial clays, sands, and gravels, has been mixed so that the original soil units have been obliterated. According to the original EA (TVA, 1986), soils in the proposed construction area are predominantly clayey sand. Soil materials of this texture have relatively low potential for erosion (Mills, et al., 1985). Also, surrounding areas are reclaimed and mostly well vegetated.

3.9 Air Quality

Air quality is an environmental resource value that is considered important to most people. Through its passage of the Clean Air Act, Congress has mandated the protection and enhancement of our nation's air quality resources. Air emissions from PAF are covered under the Permit Number O-87-012. Under the proposed activities, the primary air emission would be fugitive dust. This would derive from construction and/or maintenance activities.

3.10 Solid Waste

Currently, the solid waste at the site is generated from plant operation activities. This waste is managed in accordance with all federal and state requirements. The solid waste generated from the proposed activities would be from construction and/or maintenance activities.

3.11 Coal Refuse Areas

The Paradise coal wash plant receives 4 to 5 million tons of raw coal and sends 3 to 4 million tons of clean coal to PAF each year. Currently, the coal fines are sluiced to the disposal area of the coal fines ponds, and the coarse and medium refuse is transported by truck to the on-site dry stacking area. There are no coal fines or coarse and medium refuse being marketed or utilized at PAF, but TVA is exploring the possibility of marketing or utilizing the coal fines.

3.12 Socioeconomics

PAF is located in Muhlenberg County, Kentucky, near the middle of a triangle formed by the cities of Hopkinsville, Bowling Green, and Owensboro. The county is largely rural, the largest cities being Central City and Greenville, with population in 2000 of 5,893 and 4,398, respectively. There are several smaller places, all with fewer than 1,000 persons. The labor market area for the PAF is defined to include all adjacent counties. In addition, Daviess County, where Owensboro is located, and Warren County (Bowling Green) likely would be additional sources of construction workers for any activity at the plant.

Population—According to the 2000 Census of Population, Muhlenberg County has a population of 31,839, only 1.7 percent higher than the 1990 Census of Population count of 31,318. The labor market area population is 235,031, an increase of 5.1 percent from the 1990 count of 223,719. Population estimates for the year 2002 from the U. S. Bureau of the Census show a slight decline in the population of Muhlenberg County (0.4 of 1.0 percent) and the labor market area (0.1 of 1.0 percent).

Income and Employment—Per capita personal income in Muhlenberg County in 2001 was \$19,953, about 80 percent of the state average of \$24,878 and 66 percent of the national average of \$30,413. The level was slightly higher in the labor market area as a whole, \$20,518, over 82 percent of the state and over 67 percent of the nation. There was considerable variability, however, among the counties in the labor market area, ranging from \$17,168 in Butler County to \$27,297 in McLean County.

Muhlenberg County has a larger share of its workers, 18.6 percent, employed in the government sector than the state average of 15.1 percent, due in part to the employment at PAF. The county is also more agricultural than the state, but less dependent on manufacturing and on services. Due to a large military presence in Christian County, the

labor market area is even more dependent on government, with 32.1 percent of its employment in the government sector.

The largest source of earnings in Muhlenberg County in 2001 was government employment, that contributed 28 percent of earnings, about equally divided between federal employment and state and local government employment. Manufacturing accounted for only 9 percent of earnings, and farming 7.9 percent. The labor market area, due to its significant military presence in Christian County, received 45.1 percent from government, mostly military (30 percent of all earnings).

With a civilian labor force of 12,951 in 2002, Muhlenberg County had an unemployment rate of 8.6 percent, well above the rate in the labor market area (7.1), the state (5.6), and the nation (5.8). This is a continuation of a pattern of the last several years dating at least as far back as 1990.

3.13 Environmental Justice

The population of Muhlenberg County, according to the 2000 Census of Population, is 6.3 percent minority, well below the state average of 10.7 percent and the national average of 30.9 percent. The minority share in the labor market area, at 14.5 percent, is higher than the state average, but lower than the national average. This average is due largely to the population in Christian County, that is the largest county in the area and that is 31.9 percent minority, slightly higher than the national average. All of the other counties in the labor market area have minority shares smaller than the nation and the state, with the exception of Todd County that has a minority share of 11.4 percent, slightly higher than the state but well below the national average.

The poverty level in 1999 in Muhlenberg County, according to the 2000 Census of Population, was 19.7 percent, higher than the state level of 15.8 percent and the national level of 12.5 percent. In the labor market area, the level was 16.4 percent, somewhat lower than in Muhlenberg County. Within the labor market area, the level ranged from 15.0 percent in Christian County to 19.7 in Muhlenberg County.

3.14 Visual Effects

Visual resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity).

The proposed property lies in the north and west area of the TVA PAF Reservation. The topography is moderately sloping and is mostly void of mature vegetation. There are five mostly small water bodies scattered throughout the 500 acres. Two small cemeteries are located within the property.

Views into the site are available only briefly from County Road 176. Changes in elevation and view corridors through existing mature vegetation prevent views along much of the roadway. Available views along this route are from the foreground (0 feet to 0.5 mile) and middle ground (0.5 mile to 4 miles) viewing distances.

Rockport Paradise Road bisects the property, traveling north from its connection point at County Road 176. Views from points along Rockport Paradise Road are available to the east where motorists can see one of the five water bodies in the foreground distance as the topography slopes away from the road to the Green River. A winding dirt road can also be seen leaving Rockport Paradise Road that leads around the water body to an informal launching ramp that is managed by TVA. Views to the west of Rockport Paradise Road are framed with vegetation in the foreground. At a point traveling north on the road, a cemetery is visible in the immediate foreground viewing distance. For the most part, views to the west of the larger expanse of the 500 acres are precluded, as mature vegetation obstructs views along the route.

Another small cemetery is located to the interior of the site, where the vegetation and topography remain consistent to the region. PAF is visible from the middle ground viewing distance and becomes a focal point as the cooling towers and other vertical elements are seen against the horizon. Overall, the scenic attractiveness is minimal, and the scenic integrity is low.

CHAPTER 4

4 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences of each resource and the effects of these consequences for Alternative A - the No Action Alternative, Alternative B - Shut Down the Coal Wash Plant and Associated Coal Refuse and Fines Disposal Area, and Alternative C - Idling the Coal Wash Plant.

4.1 Terrestrial Ecology

4.1.1 Terrestrial Plants

Vegetation at the project location is typical of that found in disturbed areas. No uncommon plant communities or otherwise sensitive plant habitats would be impacted by the proposed activities. Therefore, loss of vegetation associated with any of the proposed actions would be expected to be insignificant.

4.1.2 Invasive Plant Species

There is essentially no potential for any of the alternatives in this project, as described, to contribute significantly to the spread of exotic or invasive terrestrial plant species. No permits or commitments would be required.

4.1.3 Terrestrial Animals

4.1.3.1 Alternative A

The proposed development of the coal fines area and associated activities would temporarily impact habitat suitable for wildlife. Disturbances to the existing ponds would temporarily deter most animals, but the proposed construction would ultimately create additional habitat for waterfowl and other species. Removal of the beaver dam along the west section of the dike is not expected to result in serious impacts. Therefore, the project would not affect terrestrial animals or their habitats adversely or significantly.

Project implementation is not expected to affect migratory bird populations or unique animal habitat. The project would not create habitat with increased suitability for exotic or invasive terrestrial animals.

4.1.3.2 Alternatives B and C

Terrestrial animals would continue their current use of the aquatic areas and the open foraging habitat within the project site. Impacts to terrestrial species are not expected.

4.2 Threatened and Endangered Terrestrial Species

4.2.1 Plants

Because no federally or state-listed plant species are known from the site or reported from the vicinity, no impacts to any such species are anticipated.

4.2.2 Terrestrial Animals

4.2.2.1 Alternative A

The animals reported from areas within a three mile radius of the fossil plant (Table 3-1) are state-listed bird species that have not been reported nesting in the areas proposed for construction. The large nesting colony of bank swallows occurs near the perimeter of the fossil plant, well beyond any of the areas associated with the proposed activities. Although destruction of the pond would directly affect some state-listed bird species' available foraging habitat within the fossil plant boundaries, birds would likely migrate to other aquatic areas for feeding. Therefore, adverse impacts to state- or federally protected terrestrial animals are not expected.

4.2.2.2 Alternatives B and C

Rare terrestrial animals would continue their current use of the aquatic areas and the open foraging habitat within the project site. Impacts to state- or federally listed terrestrial animals are not expected.

4.2.3 Aquatic Animals

4.2.3.1 Alternative A

No protected aquatic animal species are known or likely to be present in surface waters (streams, ponds, or conveyances) that would be directly impacted by construction and use of this coal fines area. Alteration of the wet weather conveyance tributary to Daniel Run Creek would have no direct impacts to protected aquatic animals since no protected aquatic animals are likely to occur in these waterways.

With the implementation of standard BMPs during construction and operation of the coal fines storage area, no significant changes to water quality in Daniel Run Creek or the Green River would result from this action. All discharges from this coal fines storage area would meet appropriate discharge permit requirements. Therefore, this action would have no effect on federally listed aquatic animal species. Also, this action would likely have no indirect effects on federal- or state-listed sensitive aquatic animal species.

4.2.3.2 Alternatives B and C

Under these alternatives, no coal fines pond expansion would take place and, therefore, there would be no impacts to protected aquatic species in the 88-acre expansion area.

4.3 Wetlands

4.3.1 Alternative A

The proposed use of the site would result in the filling in of the 17-acre flooded strip-mine excavation (A-3), the 0.75 acre of associated emergent fringe wetlands (W1), and the 0.3 acre of emergent wetlands (W2) in the scattered depressions south of the flooded strip-mine. Because of their low functional quality and the existence of similar open water and wetland habitats on the adjacent Peabody State WMA and other reclaimed mining sites in the area, the impacts resulting from the loss of the approximately 1.1 acre of wetlands on the project site would be insignificant.

In the event TVA implements this alternative, the USACE would be asked to provide final jurisdictional determination and appropriate approvals would be obtained by TVA before

proceeding with the action if USACE concludes that the wetlands are jurisdictional. The regulations governing jurisdictional wetlands (33 C.F.R. 328.3) state that waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act are not jurisdictional waters. The strip-mine excavation could be determined to be a treatment system. If USACE determined the wetlands are jurisdictional, mitigation for the disturbance of such wetlands would consist of one of the following options:

- Restoration of a degraded wetland,
- Wetland creation,
- Purchase of credits in an existing, approved wetland mitigation bank
- Preservation and restoration of forested wetlands in the Green River watershed through an in-lieu-fee agreement with a conservation organization such as The Nature Conservancy or other conservation organization that operates in the Green River watershed.

Any compensatory mitigation plan would meet federal and state permit conditions and requirements and would be planned and conducted in consultation with the regulatory agencies.

The original EA which evaluated this proposal found there was no practicable alternative to the disturbance of these wetlands. This current review has determined that there are practicable alternatives to the wetland disturbance because the purchase of prewashed coal is currently economically feasible. It is possible that this analysis could change in the future based on reevaluations of the practicability of purchasing prewashed coal.

4.3.2 Alternatives B and C

Under these alternatives the coal fines pond expansion would not take place, and, therefore, there would be no impacts to the wetlands in the 88-acre expansion area.

4.4 Aquatic Ecology

4.4.1 Alternative A

Under this alternative appropriate BMPs, such as silt fencing and hay bales, would be utilized during construction activities, and the ground would be stabilized with adequate ground cover after construction activities were completed. These measures to control runoff and wastewater would result in insignificant impacts to aquatic life as a result of earthmoving related to dike and access road construction. Therefore, impacts to aquatic life in Daniel Run Creek or the Green River would be minimal and insignificant due to construction activities.

Fish and other aquatic life in the existing ponds to be incorporated into the additional capacity would be directly impacted by habitat alteration or elimination; most aquatic life in these ponds would likely be lost during storage operations. Because similar ponds resulting from past mining activities are common on the PAF site and in the area, this would not represent the loss of any unique aquatic habitats or a significant loss of area aquatic resources. Since the pond is not presently accessible to the public, there would be no loss of recreational opportunities.

Operation of the additional coal wash fines capacity would not result in any changes in water chemistry and quantity in Daniel Run Creek or the Green River because the coal fines ponds are operated in a hydrologically closed-loop system. Therefore, operational effects on aquatic organisms would be insignificant.

4.4.2 Alternatives B and C

Under these alternatives, plant surface runoff would be unchanged due to construction or operation of additional coal wash fines storage capacity, so aquatic life would not be affected.

4.5 Managed Areas

4.5.1 Alternative A

Under this Alternative, 88 acres of land would be adapted for disposal of coal wash fines at PAF. The Sinclair tract of the Peabody WMA is adjacent to the plant. Modification for use and utilization of the coal wash fines disposal area would occur within plant boundaries, and no impacts to the WMA are anticipated. The PAF ash ponds are popular with local birders; however, no impacts to this area are anticipated because it lies approximately 1 mile southeast of the coal wash activity area. There are no listed streams on the Nationwide Rivers Inventory in the vicinity of the project; thus, no impacts would occur to such streams.

4.5.2 Alternatives B and C

Under these alternatives, the proposed project expansion would not occur. Since most of the Peabody WMA is on reclaimed land, no negative impacts would occur to the area because of these actions.

4.6 Recreation

Because the commitment mentioned in Section 3.6, to construct and maintain a new river access, was completed, local anglers now have access to the Green River. Impacts to Recreation would be insignificant under any of the proposed alternatives.

4.7 Groundwater

4.7.1 Alternative A

Effects of shallow earthwork and dike construction activities associated with the coal fines pond expansion on groundwater resources would be negligible.

Results of the pond A-1 water budget analysis (Vadnal, 1989) and the coal fines pond groundwater monitoring study (Lindquist et al., 1997) indicate that despite leakage from the coal fines pond, pond leachate does not appear to have had an adverse effect on local groundwater quality during the first ten years of operation. The absence of discernable groundwater quality impacts during the first ten years of operation of pond A-1 suggests that there would be no significant groundwater degradation associated with the proposed coal fines pond expansion. The rate of leakage from the proposed facility would be expected to be similar to that observed at pond A-1, because both pond sites are underlain by unconsolidated mine spoil. Likewise, the chemical characteristics of leachate from the existing and proposed ponds would be similar since there would be no change in coal washing processes and no change in the composition of other dredged materials disposed in the coal fines pond. Therefore, the effect of the proposed coal fines pond expansion on groundwater quality is expected to be insignificant.

To confirm that there would be no future groundwater quality impacts due to the coal fines pond expansion, limited groundwater monitoring of existing wells in the area is needed. A one-time sampling of wells 9550B, 9551A, 9552A, and A-1 would be performed prior to facility expansion to verify if there had been any significant change in groundwater quality since the June 1997 monitoring event. Samples would be analyzed for the same constituents as the previous samples. If no significant changes were indicated, no further monitoring of coal fines pond wells would be performed. If significant water quality changes connected with the coal fines pond are indicated, the potential risks of groundwater contamination would be assessed and the need for additional monitoring and mitigation evaluated. Mitigative measures, if required, might include installation of a liner over the bottom of the pond or construction of a leachate collection system.

4.7.2 Alternatives B and C

Under Alternative B, the proposed project area would not be utilized for disposal of coal wash fines. Present activities would continue until circumstances warranted a coal wash plant shutdown, and permanent closure activities would commence on the coarse and medium refuse and the coal fines pond areas. Under Alternative C, present plant activities would continue until the fall of 2004. At that time, the coal wash plant would be idled, and interim management of the coarse and medium refuse areas and the coal fines ponds would begin. None of the interim management activities or permanent closure activities would affect groundwater. Therefore, there would be no additional impacts to groundwater under these alternatives.

4.8 Surface Water

4.8.1 Alternative A

The existing coal fines settling area would be enlarged, requiring the construction of dikes around the new area. In addition, a pipe would be installed to divert surface runoff from off site so that it would not affect the operation of the settling ponds.

During construction, runoff from areas where dikes and access roads would be constructed and other areas of disturbed soil would be controlled by implementation of BMPs like silt fences and/or hay bales (or other filtration devices). One section of the west dike would be constructed immediately adjacent to Daniel Run Creek. This would expose this segment of dike to accelerated erosion from intermittent high flows in the creek, potentially causing significant amounts of sediment added to the creek and damage to the dike. Special care would be taken to protect this section of dike, using rock, permanent erosion control fabric, and/or vegetation plantings as appropriate. BMP selection and maintenance would prevent any significant impact.

The proposed 36-inch runoff bypass pipe would divert runoff from the ponds. TVA would implement BMPs to minimize erosion and would place rock or other controls as necessary to prevent excessive migration of sediment to the unnamed tributary of Daniel Run Creek. After the pipe was installed, the downstream channel would be inspected during the wet season of one calendar year for impacts. Based on the inspection results, appropriate mitigative measures would be implemented. The measures could include installation of silt fences and check dams (or other filtration devices) in appropriate areas upstream and downstream of the 36-inch pipe.

4.8.2 Alternatives B and C

The coal wash plant would operate until storage capacity was depleted. During operation, since the coal wash fines disposal process at PAF is a hydrologically closed loop system, there would continue to be no impact on surface water from the coal wash process water. Under Alternative B, after the depletion of the storage capacity, the coal wash plant would shut down, and the coal fines and coarse and medium refuse areas would be permanently closed. For permanent closure, erosion controls would be constructed initially as described below for interim management. A KPDES general construction storm water permit would be required, along with the associated utilization of BMPs. Silt fences and check dams would need to be constructed where necessary. Storm water controls would also be necessary for the borrow area. Under Alternative C, present plant activities would cease in the fall of 2004. At that time, the coal wash plant would be idled and interim management of the coal refuse areas would begin. During this phase there would not be any discharge of process water to surface water and consequently no impact to surface waters. However, during this phase initial closure operations for the coarse and medium refuse stack and the coal fines pond would consist of constructing erosion controls. Because disturbance would exceed 1 acre during construction, a KPDES general construction storm water discharge permit would be required. The coarse and medium refuse areas and borrow areas would also require BMPs to control runoff. These may include silt fence, check dams, or storm water retention ponds. These controls may be used as appropriate in interim or permanent closure. BMP selection and maintenance would prevent any significant impact.

Under Alternative A or C, coal fines from the coal fines pond could be processed and burned in the units at PAF. The fines would be excavated from Fines Pond Area 3 (Figure 4-1). As long as adequate BMPs are employed during this operation, the impacts to surface water would be minimal.

4.9 Air Quality

During construction activities for any of the three alternatives, additional truck and earthmoving equipment traffic would occur that would likely result in accumulation of additional dust and debris on site roads and grounds in the vicinity of the pond, the coarse and medium refuse area, and/or associated infrastructure construction. During the interim management period, there is the potential for fugitive emissions from the refuse areas. A binding agent or soil (or other material) and vegetative cover would be used to minimize this potential. Appropriate BMPs would be implemented to control and reduce fugitive dust emission from construction activities to insignificant levels.

Under Alternative A or C, coal fines from the coal fines pond could be processed and burned in the units at PAF. There would be no additional impacts to the air due to this operation because this coal would be stored and burned using the same practice that is used currently. Therefore, any impacts due to this activity would be minimal.

4.10 Solid Waste

Construction wastes and scrap material generated during construction of any of the activities for the three alternatives would be controlled by implementation of routine plant measures for proper handling and disposal of such wastes. Therefore, any impacts due to those activities would be minimal.

4.11 Coal Refuse Areas

4.11.1 Alternative A

The fines pond area would be expanded by 88 acres. The fines pond expansion area and the coarse and medium refuse areas would be managed by the same processes already in place at PAF. There could be excavation and burning of coal fines at PAF. The material would be excavated from Fines Pond Area 3 (Figure 4-1), and trucked to a staging area. The operation used for this excavation, storage, and burning of this material would be very similar in nature to other operations currently in place at PAF, and would follow the same processes already in place at PAF. Since TVA would follow the same processes already in place, and since the expansion of the 88 areas is part of the original 500-acre designated for this use in the original EA (TVA, 1986), the impacts of these activities would be minimal.

4.11.2 Alternatives B and C

Under Alternative B, the coarse and medium refuse and the fines pond complex would be closed. Under Alternative C, the coarse and medium refuse areas and the coal fines ponds would be interimly managed for a period of up to five years, while evaluations regarding other options for the coal wash refuse are completed. In the future, TVA could continue with interim management for another five-year cycle. If the evaluation showed that interim management was not effective for all or part of the refuse areas, then TVA would implement permanent closure of the areas where interim management was not effective. Appendix B (Smith, 2004) has a summary of the interim management and permanent closure plans for the coarse and medium refuse areas and the fine ponds areas. The impacts from interim management and permanent closure activities would be beneficial because the 88-acre expansion would not occur and because the fines ponds areas would be either interimly managed or permanently closed. With implementation of appropriate BMPs for interim management or permanent closure, the impacts from either of these activities would be insignificant.

4.12 Socioeconomics

4.12.1 Alternative A

Some construction activity would be required in order to expand the fines pond area and to install a pipe to enclose offsite storm water through the pond area. The result would be a small, short term, but positive economic impact on the area, due to the resulting temporary increase in construction employment in Muhlenberg County. This alternative would have no impact on permanent employment at the PAF.

4.12.2 Alternatives B and C

Under Alternative B, the coal fines disposal pond area would not be expanded. Current operations would continue until the existing storage capacity is exhausted. At that time, coal wash plant operations would cease due to lack of coal wash fines storage capacity. Under Alternative C, TVA would idle the coal wash plant by the fall of 2004. Under either Alternative B or C, there would be some construction activity at the site. The result would be small, short-term, but positive impacts to employment and income in the area. In addition, idling the plant and purchasing clean coal are estimated to save TVA about \$17 million over the first three years after placing the coal wash plant into idle status, providing a positive impact to TVA finances. Shutting down the wash plant would result in similar savings minus the cost of securing the actual plant facility and closing the disposal area. About 44 employees at the site would be affected by the idling or shutting down the coal wash plant. It is anticipated that there would be positions available at the PAF to cover all these affected employees. Should positions not be available at this site for all affected employees, there should be available positions at other TVA facilities.

4.13 Environmental Justice

There would be no significant environmental impacts under any of the alternatives. The area around the site is largely rural and not densely populated. Minority populations are relatively small, except for Christian County, although the poverty rates are somewhat higher than the state and national levels. However, due to the lack of significant impacts and the low population densities, no disproportionate impacts to disadvantaged populations would be likely.

4.14 Visual

Consequences of the impacts to visual resources are examined based on changes between the existing landscape and the landscape character after alteration, identifying changes in the landscape character based on commonly held perceptions of landscape beauty and the aesthetic sense of place.

4.14.1 Alternative A

TVA would convert the 88 acres for disposal of process waste associated with operations at PAF. The visual character of the proposed area would be altered somewhat as clearing and grading occurred on the site. Creation of multiple disposal ponds would result in dramatic changes in topography on the site as dikes are created and ponds are built to contain the process waste.

Views of these alterations in landscape character would not be exceedingly visible and would be limited to the viewing points and distances described in Section 3.14. The previous alteration of the site presents an existing scenic value that has a high visual

absorption capacity, meaning that the proposed property location has an ability to accept further human modification without compromising the existing scenic attractiveness and scenic integrity. Therefore, the impacts to visual resources would be insignificant. Subsequent development of disposal ponds to the northwest of the project site would also have insignificant impacts on visual resources.

4.14.2 Alternatives B and C

Under Alternative B, the coal wash plant would be closed, and the fines pond area would not be expanded. The coal refuse areas would be capped with a soil cover of 4 feet. Under Alternative C, the coal refuse areas would be interimly managed for a five-year cycle. There would be an increase in personnel and equipment in the project area during the construction phase of these activities. Motorists passing on County Road 176 might have brief and intermittent views of construction activities. The landscape character would be changed as the topography was manipulated and grading operations occurred on site. Due to the temporary nature of the discordant views, impacts associated with this alternative would be insignificant.

4.15 Cumulative Effects

Due to the facts that the coal fines ponds operate in a hydrologically closed-loop system, that the topography of this area has been severely altered by previous activities (prior to TVA involvement), and that there would be suitable habitat elsewhere on the PAF site for state-listed threatened and endangered species, the cumulative effects would be insignificant under any alternative.

4.16 Summary of TVA Commitments and Proposed Mitigation Measures

4.16.1 Routine and Compliance Measures

4.16.1.1 Alternative A

- (1) In the event TVA implements this alternative, the USACE would be asked to provide final jurisdictional determination and appropriate approvals would be obtained by TVA before proceeding with the action if USACE concludes that the wetlands are jurisdictional. If USACE determined the wetlands are jurisdictional, mitigation for the disturbance of such wetlands would consist of one of the following options: restoration of a degraded wetland, wetland creation, purchase of credits in an existing, approved wetland mitigation bank, or preservation and restoration of forested wetlands in the Green River watershed through an in-lieu-fee agreement with a conservation organization such as The Nature Conservancy or other conservation organization that operates in the Green River watershed. Any compensatory mitigation plan would meet federal and state permit conditions and requirements and would be planned and conducted in consultation with the regulatory agencies.
- (2) If vegetation is inadequate or if erosion features (such as gullies) are present in the area that drains to the 36-inch pipe, TVA would treat this area to minimize erosion. To prevent localized erosion and undermining of the pipe, the areas at the ends of the pipe would be treated with rock or other measures as necessary.
- (3) TVA would implement BMPs for erosion control like hay bales, silt fencing, and soil stabilization and fugitive dust suppression like the use of a binding agent or soil (or other material) and vegetative cover during construction and operation of

the coal fines expansion area. Runoff from construction activities would be in accordance with applicable permits.

- (4) Special care would be taken using rock, permanent erosion control fabric, and/or vegetation plantings as appropriate to protect the section of west dike adjacent to Daniel Run Creek.
- (5) If more than 1 acre of land would be disturbed, a construction storm water permit would be obtained.
- (6) After completion of construction activities, the ground would be stabilized with adequate ground cover.
- (7) Appropriate BMPs like limiting the distance of the coal fines transfer process would be utilized during excavation of coal fines from coal fines pond #3.

4.16.1.2 Alternatives B and C

- (1) If more than 1 acre of land would be disturbed, a construction storm water permit would be obtained.
- (2) TVA would implement standard BMPs for erosion control like hay bales, silt fencing, and soil stabilization and fugitive dust suppression like the use of a binding agent or soil (or other material) and vegetative cover during construction and operation of the coarse and medium refuse and coal fines pond complex areas and during excavation activities from coal fines pond # 3.

4.16.2 Special Mitigation Measures

4.16.2.1 Alternative A

- (1) A one-time sampling of wells 9550B, 9551A, 9552A, and A-1 would be performed prior to facility expansion to confirm that there had not been any significant change in groundwater quality since the June 1997 monitoring event. Samples would be analyzed for the same constituents as the previous samples. If no significant changes were indicated, no further monitoring of coal fines pond wells would be performed. If significant water quality changes connected with the coal fines pond area are indicated, the potential risks of groundwater contamination would be assessed and the need for additional monitoring and mitigation would be evaluated. Mitigative measures, if required, might include installation of a liner over the bottom of the pond or construction of a leachate collection system.
- (2) After the 36-inch pipe was installed to reroute storm water from the coal fines pond, the downstream receiving channel would be inspected during one calendar year's wet season for impacts. Based on the results of this inspection, the channel would be stabilized if needed.

4.16.2.2 Alternatives B and C

- (1) During interim management for the coarse and medium refuse area and applicable fines pond areas, 1-foot-thick layer of scrubber sludge or other suitable material would be placed on the surface for cover.

- (2) During interim management for the fines pond complex, a binding agent would be applied once per year to areas 1 and 3.
- (3) During interim management for the coarse and medium refuse area and fines pond complex, routine inspections would be performed for adequate vegetative cover, evidence of erosion, standing water, sloughing or subsidence of cover soil and resulting cracks, water material exposed, animal or rodent activity causing damage to cover, evidence of intruders with off-road vehicles, evidence of spontaneous coal combustion, and binding agent crust intact.
- (4) For permanent closure, 4 feet cover of suitable material would be placed over applicable surfaces of the coarse and medium refuse and fines pond areas.

CHAPTER 5

5 SUPPORTING INFORMATION

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CHAPTER 6

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APPENDIX A – ENVIRONMENTAL ENGINEERING DIKE CONSTRUCTION SPECIFICATIONS

The stability of dikes and slopes has been a concern of engineers for years. The safety factor of any soil structure should be above 1.0, or landslides could occur. The safety factor is determined by the resisting moments of a dike divided by the moments causing failure. Because of this, the proposed fines pond dikes were checked using the “PCSTABL5M” program developed by Purdue University. This program used the Simplified Janbu, Simplified Bishop, or Spencer’s Method of slices. This program has seismic calculations built in.

A vertical slice of the structure is taken and all resistance to movement is calculated. Next, all forces causing movement are calculated. Then, the slice is divided into 1 foot squares and moments of all forces are taken at all 1 foot square intersections. This calculation is done for several types of conditions, i.e., construction, saturation, and earthquake. The program can generate over 500 answers for each slice per each condition. These are each evaluated to see if they apply. When the program was generated for PAF, the piezometric surface was specified using information from previous constructed dikes of this type at the plant.

The safety factor for PAF coal wash fines dike was calculated by the Modified Janbu Method. The Modified Janbu Method is a slight modification on the Simplified Janbu Method mentioned above. The modified method utilizes fewer computer points in its calculations.

The north dike would be constructed with a 4:1 slope on the outside with a 1 percent sloping, 8-foot-wide berm at Elevation (EI) 450. The material for the north dike would be constructed to final EI 475, because no dike material would be available for the second lift once fines were diverted into the pond. The west dike would be constructed to its final height of EI 450. The dike would have a 4:1 slope on the outside with a 1 percent sloping, 8-foot-wide berm ditch at EI 435 and would be a 2:1 slope on the inside.

The south dike would be the largest of the four dikes and would require two raisings. The first phase would be constructed to EI 450 or EI 460 and raised to EI 475 after 5 years. If the first phase were constructed to EI 460, the return water could potentially be gravity-fed back to the stilling pond and be electrically pumped to the coal wash plant. If the first phase were constructed to EI 450, the (existing) diesel operated pump would still be needed. From the north end, both sides of the dike to EI 450 (460) would have a 2:1 slope for 1,200 feet. The next 2,000 feet would have a 4:1 slope on the outside and a 2:1 slope on the inside to EI 450 (460). The top of the dike would be the berm and roadway for the next lift. The top of the dike would be wide enough for the second lift to be built directly on top of the first dike. Two temporary 24-inch culverts would be placed across the dikes, one at each end, at invert EI 440 to maintain equal pressure on both sides of the dike for the first 1,200 feet of the dike. When the fines reach EI 440, the culverts would be removed and raised to EI 446 and construction on the next lift of the south dike would begin.

The east dike (pump pond dike) would have a 4:1 slope on the outside with 1 percent slope, 8-foot-wide berm ditch at EI 440 or EI 460 and be anchored at the top of the west

bank of Daniel Run Creek. If the south dike and the east dike were raised to El 460, the need for the diesel operated pump would be eliminated. The existing 7,000 feet of Daniel Run Creek bank would not be damaged or cleared by construction of the dikes. The inside of the dike would have a 2:1 slope. The existing access road would be plowed and covered over with the dike. The road would then be relocated to the top of the east dike at El 440 (460). This dike area would be for return waters from the ponds, and the diesel operated pump (if needed) would be relocated on the east end adjacent to the existing dike. This dike would be raised to El 465 after five years.

A 36-inch pipe would be constructed into the north dike to route 209 acres of off-site and on-site storm water around the project site. Because of a lighter pipe weight for construction and its better sealing properties, a double-seal continuous-welded high-density polyethylene-extruded pipe would be utilized. A fabric encapsulated backfill 6 feet deep with 5 feet of soil backfill cover would be used on the last 8 inches of the pipe backfill to ensure no floating. This encapsulation would be continuous through the pond area and extend 30 feet into the dikes. This pipe route would not be used as a road unless it is unavoidable.

APPENDIX B – SUMMARY OF INTERIM MANAGEMENT AND PERMANENT CLOSURE PLAN FOR COAL REFUSE AREAS

B.1 Course and Medium Refuse Stack Intermediate Management

Interim management activities would consist of regrading a portion of the stack to eliminate steep slopes. Care would need to be taken during grading activities to prevent spontaneous combustion. Fill material would be brought in and stockpiled so that newly graded areas can be covered immediately after grade was achieved. A one-foot thick layer of scrubber sludge would be placed on the surface of the coarse and medium refuse stack. Additional soil could be placed on top of the scrubber sludge to sustain vegetative growth, depending on the ability of scrubber sludge to support vegetation without severe erosion. The uppermost 3 to 5 inches would be scarified, fertilized, seeded, and mulched, and erosion control matting would be applied. The types of grass species utilized would be selected to survive drought periods. New vegetation would require annual maintenance during interim management, to ensure sustained growth to prevent erosion of the temporary cover. A watering system may need to be put in place to water the grass periodically as it matures. Routine inspections would be performed for adequate vegetative cover, evidence of erosion, standing water, sloughing or subsidence of cover soil and resulting cracks, water material exposed, animal or rodent activity causing damage to cover, evidence of intruders with off-road vehicles, or evidence of spontaneous coal combustion.

B.2 Coarse and Medium Refuse Stack Permanent Closure

The existing scrubber sludge surface would be disturbed as part of placing the permanent cover; existing vegetation would be stripped and the surface scarified so that subsequent layers could be bonded to the existing grade. This activity would be sequenced so that large areas would not be disturbed all at once. A cumulative of 4-foot permanent cover would be placed. 1 foot of this cover would be from interim management. The remaining cover would consist of 2 feet of scrubber sludge placed in 8-12 inch thick lifts and compacted to 90 percent standard proctor density using dozers and other equipment. The final lift would consist of a 1-foot thick layer of soil obtained from a nearby on-reservation borrow area. The uppermost 3 to 5 inches would be scarified, fertilized, seeded, and mulched. The types of grass species utilized would be selected to survive drought periods. A watering system would need to be put in place to water the grass periodically as it matures. .

B.3 Fines Pond Complex Interim Management

The general area plan for the fines pond complex is shown in Figure 4-1. Interim management would consist of cost effectively stabilizing areas to minimize dusting and erosion. Interim management would commence after the coal wash plant was idled (or within a reasonable period of time if plant operations cease in the late fall or winter months). Interim management would consist of placing a 1-foot cover of suitable material, seeding and stabilizing Areas 2, 4 and part of Area 5 (the part not under water). The part of Area 5 that is under water would be maintained as such. Areas 1 and 3 would be treated annually with a binding agent. Area 3 could also have fines excavated from it and burned in the units at PAF. Areas 6 and 7 would be seeded during interim management and would not undergo permanent closure. Routine inspections would be performed for adequate vegetative cover, evidence of erosion, standing water, sloughing or subsidence of cover soil and resulting cracks, water material exposed, animal or

rodent activity causing damage to cover, evidence of intruders with off-road vehicles, evidence of spontaneous coal combustion, and binding agent crust intact.

B.4 Fines Pond Complex Permanent Closure

B.4.1 Area 3

Area 3 is currently receiving additional coal fines. The existing surface of Area 3 has a gentle slope trending from north to south. Permanent closure would consist of placement of a grid and 2 feet of bottom ash to provide a working base for staging equipment for Area 3. Up to 4 feet of cover material consisting of bottom ash, scrubber sludge, and soil would be placed on Area 3 during permanent closure. Ash would be transported to Area 3 from PAF or from existing stockpiled material located at the fines pond complex. Once grading has been completed, the uppermost three to five inches of soil cover would be scarified, fertilized, seeded, and mulched. The types of grass species utilized would be selected to survive drought periods. A watering system would need to be put in place to water the grass periodically as it matures.

B.4.2 Area 1

Area 1 has not received any additional coal fines material for some time. Area 1 would be closed in much the same manner as Area 3. Closure of Area 1 would be accomplished by providing up to 4 feet of cover material consisting of bottom ash, scrubber sludge, and soil. The uppermost layer would be soil, to promote vegetative growth. Bottom ash material could be placed initially to provide a working base for supporting equipment. The final contours for Area 1 would resemble the existing topography, and existing surface drainage patterns would not be significantly altered.

B.4.3 Areas 2, 4, and 5

Permanent closure would consist of application of additional scrubber sludge or other material topped by 1 foot of soil for vegetative growth (minimum 4-foot thickness of cover total). Because most of Area 5 is assumed to be under water, the water level would need to be lowered to allow placement of cover.