

**POTENTIAL PARADISE FOSSIL PLANT RETIREMENT
FINAL ENVIRONMENTAL ASSESSMENT**
Muhlenberg County, Kentucky

Prepared by:
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Symbols, Acronyms, and Abbreviations

°F	Fahrenheit
µg	Microgram
AADT	Annual Average Daily Traffic
ACS	American Community Survey
BMP	best management practice
CCR	Coal Combustion Residuals
CCR Rule	USEPA Final Rule on Disposal of Coal Combustion Residuals from Electric Utilities
CCW	Condenser Cooling Water
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO ₂	carbon dioxide
CT/CC	combustion turbine/combined cycle
cy	cubic yard
dB	Decibels
dBA	A-weighted decibels
DNL	day-night average sound level
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FGD	flue gas desulfurization
FHWA	Federal Highway Administration
FY	fiscal year
GHG	greenhouse gas
gpm	gallons per minute
GRM	Green River Mile
IPaC	Information for Planning and Conservation
IRP	Integrated Resource Plan
KDFWR	Kentucky Department of Fish and Wildlife Resources
KPDES	Kentucky Pollution Discharge Elimination System
KRS	Kentucky Revised Statutes
KSNPC	Kentucky State Nature Preserves Commission
L	Liter
lb	Pound
m ³	cubic meter
MCL	maximum contaminant level
Mg	Milligram
MGD	million gallons per day
MWh	megawatt hour
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEI	National Emission Inventory

NEPA	National Environmental Policy Act
NGCC	natural gas-fired combined-cycle
No.	Number
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NWS	National Weather Service
O ₃	Ozone
OSHA	Occupational Safety and Health Administration
PAF	Paradise Fossil Plant
Pb	Lead
PCB	polychlorinated biphenyls
pH	potential hydrogen
PM	particulate matter
PM ₁₀	particulate matter less than 10 microns in diameter
PM _{2.5}	particulate matter less than 2.5 microns in diameter
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RFFA	Reasonably Foreseeable Future Action
SAIPE	Small Area Income and Poverty Estimates
SCR	Selective Catalytic Reduction System
SO ₂	sulfur dioxide
SPL	sound pressure level
SR	State Route
std.	Standard
TSCA	Toxic Substances Control Act
TVA	Tennessee Valley Authority
U.S.	United States
US Hwy	United States Highway
USACE	United States Army Corps of Engineers
USBLS	United States Bureau of Labor Statistics
USC	United States Code
USCB	United States Census Bureau
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WMA	Wildlife Management Area

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Tennessee Valley Authority's (TVA) Paradise Fossil Plant (PAF) is located in Muhlenberg County in western Kentucky, approximately 35 miles northwest of Bowling Green and 95 miles southwest of Louisville (**Figure 1-1**). The plant is on a large reservation of approximately 3,400 acres located on the west bank of the Green River near the former community of Paradise and about eight miles southeast of Central City.

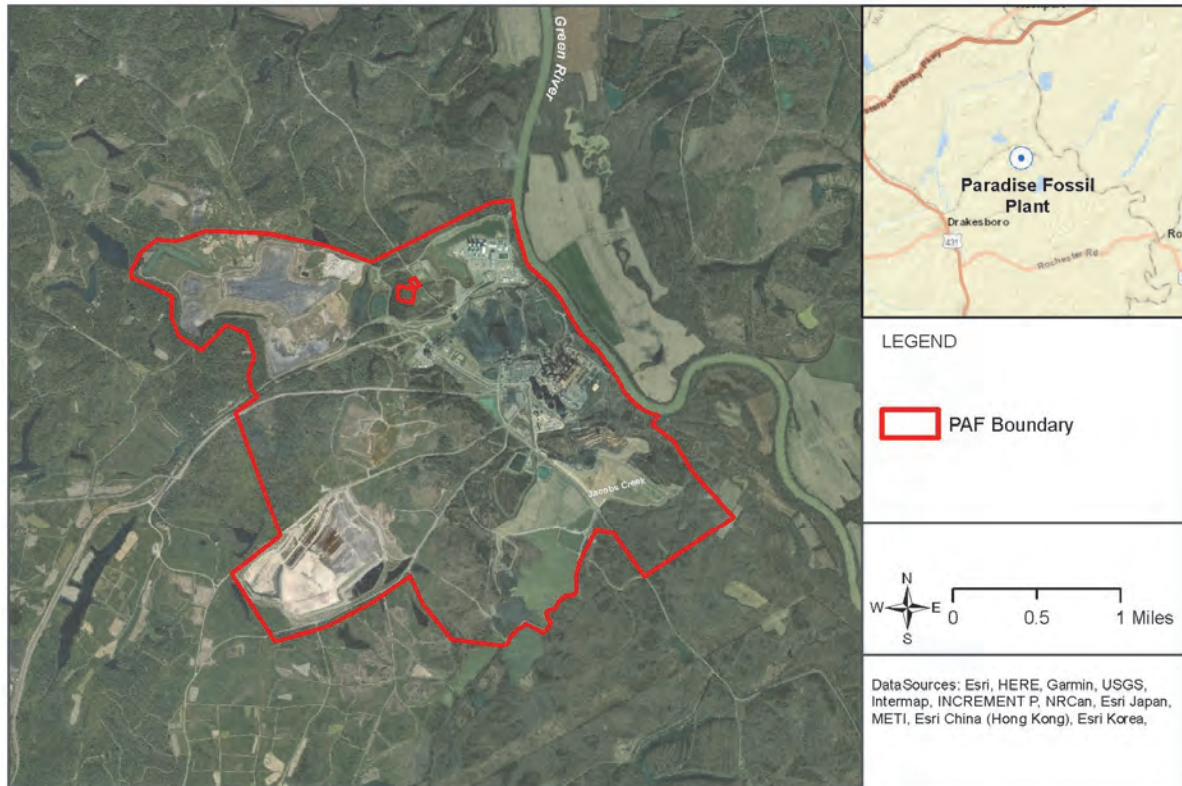


Figure 1-1. Paradise Fossil Plant Overview Map

PAF was originally constructed with two coal-fired cyclone generating units. Each of these units, known as Units 1 and 2, had a generating capacity of 704 megawatts (MW) and went on-line in 1963. A third unit, Unit 3, became operational in 1970 with a capacity of 1,150 MW. Combined, the three units had a generating capacity of 2,558 MW and could produce more than 14 billion kilowatt hours of electricity each year, enough to supply more than 950,000 homes. In order to comply with the United States (U.S.) Environmental Protection Agency (USEPA) 2010 Mercury and Air Toxics Standards, TVA retired Units 1 and 2 in April 2017 and replaced their generation with a new 1,100-MW natural gas-fired combined cycle plant located on the PAF reservation just north of the coal units. Unit 3 has continued operating.

In August 2015, TVA published the 2015 Integrated Resource Plan (IRP; TVA 2015) and associated environmental impact statement (EIS), which were developed with input from stakeholder groups and the general public. The 2015 IRP evaluated five scenarios

(plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area (PSA), which encompasses approximately 80,000 square miles for the majority of Tennessee and parts of Alabama, Georgia, Kentucky, Mississippi, North Carolina and Virginia. The target supply mix adopted by the TVA Board through the 2015 IRP included the potential retirement of up to 2,600 MW of coal-fired generation by 2033.

TVA has recently experienced flat to declining load, most similar to the Distributed Marketplace scenario in the 2015 IRP, and natural gas prices have remained relatively low. These conditions have prompted TVA to conduct analyses of all its generating assets considering load outlook, economic benefits and costs, performance, and environmental and social impacts. Assets that have relatively high projected future maintenance cost and environmental compliance expenditures, a high forced outage (i.e., an unplanned shutdown to repair or replace failed equipment) rate and poor generation portfolio fit, are now the focus of more detailed study for potential retirement. PAF Unit 3 falls into this category of assets.

Due to the reasons stated above, TVA has prepared this environmental assessment (EA) pursuant to the National Environmental Policy Act (NEPA) and TVA's procedures for implementing NEPA to assess the site-specific impacts of the potential retirement of PAF Unit 3. Because Unit 3 is the only operating unit at PAF, its retirement would result in the retirement of PAF. TVA is also currently working with stakeholders to develop the 2019 IRP and associated EIS (TVA 2018g), which include the evaluation of future facility retirements as options across various planning scenarios and strategies, similar to the 2015 IRP. Comprehensive analysis, including the NEPA evaluation for the retirement of PAF Unit 3, will inform the TVA Board as TVA plans its future power supply.

1.2 Purpose and Need

TVA is assessing the continuing cost of operations against the power demand projections and TVA's statutory mission to provide reliable electric service at the lowest system cost. Certain costs that would be incurred at PAF Unit 3 in the next few years has created the need to undertake this assessment.

PAF Unit 3 has significant future capital needs to support compliance with the USEPA's Coal Combustion Residual (CCR) and Effluent Limitation Guidelines rules. Moreover, PAF Unit 3 has experienced deterioration in its material condition resulting in reliability challenges and the need for large investments. Further, an emergent steam turbine rotor issue requires significant expenditures as the rotor must be replaced. Based on data from 2015 to 2017, material condition challenges have contributed to higher forced outage rates, placing PAF Unit 3 in the bottom quartile of the U.S. coal fleet for forced outage occurrences¹. Given lower loads, continued low natural gas prices, and the potential for greater load swings (i.e., large changes in demand over short time periods), TVA's resource portfolio benefits most from continued operation of two types of coal units:

- Large, efficient coal units with low operating costs and low forced outage rates to effectively serve baseload, and
- Small, flexible coal units with medium operating costs and low forced outage rates to effectively meet load swings.

¹ PAF Unit 3 2018 Equivalent Forced Outage Rate of 18.3 percent was slightly higher than the three year average of 16.7 percent, which ranked in the bottom quartile.

Additionally, it is beneficial for coal units to offer fuel flexibility, such as being able to utilize existing coal supplies from many different mines and/or geographic locations. The analysis of the proposed retirement considered that PAF Unit 3 offers fuel flexibility as it can use coal sourced from two major coal-producing regions and receive shipments via multiple delivery methods. However, as a large coal unit with medium operating costs and a high forced outage rate, as well as the need for significant repairs, PAF Unit 3 does not fit current portfolio needs. The retirement of a unit with high maintenance and other costs would facilitate TVA's statutory mission to provide reliable power at the lowest system cost.

Another factor to consider is the manner in which PAF Unit 3 is operated. Unit 3 was designed to produce 1,000 megawatts of steady power generation. However, with increased volatility in energy consumption and increased nuclear generation that provides lower cost, steady generation, PAF Unit 3 is challenged to respond to these changes in operation.

Recent improvements to increase flexibility have resulted in PAF Unit 3 being able to achieve a 425-MW emergency minimum generation output, higher ramp rates of 180 MW per hour, and improved ability to cycle off and back on more quickly and more often. However, even with these improvements, PAF Unit 3 does not provide the level of flexibility needed to balance hourly, daily and seasonal changes in energy consumption. In addition, cycling the unit off and on results in more wear and tear and higher operation and maintenance costs.

As future consumer demand for renewable energy continues to rise, generation flexibility will become even more important. The addition of new solar generation will require even greater flexibility than TVA can currently provide. Weather changes, such as cloud movement that temporarily blocks the sun, reduce solar output and cause other generating units to respond in order to continue to reliably supply power to the consumer. PAF Unit 3 is not designed to provide this type of response.

TVA system planners also performed an economic evaluation of the PAF retirement which takes into account fuel price volatility. Impacts of fuel price volatility were evaluated against high and low gas price sensitivities. The evaluation indicates that other TVA coal units can partly replace the generation currently provided by PAF, muting impacts during periods of higher natural gas prices. Additionally, TVA commissioned a fuel resiliency study conducted by a third party (IHS Markit) that evaluated TVA's fuel resiliency with and without the PAF retirement. The study criteria included fuel supply, fuel delivery, inventory, and backup contingencies for all of TVA's generating assets. It indicated that TVA's overall fuel supply position is among the most resilient in the U.S. due to a well-diversified generation portfolio, advantageous location with respect to major gas pipelines, access to multiple coal supply and transport options, and a strong and resilient program to secure nuclear fuel. An analysis of study findings indicates that reducing the coal fleet would not materially impact TVA's fuel resiliency.

Therefore, TVA has prepared this EA to evaluate the retirement of PAF Unit 3 in 2020 considering load outlook, economic benefits and costs, performance, and environmental and social impacts, with no immediate need to replace the generating capacity currently provided by PAF Unit 3. TVA's action is consistent with TVA's 2015 IRP and supports a low cost, reliable, risk-informed, diverse, environmentally responsible, and flexible power system.

1.3 Related Environmental Reviews

The following environmental reviews provide information relevant to this EA:

- *Paradise CCR Management Operations Environmental Assessment* (TVA 2017). This EA reviewed actions necessary to convert CCR storage from wet to dry and included the construction and operation of a Gypsum Dewatering Facility, Dry Fly Ash Handling System, and an onsite CCR landfill. The Proposed Action also included the closure of the Gypsum Disposal Area, Slag Impoundment 2A/2B, Stilling Impoundment 2C, and the Peabody Ash Impoundment. This EA tiers from the 2016 Ash Impoundment Closure EIS to evaluate the closure alternatives for the existing ash impoundments at PAF. The *Paradise CCR Management and Process Water Basins Supplemental Environmental Assessment* (TVA 2018a) included the additional development of Process Water Basins north of Slag Impoundment 2A/2B.
- *Ash Impoundment Closure Environmental Impact Statement* (TVA 2016). This programmatic EIS was prepared to address the closure of CCR impoundments at all of TVA's coal-fired power plants. It did not specifically address impoundments at PAF; however, it was used as the basis for analysis in the 2017 Paradise CCR Management Operations EA.
- *Integrated Resource Plan, 2015 Final Report* and Supplemental EIS (TVA 2015). This plan provides direction for how TVA will meet the long-term energy needs of the TVA PSA. The plan and the associated supplemental EIS evaluate scenarios that could unfold over the next 20 years. It discusses ways that TVA can meet future power demand economically while supporting TVA's equally important mandates for environmental stewardship and economic development across the TVA PSA. The report indicated that a diverse portfolio is the best way to deliver low-cost, reliable electricity.
- *Final Environmental Assessment, Paradise Fossil Plant Units 1 and 2 Mercury and Air Toxics Standards Compliance Project, Muhlenberg County, Kentucky* (TVA 2013a). The EA evaluated two alternatives to comply with USEPA's 2010 Mercury and Air Toxics Standards. These included installation and operation of pulse jet fabric filter systems or as an alternative to installation of emission control equipment on PAF, replacing Units 1 and 2 with a combustion turbine/combined cycle plant.
- *Supplemental Environmental Assessment, Paradise Fossil Plant Disposal of Coal Wash Fines, Muhlenberg County, Kentucky* (TVA 2004). This EA evaluated the capacity for disposal of coal wash fines from coal washing operations at PAF. Previous reviews evaluated the purchase of 500 acres of undeveloped land for the disposal of coal wash fines and miscellaneous dredge materials. This supplemental EA reviewed the development of 88 of those previously designated acres into an expansion pond for disposal of coal wash fines, shutting down PAF coal wash plant operations after exhausting the existing coal fines storage space, or idling the coal wash plant and retaining the ability to restart the wash plant in the future if necessary.
- *Development of Ash Disposal Capacity at Paradise Fossil Plant, Tennessee Valley Authority* (August 1996). This EA evaluated alternatives for disposal of fly ash produced at PAF and considered the expansion of the Peabody Ash Impoundment.

1.4 Scope of the Environmental Assessment

This EA evaluates the environmental and socioeconomic impacts of the potential retirement of PAF. If TVA decides to retire PAF, actions associated with deconstruction and demolition of PAF Unit 3 would be addressed in a future NEPA review. A detailed description of the proposed action and alternatives considered are provided in Chapter 2. TVA has performed a preliminary analysis and determined that the following resources will not be affected by the proposed action and are eliminated from detailed review:

- Cultural Resources – Although several historic properties have been identified in the vicinity of PAF, TVA has determined that the PAF facilities lack historic significance and are ineligible for listing on the National Register of Historic Places (TVA 2013a). TVA has also determined that no archaeological resources are known or likely to occur in the immediate vicinity of the PAF facilities. The analysis in this EA is focused on the retirement of PAF Unit 3 and ceasing current operations. No ground-disturbing activities are anticipated at this time. Activities associated with the long-term disposition of PAF, including its potential deconstruction, would be analyzed in a future NEPA review.
- Recreation – Two public boat ramps are located near the PAF reservation on the Green River. Both are accessible from the public county road that bisects the reservation. No changes to public access are proposed as a result of the retirement of PAF Unit 3.
- Potential effects related to land use, botany, wildlife, geology, floodplains, parks, and managed areas, prime farmland, and wetlands were considered. However, due to the nature of the action and project footprint, potential effects were found to be absent and these resources do not require further evaluation.

The following resources have the potential to be affected by the proposed action:

- Air Quality
- Surface Water
- Groundwater
- Aquatic Ecology
- Threatened and Endangered Species
- Solid and Hazardous Waste
- Visual Resources
- Transportation
- Noise
- Socioeconomics and Environmental Justice

1.5 Public and Agency Involvement

TVA issued a draft of this EA for a 30-day public and agency review. The availability of the draft EA was announced in two newspapers that serve the Muhlenberg County area, the *Central City Leader News* and *Central City Times Argus*. The draft EA and a request for comments were also posted on the TVA website. Notices of the availability of the draft EA and requests for comments were sent to local, state, and federal agencies. Chapter 5 provides a list of agencies and organizations notified of the availability of the draft EA. Comments were accepted from November 19, 2018 through December 19, 2018 via the TVA website, mail, and e-mail.

TVA received 327 comments on the draft EA. Commenters included elected officials, local businesses, TVA employees and retired TVA employees, Muhlenberg County school personnel, school board, and sheriff's office, Greater Muhlenberg Chamber of Commerce, federal and state agencies, and many local residents. The majority of the commenters opposed the retirement of PAF, highlighting the economic contribution of the plant to the local community, an expected increase in the cost of electricity, and unemployment for TVA and mining industry employees in the area. A smaller portion of the comments support the retirement for its potential to benefit the health of the environment and local citizens, mitigate climate change, and provide opportunity for new industries to come to Muhlenberg County.

The Sierra Club submitted a form letter in support of the potential retirement of PAF and Bull Run Fossil Plant (evaluated under a separate EA). The letter also stated that TVA should provide a just transition for TVA employees and the surrounding communities affected by the potential retirement of these facilities. The letter was signed by 613 Sierra Club members and contained additional personalized messages from 274 Sierra Club members. Appendix A contains the comments on the draft EA and TVA's responses to those comments.

During the public review period, over 1,650 letters of opposition were sent to the TVA Board of Directors from Muhlenberg County students, teachers, staff, Board of Education members, and residents. Each of these letters expressed opposition to the retirement of PAF and supported its continued operation. Most letters also expressed concern that the retirement would have a severe impact on the county's economy as well as the school system. Many of the students, teachers, and administrators stated that the loss of TVA jobs would impact their families, friends and the community and that the retirement would force people to leave the county, harming other local businesses (examples provided by commenters of businesses impacted include local trucking companies, grocery stores, and restaurants). Many expressed concern that the local school system would lose students and tax revenue because of the closure. According to commenters, the loss of funding would adversely impact the ability of the school system to provide for teacher salaries, educational supplies, and extracurricular activities. None of the comments sent to the TVA Board specifically addressed the environmental analysis in the draft EA.

The TVA Board received comments from the public and agencies after the closure of the comment period on December 19, 2018. While these comments are not included in Appendix A, the general themes found within the comments have been addressed.

1.6 Necessary Permits or Licenses and Consultation Requirements

TVA would obtain necessary permits, licenses, and approvals required for the alternative selected. Depending on the alternative selected, TVA may need to obtain or seek amendments to the following permits:

- Kentucky Pollution Discharge Elimination System (KPDES) General Permit: KY0004201
- Title V Air permit for air emissions

The need for permits would be evaluated based on site-specific conditions.

CHAPTER 2 - ALTERNATIVES

This chapter describes the proposed action and its alternatives to address proposed plant retirement of PAF in 2020. **Table 2-1** provides an overview of which actions are associated with each alternative.

Table 2-1. Summary and Comparison of Projects by Alternative

Activity	Alternative A: No Action Alternative	Alternative B: Potential Retirement of Paradise Fossil Plant
<i>Actions Considered in this EA</i>		
Plant Decommissioning		X
Plant Deactivation		X
Plant Decontamination		X
Continued Plant Operation	X	
<i>Projects Previously Evaluated</i>		
Gypsum Dewatering Facility	X	X
New Landfill (Full Buildout)	X	
Dry Fly Ash Conversion for Unit 3	X	X
Gypsum Pond Instrumentation Installation	X	X
Process Water Basins	X	X
Peabody Ash Impoundment Closure	X	X
2A/2B Ash Impoundment Closure	X	X
Peabody Dike	X	X
Gypsum Stack Closure	X	X
Daniels Run Coal Fines Impoundment Closure	X	X
Landfill Infrastructure and Cell 1A	X	X
Coal Yard Closure		X
<i>Foreseeable Future Projects not Evaluated in this EA</i>		
Wastewater Treatment Plant	X	
Bottom Ash Dewatering Facility	X	
Sulfite Analyzers	X	
Outage Wash Collection System	X	
Chemical Impoundment Closure	X	X
Deconstruction and Demolition of PAF Unit 3		X

2.1 Description of Alternatives

2.1.1 Coal Combustion Residual Activities to Occur with All Alternatives

PAF Unit 3 has significant future capital needs to support compliance with the USEPA's CCR and Effluent Limitation Guidelines rules. TVA has previously conducted environmental reviews for activities necessary to comply with USEPA's CCR Rule (USEPA 2018e). This section discusses actions related to CCR management that would occur if the plant remains operational (Alternative A) or is retired (Alternative B). Under either alternative, the following projects are either underway or would start within the next 5 years; they have been previously analyzed in NEPA documents listed in **Section 1.3**.

1. **Gypsum Dewatering Facility.** TVA's goal of eliminating all wet CCR storage at its coal plants would require the construction of a new Gypsum Dewatering Facility. With this new facility, gypsum slurry would be delivered to one of two gypsum slurry storage tanks located adjacent to a gypsum dewatering building located within the area, where it would be mechanically dewatered using vacuum belt filters. The Gypsum Dewatering Facility would include two 100 percent capacity dewatering trains, each consisting of a horizontal vacuum belt filter and all associated ancillary equipment. Associated actions would include the construction and operation of a dewatering facility building, two de-aeration tanks and two gypsum effluent water clarifiers, and a Gypsum Storage Pad Area (TVA 2017).
2. **Dry Fly Ash Conversion for Unit 3.** The conversion of Unit 3 to pneumatically convey fly ash from Unit 3 to a transfer station within the existing power plant and onto storage/disposal silos located adjacent to the future Gypsum Dewatering Facility would allow TVA to eliminate wet CCR storage at PAF. The dry fly ash may be mixed with water during loading to facilitate compaction and transported to a landfill for disposal. Associated actions include the construction of two storage silos with a total storage capacity of three days at the maximum design rate of fly ash production and one dry unloading spout and truck weigh scale under each silo, if the dry fly ash is sold or transported offsite for other beneficial reuse (TVA 2017). This conversion is nearing completion.
3. **Gypsum Pond Instrumentation Installation** (see Gypsum Dewatering Facility).
4. **Process Water Basins** (see 2A/2B Ash Impoundment Closure)
5. **Peabody Ash Impoundment Closure.** TVA's goal of eliminating all wet CCR storage at its coal plants would require closure of the Peabody Ash Impoundment wherein water is pumped in from the stilling impoundment. Associated actions would include the conversion of the impoundment to lined process water ponds and covering the excavated surface with a composite geosynthetic liner which may include a 60-mil high density polyethylene flexible membrane liner and geotextile cushion drainage layer to meet or exceed applicable permeability requirements (TVA 2017).
6. **2A/2B Ash Impoundment Closure.** TVA's goal of eliminating all wet CCR storage at its coal plants would require the closure of the Slag Impoundment 2A/2B and Stilling Impoundment 2C to the north of the plant. Associated actions would include the direct disturbance of the CCR impoundment and Stilling Impoundment (TVA 2017). The existing 2A/2B Impoundment would be closed and Process Water Basins would be developed immediately north of the impoundment. Slag Impoundment 2A/B would be closed in place (TVA 2018a).
7. **Peabody Dike.** Closure of the Peabody Ash Impoundment would require construction of a divider dike between the northern and southern portions of the impoundment. CCR from the northern portion would be excavated, decanted and

re-utilized as fill material in the southern portion of the impoundment. The southern portion would be closed-in-place (TVA 2017).

8. **Gypsum Stack Closure.** Closure of the Gypsum Disposal Area would require re-grading of the CCR impoundment and a laydown area. A protective cover system would be placed over the entire Gypsum Disposal Area. The final cover system would be vegetated to minimize erosion and the need for future maintenance. The grading of the final cover system would promote drainage to the existing perimeter ditches and stilling basins (TVA 2017).
9. **Daniels Run Coal Fines Impoundment Closure.** Several seeps have been noted at the Daniel Run Pond 3. As a result, closure of the Daniels Run Coal Fines Impoundment would begin within the next 5 years (TVA 2013b).

2.1.2 Alternative A – The No Action Alternative

Under the No Action Alternative, PAF Unit 3 would not be retired and it would continue to operate as part of the TVA generation portfolio. Under the No Action Alternative, the projects described in 2.1.1 would start within the next 5 years. TVA would also construct and operate a new Subtitle D landfill to accommodate long-term storage of dry CCRs. This 80-acre CCR landfill on the PAF reservation would provide approximately 32 years of CCR disposal capacity (TVA 2017). In order for the plant to remain operational, TVA would also replace the damaged steam turbine rotor with a similar product. Replacement of the rotor would be evaluated under a future NEPA document and it would likely be eligible for a categorical exclusion with minimal effects on the surrounding environment.

TVA would also implement projects associated with the wastewater treatment plant, bottom ash dewatering facility, sulfite analyzers, outage wash collection system, and chemical impoundment closure. Details regarding these projects, including analyses of their potential environmental impacts, have not been finalized. Once a decision is made regarding the retirement of PAF Unit 3 and additional details are available, the analyses of these projects will be completed.

2.1.3 Alternative B – Potential Retirement of Paradise Fossil Plant

Under Alternative B, TVA would retire PAF Unit 3 in 2020. At that time, TVA would cease most plant operations and reduce plant staff. In order to minimize environmental and safety risks and comply with applicable laws and regulations, TVA would implement the actions described below.

2.1.3.1 Decommissioning, Deactivation, and Decontamination Activities

Decommissioning is the performance of activities required to ready a facility for deactivation. Work performed includes removal of equipment, components, and parts that can be used at other sites, draining of oil/fluids from equipment, removal of coal and ash from boilers and other equipment, removal of hazardous materials and potential waste like materials, removal of polychlorinated biphenyls (PCBs) equipment, removal of furniture/furnishings, removal of installation technology assets, removal of plant records.

Key activities include:

- Tagging out all unit or plant equipment except service water, lighting, etc.
- Emptying and cleaning hoppers, bins, bunkers, etc.
- Opening all equipment electrical breakers not in use
- Draining oil and fluids
- Salvaging and storing all useable equipment, components, materials, spare parts, office products etc. and relocating them, as practical
- Salvaging and storing all key plant records.

Deactivation is shutting down of power and energized systems as appropriate as well as isolating and/or severing power, water and piping to the plant to provide a cold, dark and dry structure. Work includes removing power and services, installing bulkheads, and sealing tunnels. Activities may also include rerouting of power and services as required for any facilities that would remain operational. Key activities include:

- Performing electrical and mechanical isolation of systems, components and areas
- Installing bulkheads and/or fill tunnels
- Providing alternate power and services (sump pumps, Federal Aviation Administration (FAA) stack lighting, etc.)

Limited Decontamination involves removing select regulated materials in a safe and practical manner in such a way that the plant is left in a status that does not present a hazard or risk to the environment or personnel. Limited contamination work undertaken at PAF Unit 3 may include abatement and disposal of regulated materials, which include but are not limited to PCB equipment, asbestos, hazardous waste, solid waste, products, etc. Key activities include:

- Removal and proper disposal of regulated materials as practical
- Periodic materials condition monitoring.
- Periodic waste removal as materials deteriorate over time.

2.1.3.2 CCR Activities

TVA has previously conducted environmental reviews for activities necessary to comply with the CCR Rule. Therefore, the CCR management projects are not evaluated further as part of this alternative. In addition to the projects described in **Section 2.1.1**, if PAF Unit 3 is retired in 2020, the following actions would be started by 2025:

- Landfill Cell 1A, including landfill haul road and infrastructure
- Process Water Basins would transition to stormwater runoff ponds after retirement
- Coal Yard Closure

TVA would also close the chemical impoundment. Details regarding this project, including analyses of its potential environmental impacts, have not been finalized. Once a decision is made regarding the potential retirement of PAF Unit 3 and additional details are available, the analyses of this project will be completed.

2.2 Comparison of Alternatives

Table 2-2 provides a comparison of alternatives with respect to environmental consequences.

Table 2-2. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts ¹ From Alternative A: No Action Alternative ²	Impacts From Alternative B: Potential Retirement of Paradise Fossil Plant
Air quality	Minor	Long-term, minor beneficial impacts from reduction in TVA's system-wide emissions of SO ₂ , NO _x , Hg and CO ₂
Surface Water	No impact	Temporary, negligible impacts; Long-term direct, indirect, and cumulative beneficial impacts.
Groundwater	No impacts	Long-term, minor, beneficial impacts

Resource Area	Impacts¹ From Alternative A: No Action Alternative²	Impacts From Alternative B: Potential Retirement of Paradise Fossil Plant
Aquatic Ecology	No impacts	Long-term, minor beneficial impacts on the Green River. Long-term, indirect, negligible adverse impacts on communities downstream of PAF.
Threatened and Endangered Species	No effect on listed species.	No effect on listed species.
Solid and Hazardous Waste	No impacts	Minor beneficial impacts
Visual resources	No impacts	Minor beneficial impacts.
Transportation	No impacts	Short-term, minor impacts. Long-term, minor beneficial impacts.
Noise	No impacts	Short-term, minor impacts. Long-term, minor beneficial impacts.
Socioeconomics and Environmental Justice	No impacts	No significant environmental justice impacts. Moderate direct, indirect, and induced adverse impacts on socioeconomics.
Cumulative	Minor cumulative impacts	Minor cumulative impacts on noise and transportation; moderate cumulative impacts on socioeconomics

¹ Unless otherwise stated, impacts listed in the table are adverse effects.

² Impacts under the No Action Alternative are described based on continued operation of PAF. Impacts associated with CCR management activities have been previously reviewed under NEPA, or will be reviewed in the future. Table 2-2 does not include impacts associated with CCR management projects.

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CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment (existing conditions) of environmental resources in the project area and the anticipated environmental consequences that would occur from adoption of the alternatives described in Chapter 2. Chapter 3 only considers the environmental consequences associated with the continued operation of PAF (Alternative A) or the retirement of PAF (Alternative B). Environmental consequences associated with CCR management activities have been previously reviewed under NEPA, or will be reviewed in the future. Therefore, the CCR management projects are not evaluated in Chapter 3. The affected environment descriptions below are based on surveys conducted by TVA and contractors, published and unpublished reports, and personnel communications with resource experts.

3.1 Air Quality

3.1.1 Affected Environment

This section describes the existing air quality and climate conditions in the study area and the potential air quality impacts of the proposed project. The study area for air quality is defined as Muhlenberg County, Kentucky. However, given that air emissions obviously cross county lines, the assessment here can be considered to apply to air quality effects over larger areas downwind of the facility. For purposes of climate assessment, the study area is also Muhlenberg County with respect to local climate conditions, and with respect to greenhouse gas (GHG) emissions, the study area is the global environment.

3.1.1.1 Air Quality

Air quality is measured primarily by the concentrations of six criteria pollutants within a region. These criteria pollutants are ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), lead (Pb), sulfur dioxide (SO₂), and particulate matter (PM), which includes two subcategories: particles less than 10 microns in diameter (PM₁₀) and particles less than 2.5 microns in diameter (PM_{2.5}). Criteria air pollutants are subject to National Ambient Air Quality Standards (NAAQS) that were developed by the USEPA Office of Air Quality Planning and Standards, and were chosen because they are the predominant air pollutants of concern for the environment and public health. The NAAQS are summarized in **Table 3-1**.

USEPA designates compliance status for the NAAQS through a formal rulemaking process involving publication of proposed and final rules in the *Federal Register*. For each pollutant for which there is a NAAQS, USEPA designates an area as attainment, nonattainment, or maintenance. A maintenance area, sometime referred to as maintenance/attainment, is one that was designated as nonattainment within the prior 20 years, and has come into attainment with the NAAQS. Part of the redesignation process requires that the state or local agency with responsibility for managing air quality in the area must submit for USEPA approval a plan to maintain compliance with the NAAQS for which the area was in nonattainment status.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Averaging Times	Primary NAAQS	Secondary NAAQS
CO	8-hour ^(a)	9 ppm (10 mg/m ³)	None
	1-hour ^(a)	35 ppm (40 mg/m ³)	None
Pb	Rolling 3-Month Average	0.15 µg/ m ³	Same as Primary
NO ₂	Annual (Arithmetic Mean)	0.053 ppm (100 µg/m ³)	Same as Primary
	1-hour ^(f)	0.100 ppm (188 ug/m ³)	Same as Primary
PM ₁₀	24-hour ^(b)	150 µg/m ³	Same as Primary
PM _{2.5}	Annual ^(c) (Arithmetic Mean)	12.0 µg/m ³	Same as Primary
	24-hour ^(d)	35 µg/m ³	Same as Primary
O ₃	8-hour ^(e)	0.075 ppm (2008 std.)	Same as Primary
	8-hour ^(e)	0.070 ppm (2015 std.)	Same as Primary
SO ₂	3-hour ^(a)	none	0.5 ppm (1300 µg/m ³)
	1-hour ^(g)	0.075 ppm (196 ug/m ³)	Same as Primary

Source: 40 Code of Federal Regulations (CFR) part 50, USEPA 2016

^a Not to be exceeded more than once per year.

^b Not to be exceeded more than once per year on average over 3 years.

^c To attain this standard, the 3-year average at any monitor must not exceed 12.0 µg/m³.

^d To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³.

^e To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O₃ concentrations measured at each monitor within an area over each year must not exceed the standard. While both the 2008 and 2015 standards are still in place, the 2015 standard is the controlling one, given its greater stringency.

^f Standard is attained when the 3-year average of the eighth-highest daily maximum 1-hour average NO₂ concentration does not exceed 0.100 ppm (100 ppb)

^g Standard is attained when the 3-year average of the fourth-highest daily maximum 1-hour average NO₂ concentration does not exceed 0.100 ppm (100 ppb).

Muhlenberg County is an attainment or maintenance area for all criteria pollutants (USEPA 2018a). The county has been in maintenance status for the 1971 3-hour SO₂ NAAQS since October 19, 1998, when USEPA redesignated Muhlenberg County from nonattainment status to maintenance/attainment status for this SO₂ NAAQS.

Table 3-2 summarizes monitoring data for PM_{2.5} and O₃ (USEPA 2018b), the only two pollutants for which monitoring data for recent years within 50 kilometers of PAF is available. The monitoring site, which has monitors for both PM and O₃, is located at 10800 Pilot Rock Road, Hopkinsville Kentucky, approximately 31 miles southwest of the power plant. The ambient monitoring data indicate compliance with the NAAQS based on three-year averages, which is the basis for USEPA attainment/nonattainment designations.

Table 3-2. Monitored Air Quality in Region of Paradise Fossil Plant

Pollutant	Averaging Period	Units	Monitored Design Concentrations ^a					NAAQS
			2013	2014	2015	2016	2017	
PM _{2.5}	24-hour	µg/m ³	21.6	23.4	22.2	17.3	16.5	35
	Annual	µg/m ³	9.7	10.1	9.1	8.3	8.2	12
Ozone	8-hour	ppm	0.062	0.065	0.062	0.061	0.060	0.070

^a The design concentration is the monitored (ranked or percentile basis) concentration that would be used to assess compliance with the NAAQS.

3.1.1.2 Climate

The climate of Muhlenburg County is typical of much of the Ohio River Valley, which experiences generally warm, humid summers and temperate winters with occasional accumulations of snow or ice. Based on data from the National Weather Service Central Region Headquarters at the Bowling Green-Warren County Regional Airport approximately 36 miles southeast of PAF, the annual average precipitation is approximately 50 inches and average annual snowfall is 8.9 inches (NWS 2018). The all-time high temperature for Bowling Green (Warren County Airport) was 113 degrees Fahrenheit (°F) (in 1930) and the all-time low temperature was -26°F (in 1886).

The average (mean) temperatures at Bowling Green for January, July, and the annual period are shown in **Figure 3-1** (Iowa State University 2018). Average annual temperature is approximately 58°F with a slight downward trend (-0.8°F) over the period of record. The July monthly temperature average is approximately 79°F, again with a slight downward trend (-0.6°F) over the period of record. The January monthly temperature average is approximately 36°F, with a downward trend of around 3°F over the period of record.

3.1.2 Environmental Consequences

Implementation of the proposed action to retire PAF would affect air quality both locally and regionally by elimination of the emissions from coal-fired electricity generation. Also, the shutdown would reduce GHG emissions, especially carbon dioxide (CO₂) which is implicated in climate change. The assessment of air quality and climate impacts in this document is primarily qualitative, given the PAF Unit 3 emissions contribute a small portion of criteria pollutant and GHG emissions at regional and global scales.

3.1.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**. Criteria pollutant emissions from the continued operation of PAF would include emissions from the plant's boiler stack, as well as associated emissions such as those from coal mining, handling and transportation activities, and ash handling and disposal. Emission rates of PAF would be expected to remain similar to current levels, although plant utilization may decrease if competing fuels such as natural gas continue to be cost competitive.

The emissions trends of SO₂, NO_x and mercury for the PAF are shown in **Figure 3-2** (TVA 2018b; USEPA 2018c). Combustion processes emit NO_x, some of which is in the form of NO and some of which converts to NO₂ in the atmosphere. These emissions data, which include the three PAF coal units, show dramatic reductions of these emissions in the past 10 years compared to the prior operating periods. Some of the reduction is due to lower annual utilization of the plant, including retirement of Units 1 and 2, but the greatest proportion of the reductions is due to emission control retrofits that added a scrubber for removal of SO₂ and other acid gases (2006), selective catalytic reduction (SCR) for NO_x removal (2003), and hydrated lime injection for sulfuric acid mist removal (2011). The additional reduction in NO_x emissions after 2008 is due to a change from part-year to year-round operation of the SCR system. The SCR system takes time to warm up upon plant startup, so emissions of NO_x are typically higher than average for several hours after startup, prior to the SCR system reaching its design efficiency. However, these startup emissions typically occur only a few times per year, and therefore are not expected to represent a significant impact on existing air quality either locally or regionally.

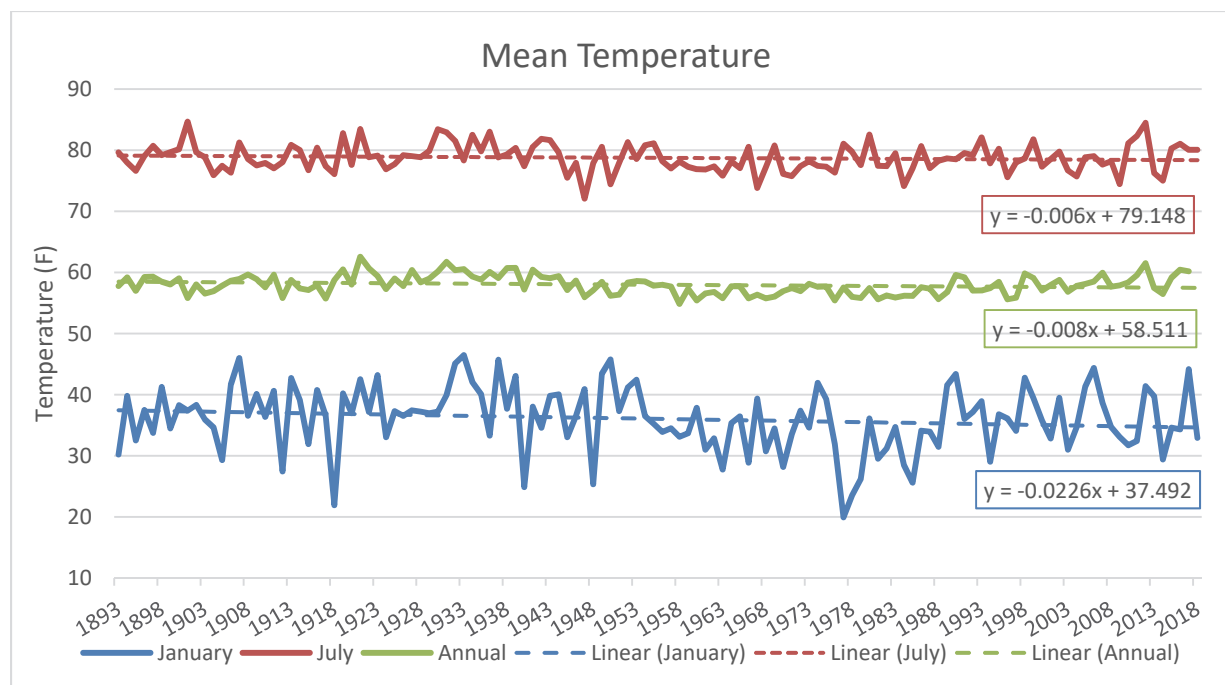


Figure 3-1. Long-Term Temperature Trends for Bowling Green

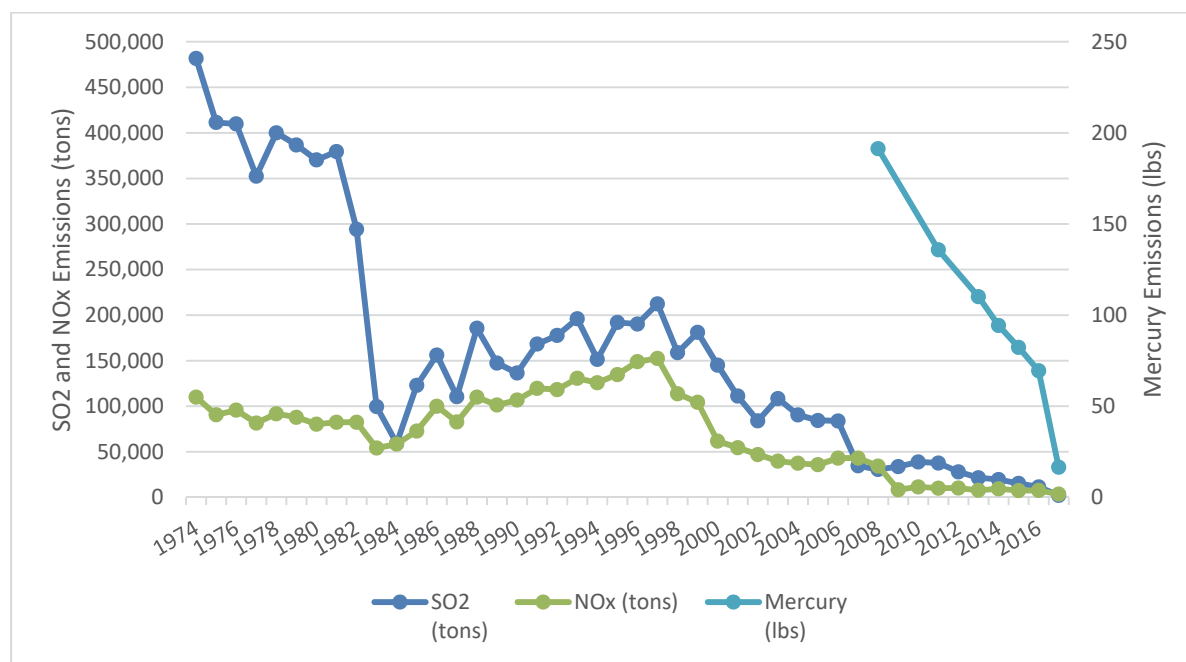


Figure 3-2. Pollutant Emissions Trends for PAF

Similarly, trend data show CO₂ emissions from PAF have decreased in the last decade from earlier levels, as shown in **Figure 3-3** (USEPA 2018d). Because the CO₂ emissions are directly related to the amount of fuel burned, this figure reflects that the plant coal use has dropped over the last decade from prior levels averaging around 15 million short tons per year to around 4.8 million short tons per year in 2017. This reflects lower plant

electricity production in recent years and the retirement of coal-fired Units 1 and 2 in 2017. As with other emissions, if the plant remains in operation, CO₂ emissions would be expected to remain similar to current levels in the future. In general, air quality impacts associated with Alternative A are expected to be minor.

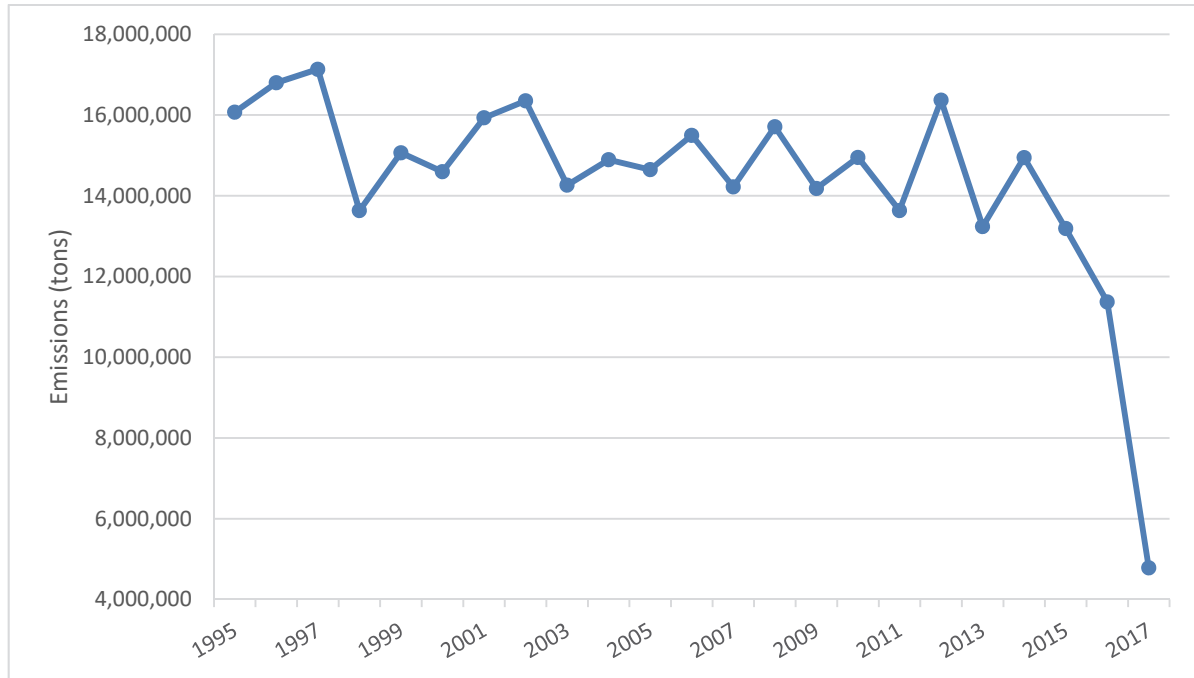


Figure 3-3. CO₂ Emissions Trend for PAF

3.1.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, PAF Unit 3 would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**.

The retirement of PAF would eliminate its emissions (**Figures 3-2 and 3-3**) as well as those from regional coal mining operations that supply the plant. Given the already low and well-controlled emissions of criteria air pollutants, any local improvements in air quality are expected to be minor.

Also, given that current plant emissions of SO₂ and NO_x represent only a very small portion of total regional emissions of all sources, the larger-scale improvement in air quality is expected to be minor following plant retirement. However, together with other reductions in region-wide use of coal power plants, and substantial ongoing emissions reductions from the mobile source (vehicle) sector, downwind areas are likely to experience continued improvement in air quality and visibility, a trend which has been ongoing for decades in the U.S.

Although the net emissions of air pollutants from electricity generation would decrease with the closing of PAF Unit 3, consumer demand for electricity currently produced by PAF Unit 3 is unlikely to change significantly. The electricity generation of PAF Unit 3 must therefore

be displaced by other electricity generators within the region. The replacement generation would likely include electricity generation fueled by natural gas, generation from other existing coal units, and renewables. The emissions from natural gas-fired electricity generation would be lower for most pollutants than the equivalent amount of coal-fired generation from PAF Unit 3.

Table 3-3 shows the 2017 annual average emission rates on a pounds per megawatt hour (lb/MWh) basis for PAF Unit 3 for each of the major air pollutants (TVA 2018c). This table also shows the emission rates by pollutant for potential replacement capacity if it were in the form of natural gas-fired combined-cycle (NGCC) generation, using rates typical of Best Available Control Technology for new units. The PM emission rates provided in this table only include those from the boiler stack and do not include other sources such as emissions from fugitive or material handling sources. The percent reductions for substitution of 2017 PAF emission rates with NGCC emission rates are shown in the last row of **Table 3-3**.

Table 3-3. Comparison of PAF Average Emission Rates (lb/MWh) for 2017 and Replacement Power from NGCC Generation

Basis	SO ₂	NO _x	CO ₂	Mercury	VOC ^a	PM ₁₀	PM _{2.5}
PAF	1.39E+00	2.26E+00	2.16E+03	5.47E-06	4.59E-02	4.52E-01	3.34E-01
NGCC	8.80E-03	4.66E-02	7.96E+02	1.74E-06	8.08E-03	2.76E-02	2.76E-02
NGCC % Reduction	99.4	97.9	63.1	68.2	82.4	93.9	91.7

^a Volatile organic compound

As part of its recent analysis of its generating assets (see **Section 1.1**), TVA modeled the future operation of its generating assets with and without the retirement of PAF Unit 3. This analysis is based on the current TVA power supply plan. The results of this analysis show that a majority of the generation currently provided by PAF Unit 3 would, following the retirement of PAF, be replaced by increased generation from NGCC plants. Most of the remainder would be replaced by increased generation at other coal plants, and a small amount by renewable sources. The retirement of PAF Unit 3 would result in system-wide decreases in annual emissions over the decade following retirement of up to 6.0 percent for SO₂, 11.5 percent for NO_x, and 9.0 percent for mercury.

In terms of GHG emissions, the PAF retirement would eliminate a relatively large source of CO₂ emissions. The results of the analysis described in the preceding paragraph project system-wide decreases of annual CO₂ emissions of up to 4.4 percent (2,143,000 tons) over the decade following retirement. The decrease in CO₂ emissions would be greater if a larger proportion of the replacement generation was from other non-emitting and low-emitting sources, such as natural gas and renewable generation.

3.2 Surface Water

3.2.1 Affected Environment

3.2.1.1 Surface Water – Green River and Jacobs Creek

PAF is located adjacent to the Green River, and is bordered to the south by Jacobs Creek. The plant intakes for Unit 3 are located at Green River Mile (GRM) 100.3 and GRM 100.6. The plant withdraws water from the river for cooling and process purposes (U.S. Army Corps of Engineers [USACE] 2011). The Green River basin contains approximately one-fourth of Kentucky's land area and is the largest drainage basin in the state with an area of

18,858 square miles (TVA 2017). Reservoirs have been constructed by USACE on the Rough, Nolin, and Barren Rivers, as well as on the main stem of the Green River in the upper basin. Major sources of stream contamination in the upper basin are agriculture (sediment, nutrients, and pesticides); mining or drilling (chlorides); onsite and municipal wastewater-treatment systems (decomposable organic matter, nutrients, and bacteria); and urban storm water runoff (metals, nutrients, and sediment).

Overall, water quality is good in the Green River Basin. However, two segments of the Green River between GRM 210.4 and 250.2 and 283.1 to 308.9 are listed on the 2016 state 303(d) report as impaired for mercury in fish tissue, fecal coliform, and *E. coli*, and only partially support their designated fish consumption and primary contact recreation uses (Kentucky Energy and Environment Cabinet 2016). The 303(d)-listed Green River sites are located upstream of PAF. No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are near the plant vicinity. Jacobs Creek and the portion of the Green River adjacent to PAF are currently not assessed for water quality by the state of Kentucky.

All of the proposed landfill area has been previously disturbed, originally by mining of coal and later by disposal impoundments or other plant site activities. Drainage on the property flows generally to the east and south to Jacobs Creek. Several ponds resulting from prior mining activity are evident on aerial imagery within the proposed landfill site; these open water bodies previously were drained and no longer exist.

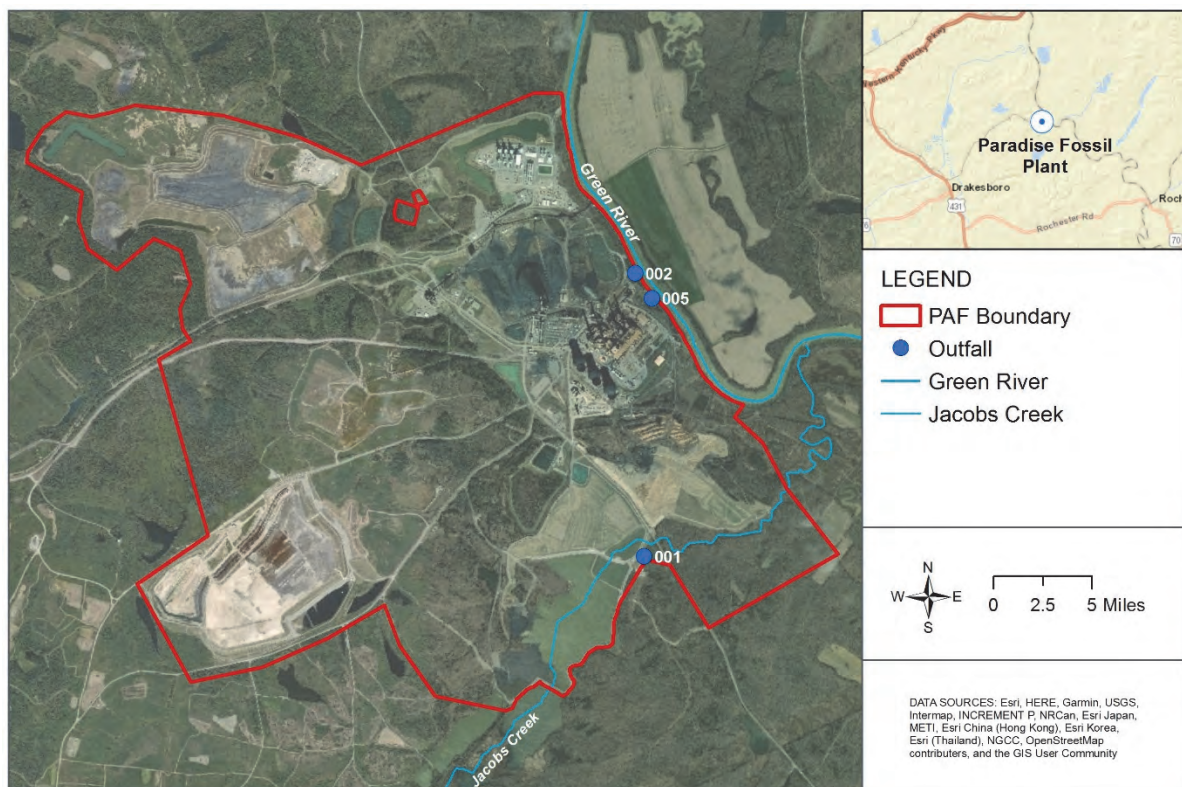


Figure 3-4. Location of impoundments and outfalls

3.2.1.2 Existing PAF Wastewater Streams

Discharges from the PAF site include wet weather conveyances, process water discharges (including cooling water), red water ditches (which ultimately flow to either the slag

impoundment or the Peabody Ash Impoundment), and include a total of 21 permitted outfalls managed under Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0004201, effective October 1, 2018 through September 30, 2023. Under the current permit, TVA is required to meet effluent limitations at each permitted outfall.

3.2.1.2.1 Condenser Cooling Water

Prior to the shutdown of PAF Units 1 and 2, the largest discharge at PAF was condenser cooling water (CCW), which had an average daily flow of approximately 305 MGD when these units were operating in open cycle. Units 1 and 2 could also operate fully or partially on cooling towers, which reduced the discharge flow rate depending on the percentage of flow recycled. Following the shutdown of Units 1 and 2, approximately 164 million gallons per day (MGD) flowed through Outfall 005. This value reflects one CCW pump that remained in operation for water uses other than condenser cooling. Because Unit 3 operates in closed cycle utilizing cooling towers, it does not discharge condenser-cooling water through Outfall 005. However, some cooling water from Unit 3 is used for ash sluicing and is eventually discharged via Outfalls 001 and 002. If Unit 3 were to continue to operate, a discharge of cooling tower blowdown via Outfall 005 would eventually be needed. The current permit contains limitations on the discharges from Outfall 005 with respect to hydrogen (pH), mixed river temperature, instream temperature change, free available chlorine, total residual oxidants, oxidant discharge time, total chromium, total zinc, and priority pollutants. The permit also requires reporting of flow, discharge temperature, and total recoverable mercury. Maximum daily value concentrations for effluent discharge through Outfall 005, as reported in the 2016 NPDES Permit Renewal Application are summarized in **Table 3-4**.

Table 3-4. Maximum daily value concentrations for Outfall 005 effluent discharge

Pollutant/Parameter	Benchmark Value	Maximum Daily Value ¹
Flow	NE ²	421.9 MGD ³
pH	6.0 – 9.0 SU	6.9 – 8.3 SU
Discharge temperature	NE	42.3° C – 42.9° C
Mixed river temperature	89° F	NA
Instream temperature change	10 ° F	NA
Total recoverable mercury	NE	2.61 ⁴
Free available chlorine	0.5	<0.05
Total residual oxidants	0.2	NA
Oxidant discharge time	120 min/unit/day	NA
Total chromium	0.2	<0.002
Total zinc	0.212	<0.025
Priority pollutants	No detectable amount	ND

Notes:

1. Maximum daily values from Kentucky Pollutant Discharge Elimination System Permit Application Form 2C, dated May 18, 2017. Units are reported in milligrams per liter (mg/L) unless otherwise noted.
2. NE – Not established; per 2018 NPDES Permit KY0004201, parameter is to be reported, but no benchmark value is specified.
3. MGD – millions of gallons per day; SU – standard units
4. Low-level mercury analysis used for permit renewal. Concentrations in ng/L.
5. NA – Not applicable; parameter was not reported on KPDES Form 2C.
6. ND – Not detected above laboratory reporting limits.

Based on the data reported in the 2017 NPDES permit renewal application, pH, chlorine, total chromium, total zinc, and priority pollutant concentrations were within regulatory limits at Outfall 005.

3.2.1.3 Coal Combustion Residuals

The existing systems for handling CCR include several areas that receive and treat CCR wastewater streams, including Slag Impoundment 2A/2B, and Stilling Impoundment 2C; the Peabody Ash Impoundment and the Gypsum Disposal Area.

3.2.1.3.1 Slag or Bottom Ash

Slag or bottom ash collects in the bottom of the boiler. It is washed from the boiler bottoms with jets of water and sluiced to Slag Impoundment 2A where suspended solids are settled. Boiler ash sluice flow at PAF averages approximately 22 MGD. Precipitation runoff from the coal storage area drains to three separate impoundments. Impoundment 2A discharge flows through a culvert to Impoundment 2B for further settling. Impoundment 2B discharges into a stilling impoundment and the stilling impoundment discharges into the Green River through Outfall 002. Discharge from Outfall 002 has an average flow of approximately 16 MGD, based on flow measurements recorded from 2017 to 2018 (TVA 2018d). A pump platform is located at the head of the Stilling Impoundment 2C which pumps up to 17 MGD to the Peabody Ash Impoundment to aid in regulating total dissolved solids that discharge from the Peabody Ash Impoundment through Outfall 001. Outfall 002 will undergo operational changes as the facility transitions from existing conditions of an active ash pond to proposed conditions of a process water basin. As such, effluent limitations have been developed and are outlined in the 2018 KPDES Permit in three phases. Currently, TVA is required under KPDES Permit Number (No.) KY0004201 to meet the discharge limits at Outfall 002 listed in **Table 3-5**.

Table 3-5. Maximum daily value concentrations for Outfall 002 effluent discharge

Pollutant/Parameter	Benchmark Value	Maximum Daily Value ¹
Flow	NE ²	38.53 MGD ³
pH	6.0 – 9.0 SU	7.01 – 8.19 SU
Oil & grease	19.6	<4.3
Total suspended solids	98.0	30.0
Hardness (as mg/L CaCO ₃)	NE	213
Total recoverable mercury	NE	2.83 ⁴
Total recoverable cadmium	NE	0.0007
Total recoverable thallium	NE	0.0009
Chronic WET ⁵	3.28	

Notes:

1. Maximum daily values from Kentucky Pollutant Discharge Elimination System Permit Application Form 2C, dated May 18, 2017. Units are reported in milligrams per liter (mg/L) unless otherwise noted.
 2. NE – Not established; per 2018 NPDES Permit KY0004201, parameter is to be reported, but no benchmark value is specified.
 3. MGD – millions of gallons per day; SU – standard units
 4. Low-level mercury analysis used for permit renewal. Concentrations in ng/L.
 5. WET – Whole Effluent Toxicity
 6. NA – Not applicable; parameter was not reported on KPDES Form 2C.
- ND – Not detected above laboratory reporting limits.

Based on the data reported in the 2017 NPDES permit renewal application, pH, oil and grease, and TSS concentrations were within regulatory limits at Outfall 002.

3.2.1.3.2 Fly Ash

About 8 percent of coal burned at PAF remains as ash, of which approximately 70 percent is slag/bottom ash and 30 percent is fly ash, but these ratios vary slightly. PAF Units 1 and 2 are no longer operating, and thus do not contribute to the quantity of fly ash sluiced to the ash impoundments. All of the fly ash from Unit 3 (approximately 38,947 tons per year) is sluiced to the Peabody Ash Impoundment at an average annual flow of approximately 11 MGD. Some ash is collected at the Selective Catalytic Reduction System (SCR) in ash hoppers and then sluiced to the Peabody Ash Impoundment (TVA 2017).

TVA is required under KPDES Permit No. KY0004201 to meet effluent the toxicity limits on the Peabody Ash Impoundment discharge listed in **Table 3-5**. Upon completion of ash pond mechanical dewatering, the KPDES permit also requires monitoring for a series of total recoverable metals including antimony, arsenic, beryllium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (KPDES 2018). Three sources (slag/bottom ash basin, and fly ash and FGD sluicing) comprise almost 98 percent of the total in-flow to the Peabody Ash Impoundment.

The Peabody Ash Impoundment provides settling of suspended solids, ammonia removal, and limited metals precipitation before treated water flows to a stilling impoundment for further settling. Effluent (about 30 MGD) from the stilling impoundment is discharged into Jacobs Creek through KPDES Outfall 001 (**Figure 3-4**). Normal operating conditions can result in lower discharge flows in the range of 17 to 20 MGD. The pH of effluent discharged from the Peabody Ash Impoundment generally ranges from 6.0 to 9.0; however, a CO₂ system is in place to provide pH control when needed to meet discharge limits. A numerical model, FLOWPATH, for determining subsurface discharges at the impoundment boundaries indicated that impoundment seepage entering Jacobs Creek is minute compared to the surface discharge to the creek (TVA 2017).

3.2.1.3.3 FGD Scrubber Gypsum Byproduct

Most fly ash removal for PAF Units 1 and 2 was performed by the FGD system for those units, which are now retired. Fly ash removal for PAF Unit 3 is performed primarily by an electrostatic precipitator. FGD makeup water and the lime feed slurry for PAF Unit 3, which remains in operation, comprise approximately 1.4 MGD of the FGD impoundment discharge of approximately 1.8 MGD.

When the gypsum concentration in the FGD for Unit 3 reaches about 15 percent, solution blowdown is initiated to maintain equilibrium. This blowdown stream is pumped to the Gypsum Disposal Area. The Gypsum Disposal Area consists of the main disposal unit with wet stacks for CCR materials, and two treatment settling impoundments identified as the Stilling Basin 1 and Stilling Basin 2 (**Figure 3-4**). The stilling impoundments discharge to the Peabody Ash Impoundment through the FGD channel. Most of the ammonia that passes through (“slips”) the SCRs is removed from the stack gases in the FGD scrubber and becomes part of the FGD scrubber gypsum/fly ash byproduct impoundment wastewater (TVA 2017). PAF performs monthly monitoring of ammonia in the intake, and slag impoundment and Peabody Ash Impoundment discharges under a monitoring plan required by KPDES Permit KY0004201.

3.2.1.4 Other Surface Runoff

Most sanitary wastewater at PAF is treated onsite in a small, extended aeration package plant that discharges as an internal outfall (Outfall 004) to Red Water Ditch No. 1. Red Water Ditch No. 1 then discharges to the slag impoundment system. Outfall 004 has

limitations on carbonaceous biochemical oxygen demand and fecal coliform bacteria. The average annual flow from Outfall 004 is 0.02 MGD. During outages, an additional 100 workers may be on site and portable toilets are provided because of the distance to the permanent sanitary facilities. The wastewater from the portable toilets is pumped and hauled to a nearby municipal wastewater treatment facility (TVA 2017).

3.2.1.5 *Paradise Combined Cycle Plant*

The Paradise NGCC plant began commercial operations in April 2017. The KPDES permit (KY011902) for this facility was effective on September 1, 2016. This facility is located on the PAF reservation and would not be directly affected by the proposed action.

3.2.2 Environmental Consequences

3.2.2.1 *Alternative A: No Action Alternative*

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**. As a result, existing surface water conditions would not change from continuing operations under this alternative. The existing wastewater streams would continue to be authorized under KPDES Permit KY0004201. Discharges would continue to comply with all applicable permit limits and therefore, surface water quality adjacent to PAF should remain approximately the same. Thus, continued operations at PAF under the No Action Alternative would not be expected to cause any additional direct or indirect effects to local surface water resources.

3.2.2.2 *Alternative B: Potential Retirement of Paradise Fossil Plant*

Under the Action Alternative, the plant would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**.

Under Alternative B, coal burning operations would cease resulting in a substantial reduction of wastewater discharged into the Green River from Outfalls 001 and 002. The existing wastewater streams would continue to be authorized under KPDES Permit KY0004201. The CCR at the facility would either be removed or capped-in-place. Upon closure and repurposing of impoundments and landfills, it is expected that 75 percent of discharge flows would cease. The remaining discharge flows would come from fire protection water, main station sumps, storm water flow, and from ponds until closed. Surface water discharges would be expected to have direct and indirect beneficial impacts due to the decrease loading of metals as a result of ceasing operations. The elimination of withdrawals and discharges of cooling water would reduce impingement and entrainment impacts, and have other beneficial impacts from reduced water consumption.

Currently, approximately 19 million gallons per day (MGD) of flow is discharged through Outfall 001, which represents an approximate decrease in flow from 33 MGD after Units 1 and 2 were retired. Implementation of Alternative B would eliminate withdrawals and discharges from miscellaneous equipment cooling water and other plant wastewater. Thus, beneficial surface water impacts from the reduction of both intake demand for surface withdrawals and the reduction in loading to surface water discharged from the facility would occur.

Because facility buildings, structures, and facilities would remain in place until a decision regarding the reuse of the site was made, there would be a long-term potential for direct discharges of chemicals, hazardous waste, and solid waste, including but not limited to friable asbestos releases, to receiving streams through sump discharges, storm water releases, and directly to adjacent surface waters. Periodic inspections and maintenance of the remaining facilities would be performed as needed to ensure that any contaminated equipment would not impact surface water quality. The implementation of BMPs, protocols to respond to on-site spills prior to discharge, and site clean-up would help to reduce the potential for any releases to surface waters.

With the use of proper BMPs and compliance with all Federal, State, and Local regulations and guidelines, any adverse surface water impacts associated with direct, indirect or cumulative impacts would be expected to be temporary and minor.

3.3 Groundwater

3.3.1 Affected Environment

3.3.1.1 Physiographic Setting and Regional Aquifer

Regional aquifers within 5 miles of PAF are represented by the bedrock carbonate aquifer and the alluvial aquifer associated with the Green River. Carbonate rocks are a class of aquifers that are represented in the Highland Rim physiographic region around PAF. Carbonate rocks, such as limestone and dolomite, contain a high percentage of carbonate minerals (e.g., calcite) in the rock matrix. Carbonate rocks in some parts of the region readily transmit groundwater through enlarged fractures (cracks) and cavities created by dissolution of carbonate minerals by acidic groundwater.

The alluvial aquifer consists of the water bearing sand and gravel deposits associated with streams and floodplains. The alluvium may yield as much as 100 gallons per minute (gpm) from sands and gravel along the Green River (Duvaul and Maxwell 1962). The alluvium yields enough water for a modern domestic supply (more than 500 gallons per day) to wells in valleys of the Green River and its larger tributaries (Starn et al. 1993). It yields practically no water to wells in small valleys where it is thin and fine grained. Water is hard or very hard, and may contain objectionable amounts of iron (Carey and Stickney 2004).

The availability of groundwater from bedrock sandstone in the Western Coal Field region varies widely. Prior to mining, the area was underlain by the three identifiable aquifers: the Lisman aquifer located near the surface (in the Sturgis formation), the Carbondale aquifer at an intermediate depth, and the Caseyville aquifer located more than 600 feet below the surface. Elsewhere in the region, usable groundwater is also found in the Tradewater Formation. The Lisman is exposed in a part of the region, but has been largely removed by coal mining and replaced by mining spoil in the upland areas. Where sandstone units of the Lisman or Carbondale aquifers are exposed at the surface, they receive direct infiltration and are susceptible to potential contamination. In undisturbed areas where the sandstone units are overlain by shale and coal beds, the sandstone is protected from direct recharge and less susceptible to potential contamination (TVA 2013a).

Groundwater derived from carbonate formations of the Highland Rim is generally slightly alkaline and high in dissolved solids and hardness. The quality of groundwater from shallow bedrock aquifers is generally soft to moderately hard, but may contain undesirable amounts of iron. Most water from the alluvium along the Green River is generally harder and contains more iron than water from the bedrock aquifers. Iron and common salt (saline

water) are the main naturally occurring constituents affecting the taste of the groundwater (Carey and Stickney 2004).

Horizontal groundwater gradients in the overburden generally follow surface topography with flow toward the Green River and Jacobs Creek. Groundwater movement in the underlying Carbondale formation occurs primarily through bedrock fractures and bedding planes (TVA 2017). The Carbondale receives recharge from the overburden and from lateral inflow along the western boundary of the reservation. Although horizontal groundwater gradients in the Carbondale formation are similar to those of the overburden, the groundwater potentiometric surface of the Carbondale averages about 5 feet lower than that of the overburden.

In general, groundwater in the vicinity of TVA's ash impoundments is influenced by the surrounding upland, local geological conditions, and the hydrologic influence of the receiving water body. Depths to the uppermost aquifer will be investigated by TVA at ash impoundments in accordance with the requirements of the CCR Rule.

Groundwater beneath unclosed impoundments may be expected to remain somewhat elevated even for an inactive impoundment (i.e., no additional CCR material inputs), due to the continued addition of storm water and other process wastewaters into the impoundment. According to the Electric Power Research Institute (TVA 2016), because of this continued input of water to the impoundment, the quantity of water seeping vertically ("leachate" water) downward beneath the impoundment, subsurface flow may also be considered constant. The extent to which such leaching may occur and how it may interact with the uppermost aquifer and receiving surface waters is dependent upon site-specific conditions such as soil permeability, water depth within the impoundment, volume of CCR materials and their composition and depth to the uppermost aquifer, etc. As described in the TVA (2017), groundwater monitoring of the impoundments will be undertaken in conjunction with the Groundwater Optimization Plan. Under this plan, TVA will continue to work with the state to obtain and evaluate groundwater quality associated with the CCR management facilities at PAF..

3.3.1.2 Groundwater Use

According to the most recent data regarding public water use, Muhlenberg County had an estimated population of 30,816 in 2017 (USCB 2018a). An estimated 94 percent of the population is served by surface water provided by a water utility. In areas not served by public water, about 70 percent of the households use wells and 30 percent use other sources (Carey and Stickney 2004).

The Carbondale yields enough water for a modern domestic supply to wells penetrating sandstone. It yields practically no water to wells penetrating only shale. Wells are known to produce as much as 30 gpm. Water is hard or very hard, but otherwise of good quality. It yields either no water or water containing iron sulfate in areas where the Kentucky No. 9 coal has been mined as it has been at the PAF facility. Previous studies identified four wells within 2 miles of the plant reservation. These include one domestic well completed in the Sturgis formation. Three wells (two domestic and one industrial) were developed in the Carbondale. The two Carbondale domestic wells were reviewed in 2003 by TVA and found to no longer exist. The third Carbondale well is an industrial well upgradient of PAF. No new public drinking water sources have been located near the PAF (TVA 2013a).

The Safe Drinking Water Act of 1974 established the sole source aquifer protection program which regulates certain activities in areas where the aquifer (water-bearing geologic formations) provides at least half of the drinking water consumed in the overlying area. No sole source aquifers exist in the vicinity of PAF (USEPA 2015). No directly applicable groundwater monitoring data are available from TVA's monitoring network for the facilities that are the subject of this EA. Groundwater monitoring of other site features occurs semiannually and results are reported to the Kentucky Division of Waste Management in the Semi-Annual Groundwater Report for the Residual Landfill and the FGD Pond Voluntary Monitoring Report. As of June 2013, the residual landfill had no maximum contaminant level (MCL) exceedances from the groundwater. Statistical exceedances of sodium, conductance, chloride, and total dissolved solids were reported and have been observed in the past. In June 2013, a statistical exceedance for boron was reported. Analytical results for the 2012 FGD Pond Voluntary Monitoring Report indicated that all constituent contaminants were below MCLs (TVA 2013a).

3.3.1.3 Groundwater Quality

TVA established three networks of monitoring wells at PAF: Gypsum Disposal Area CCR Multi-unit, Peabody Ash Pond CCR Unit, and Slag Pond Area CCR Multi-unit. Detection monitoring results from samples taken in October 2017 show boron, calcium, chloride, fluoride, and pH are above background threshold values (Stantec 2018a, 2018b, 2018c).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**. As a result, existing groundwater conditions would not change from continuing operations under this alternative. Groundwater monitoring of the Gypsum Disposal Area, Peabody Ash Pond, and Slag Pond Area impoundments would continue. TVA would continue to work with the state to obtain and evaluate groundwater quality associated with the CCR management facilities at PAF.

3.3.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, PAF Unit 3 would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**.

Proposed impacts to groundwater from this alternative are expected to be minor, but beneficial. The landfill cover systems over the compacted CCR prevents additional infiltration from precipitation and would facilitate management of storm water runoff. Elimination of the hydraulic inputs to the impoundment reduces the potential for migration of leachate to groundwater beneath the impoundment and to receiving surface waters.

Elimination of sluice water reduces the hydraulic head, reducing the pressure of water forcing ash contaminants into groundwater. Installing a cover system improves groundwater quality by eliminating rainfall infiltration and reducing downward migration of contaminants into groundwater. KPDES outfall and the receiving river water quality would improve as contact with ash would cease following installation of a cover system.

3.4 Aquatic Ecology

3.4.1 Affected Environment

PAF is adjacent to the Green River at GRM 100.5 (left bank) within the Jacobs Creek-Green River watershed. The Green River is a tributary of the Ohio River and is considered the most biologically diverse branch of the Ohio River system with the greatest aquatic diversity occurring in a 100-mile section from the Green River Reservoir Dam through Mammoth Cave National Park to approximately GRM 190 (TVA 2017). This stretch is many miles upstream of PAF. The Green River adjacent to PAF is characterized as having steep banks with limited suitable spawning habitat for fishes. The river is fairly turbid due to runoff from coalfields and frequent barge traffic. Water level on the Green River near PAF is susceptible to drastic fluctuations from storm events (TVA 2017). The fish community is dominated by warmwater species with the exception of two coolwater species, sauger and walleye.

TVA has conducted biological surveys on the Green River near PAF throughout its history, particularly in relationship to entrainment (the unwanted passage of fish through a water intake) and impingement (physical contact of a fish with a barrier structure or screen). Most recently, TVA collected fish from the PAF intake structure as part of their CWA Section 316(b) compliance program (for addressing entrainment and impingement impacts) from 2006-2008. During March 2006 to March 2007 (Year-1) and March 2007 to February 2008 (Year-2), a total of 18,180 fish representing 44 species and 25,693 fish representing 28 species were collected from intake screen wash samples. Samples in both years were dominated by gizzard shad (82 percent), and secondarily by threadfin shad and freshwater drum (less than 15 percent). Previous studies conducted in the 1970s found threadfin shad and gizzard shad to be the dominant species at 52 and 45 percent respectively (TVA 2009).

TVA sampled fish upstream and downstream of the PAF between GRM 98.4 and GRM 105 in 2011. There were 1,272 fish (42 species) collected downstream of PAF, with the most abundant species including emerald shiner (20 percent), bullhead minnow (18 percent), spotfin shiner (15 percent), and bluegill (15 percent). There were 887 fish (37 species) collected upstream of PAF. The most abundant species upstream of PAF were Mississippi silvery minnow (32 percent), emerald shiner (17 percent), and gizzard shad (11 percent) (TVA 2012). Additionally, benthic invertebrates were also collected, with oligochaetes, chironomids, and Asiatic clams being the dominant taxa both upstream and downstream of PAF.

A 2008 mussel survey (TVA 2008) on the Green River near the PAF coal unloading facility found very low densities of a small number of common mussel species. Another mussel study on the Green River, 7 river miles upstream of PAF, documented the presence of 23 mussel species (TVA 2004).

Jacobs Creek is a small tributary of the Green River that flows within the eastern portion of the PAF site. A TVA bioassessment conducted in 1998 on Jacobs Creek adjacent to PAF reported Index of Biotic Integrity scores of all sampling sites on Jacobs Creek as either “poor” or “fair” both upstream and downstream of PAF (TVA 1998). Nonpoint source pollution from strip mining in past years has resulted in the degradation of water quality in Jacobs Creek. Additionally, periodic drought conditions result in intermittent flow and isolated pools, whereas extensive flooding and sedimentation result from periods of prolonged rainfall (TVA 2017).

The PAF site has numerous ponds resulting from prior surface mining. These likely provide some habitat for aquatic species. Aquatic communities in ponds on the PAF site likely vary in abundance and diversity depending on the morphology of a given pond, water depth and permanence, and water quality. Because these ponds are the result of previous surface mining activities, habitat quality and species diversity of aquatic biota are expected to be low. Additionally, several of the ponds that appear on historical aerial imagery within the proposed landfill area, no longer exist or appear to hold water.

3.4.2 Environmental Consequences

3.4.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. Continued long-term, direct, and negligible impacts on fish eggs, fish larvae, and fish are expected from entrainment and impingement; however, the severity of these impacts would be dependent upon the frequency of PAF operation and would be less than those described in TVA (2009) because Units 1 and 2 have been decommissioned. No other project-related environmental impacts with respect to aquatic ecosystems would occur under this alternative.

3.4.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, the PAF Unit 3 would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**.

Under this alternative, TVA would retire PAF Unit 3 in 2020 and CCW would no longer be withdrawn from the Green River. Long-term, beneficial impacts on fish species would be expected from the reduction in intake water flow, which would reduce entrainment and impingement of fish species. Additionally, wastewater discharge would be reduced by 75 percent and indirect impacts could occur on the downstream reaches of adjacent water bodies (i.e., Jacobs Creek and the Green River) because of the reduced flow. Aquatic communities would be expected to adjust to reflect the abundance and composition of those in upstream areas; therefore, this impact on aquatic resources is expected to be negligible.

The wastewater discharges after PAF Unit 3 retirement would meet existing permit limits, and sampling would continue to be performed at the approved outfall structure in accordance with the KPDES permit, as applicable. Based on the use of an approved outfall structure in accordance with the KPDES permit for wastewater discharge, impacts on aquatic resources as a result of the PAF retirement are expected to be negligible.

3.5 Threatened and Endangered Species

3.5.1 Affected Environment

The Endangered Species Act (ESA) (16 United States Code [USC] §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the

conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Under Section 7 of the ESA, federal agencies are required to consider the potential effects of their proposed action on endangered and threatened species and critical habitats. If the proposed action has the potential to affect these resources, the federal agency is required to consult with the USFWS.

The state of Kentucky provides protection for species considered threatened, endangered, or deemed in need of management within the state in addition to those also federally listed under the ESA. The listing of species is managed by the state wildlife agency, Kentucky Department of Fish and Wildlife Resources (KDFWR). Additionally, the Kentucky State Nature Preserves Commission (KSNPC) and TVA both maintain databases of aquatic and terrestrial animal species that are considered threatened, endangered, special concern, or are otherwise tracked in Kentucky because the species is rare and/or vulnerable within the state. Plant species are protected in Kentucky through the Kentucky Rare Plant Recognition Act of 1994.

Plants

There are eight species of plants listed by the KSNPC as threatened, endangered, or species of special concern in Kentucky that occur or have been reported to occur in Muhlenberg County (**Table 3-5**). Of these eight species, none have been found during several field surveys on the PAF reservation or reported within 5 miles of PAF. Based on the habitats present, additional populations of state-listed species could be present in relatively undisturbed areas. No federally listed plants are known or likely to occur in the project area and no designated critical habitat for federally listed plants occurs in the project area.

Animals

According to the KSNPC, 36 terrestrial and aquatic animal species of conservation concern occur in Muhlenberg County (**Table 3-6**) (KSNPC 2018). A review of the TVA Regional Natural Heritage database in September 2018 indicated that of those species listed by USFWS and KYNPC, 24 species are currently known or have been known to occur within a 5-mile radius of PAF (as indicated by asterisks in Table 3-6). Review of the USFWS Information for Planning and Conservation (IPaC) website identified one additional federally listed species, the northern long-eared bat, that has the potential to occur in the project area. No designated critical habitat for federally listed terrestrial animals occurs in the project area.

Table 3-6. Species of Conservation Concern within Muhlenberg County and the Vicinity of PAF

	Common Name	Scientific Name	Status		Suitable Habitat Present ⁴
			Federal ¹	State ² (Rank ³)	
Plants	Water Hickory	<i>Carya aquatica</i>	--	T(S2S3)	N
	Rose	<i>Chelone obliqua</i>	--	S(S3)	N
	Turtlehead	var. <i>speciosa</i>	--		
	Water-purslane	<i>Didiplis diandra</i>	--	E(S1S2)	N
	French's Shooting Star	<i>Dodecatheon frenchii</i>	--	S(S3)	N

	Common Name	Scientific Name	Status		Suitable Habitat Present ⁴
			Federal ¹	State ² (Rank ³)	
Aquatic Snails	Hair Grass	<i>Muhlenbergia glabrifloris</i>	--	S(S2S3)	N
	Trepocarpus	<i>Trepocarpus aethusae</i>	--	S(S3)	N
	Buffalo Clover	<i>Trifolium reflexum</i>	--	E(S1S2)	N
	Southern Wild Rice	<i>Zizaniopsis miliacea</i>	--	T(S1S2)	N
	Rugged Hornsnail*	<i>Pleurocera alveare</i>	SOMC	S(S3S4)	N
	Fanshell*	<i>Cyprogenia stegaria</i>	LE	E (S1)	N
	Catspaw*	<i>Epioblasma obliquata</i>	LE	E (S1)	N
	Pocketbook*	<i>Lampsilis ovata</i>	--	E (S1)	N
Mollusks	Rough Pigtoe*	<i>Pleurobema plenum</i>	LE	E (S1)	N
	Pyramid Pigtoe*	<i>Pleurobema rubrum</i>	SOMC	E (S1)	N
	Purple Lilliput*	<i>Toxolasma lividus</i>	SOMC	E (S1)	N
	Little Spectaclecase*	<i>Villosa lienosa</i>	LE	S (S3S4)	N
Crustaceans	Mud River Crayfish	<i>Orconectes ronaldi</i>	--	T(S2S3)	N
Fish	Lake Chubsucker	<i>Erimyzon sucetta</i>	--	T(S2)	N
	Chestnut Lamprey*	<i>Ichthyomyzon castaneus</i>	--	S(S2)	N
	Redspotted Sunfish	<i>Lepomis miniatus</i>	--	T(S2)	N
Amphibians	Hellbender	<i>Cryptobranchus alleganiensis</i>	SOMC	E(S1)	N
	Bird-voiced Treefrog*	<i>Hyla avivoca</i>	--	S(S3)	N
Reptiles	Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	--	S(S3)	P
	Broad-winged Skipper	<i>Poanes viator</i>	--	T(S1)	P
Insects	Elusive Clubtail	<i>Stylurus notatus</i>	SOMC	E(S1)	N
Birds	Henslow's Sparrow*	<i>Ammodramus henslowii</i>	SOMC	S(S3B)	P
	Great Egret*	<i>Ardea alba</i>	--	T(S2B)	P
	Short-eared Owl*	<i>Asio flammeus</i>	--	E(S1B,S2N)	P (foraging only)
	Long-eared Owl*	<i>Asio otus</i>	--	E(S1B,S1S2N)	P (foraging only)
	American Bittern	<i>Botaurus lentiginosus</i>	--	H(SHB)	N

	Common Name	Scientific Name	Status		Suitable Habitat Present ⁴
			Federal ¹	State ² (Rank ³)	
Mammals	Lark Sparrow	<i>Chondestes Grammacus</i>	--	T(S2S3B)	P
	Northern Harrier*	<i>Circus cyaneus</i>		T(S1S2B,S4N)	P
	Sedge Wren*	<i>Cistothorus platensis</i>	--	S(S3B)	N
	Common Gallinule*	<i>Gallinula galeata</i>	--	T(S1S2B)	N
	Bald Eagle*	<i>Haliaeetus leucocephalus</i>	DM	T(S2B,S2S3N)	N
	Least Bittern*	<i>Ixobrychus exilis</i>	--	T(S1S2B)	N
	Osprey*	<i>Pandion haliaetus</i>	--	S(S2S3B)	Y
	Bank Swallow*	<i>Riparia riparia</i>	--	S(S3B)	N
	Barn Owl	<i>Tyto alba</i>	--	S(S3)	P
	Bell's Vireo*	<i>Vireo bellii</i>	--	SOMC S(S2S3B)	Y, P (past record within the South Spoil Area)
	Indiana bat*	<i>Myotis sodalists</i>	LE	E(S1S2)	P (foraging only)
	Northern long-eared bat	<i>Myotis septentrionalis</i>	LT	E(S3)	P (foraging only)
	Evening Bat*	<i>Nycticeius humeralis</i>	--	S(S3)	P (foraging only)
	Southeastern Bat	<i>Myotis austroriparius</i>	SOMC	E(S1S2)	P (foraging only)
	Gray Bat	<i>Myotis grisescens</i>	LE	T(S2)	P (foraging only)

Sources: USFWS 2018, TVA 2017, TVA 2018e, KSNPC 2018,

¹Federal Status Codes:

LT = Listed threatened

LE = Listed endangered

DM = Delisted, Recovered, and Being Monitored

- = Not Listed by USFWS

²State Status Codes:

E = Endangered

S = species of special concern

T = Threatened

³Rank Codes:

S1 = critically imperiled

S2 = imperiled

S3 = vulnerable

S4 = apparently secure

S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

Migratory Species may have separate ranks for different population segments (e.g., S1B, S2N, S4M);

S#B = rank of breeding population S#N = rank of non-breeding population

⁴Habitat Codes (see TVA 2017 for species descriptions):

Y = Yes, species has been documented in existing habitats in study area and suitable habitat is present

N = No, no records of species within study area and no suitable habitat is present

P = Potentially suitable habitat is present, but no records of species in study area

* Species documented within 5 miles of PAF by the TVA Natural Heritage Database.

3.5.2 Environmental Consequences

3.5.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. As a result, no new work would be conducted that could potentially alter project-related environmental conditions within PAF. Therefore, no new impacts on threatened or endangered species, or species of conservation concern or any suitable habitat would occur under this alternative.

3.5.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, PAF Unit 3 would be decommissioned. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**.

Suitable habitat for state- or federally listed aquatic species does not occur within the project area; therefore, direct impacts to state- or federally listed threatened and endangered aquatic species are not anticipated to occur from PAF Unit 3 retirement. Additionally, water discharges would continue to meet existing KPDES permit limits, which are designed to be protective of aquatic life in receiving waters. Therefore, impacts on listed fish and shellfish species near PAF are not anticipated.

The terrestrial habitat onsite has been severely degraded and is currently disturbed land comprised of fill material, which is generally unsuitable habitat for the eight listed plant species identified within the vicinity of PAF. Additionally, no ground disturbing activities would occur during plant retirement. Therefore, impacts to listed plant species or species of conservation concern are not anticipated.

No tree clearing or ground disturbance would occur in conjunction with plant retirement activities. None of the species identified in Table 3-6 have been documented within the project area and only the Indiana bat has been detected acoustically within 5 miles of the project area. As a result, no impacts would occur to tree dwelling bats or bird species. No suitable habitat exists for any of the other federally listed threatened or endangered terrestrial species, and therefore no impacts are anticipated.

3.6 Solid and Hazardous Waste

3.6.1 Affected Environment

3.6.1.1 Solid Waste

In Kentucky, requirements for management of solid wastes are focused on solid waste processing and disposal under Kentucky Revised Statutes (KRS) 224. Solid wastes are defined in the rule as garbage, trash, refuse, abandoned material, spent material, byproducts, scrap, ash, sludge and all discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial mining and agricultural operations, and from community activities (KRS 224.1-010(31)a). The solid waste generated at PAF is managed in accordance with federal and state requirements. Under KRS 224.50-760, special wastes include high volume and low hazard wastes such as mining wastes, utility wastes (fly ash, bottom ash, and scrubber sludge), sludge from water

and wastewater treatment facilities, gas and oil drilling muds and other wastes not regulated as hazardous waste.

On April 17, 2015, the Final Rule on Disposal of CCR from Electric Utilities (CCR Rule) was published in the *Federal Register*. Under the CCR Rule, CCRs are not regulated as hazardous waste. The primary solid wastes that result from the operation of PAF are collectively known as CCRs. The primary CCR waste streams are fly and bottom ash, gypsum, and boiler slag. TVA has historically managed storage of CCR materials generated at PAF in a combination of onsite dry stacks, wet stacks and impoundments. The projected quantities of CCR that are estimated to be generated at PAF daily and annually between 2020 and 2039, assuming Unit 3 remains in operation, are provided in **Table 3-7**.

Table 3-7. Summary of Projected Waste Disposal Quantities at PAF

Waste Materials	Tons/Year	Tons/Day
Fly Ash	45,663	126
Gypsum	321,666	882
Boiler Slag	132,370	362
Total	499,699	1,370

Fly ash and boiler slag are comprised of the noncombustible particles or components in coal. Both fly ash and bottom ash are composed primarily of silica, aluminum oxide and iron oxide. These waste streams also contain a variety of heavy metals at limited concentrations including arsenic, cadmium, chromium, copper, lead, mercury and selenium. Under KRS 224.50-760, CCRs are regulated as special wastes that require special waste approval for disposal at a landfill specifically permitted to receive those types of wastes (TVA 2017).

Disposal areas for CCR include the Gypsum Disposal Area Multi-Unit, Peabody Ash Pond, and Slag Ponds Area Multi-Unit. Approximately 13.7 million cubic yards (cy) of CCR are stored in the Gypsum Disposal Area Multi-Unit. Approximately 1.7 million cy of CCR are stored in the Peabody Ash Pond. Approximately 0.46 million cy of CCR are stored in the Slag Ponds Area Multi-Unit.

3.6.1.2 Hazardous Waste

Hazardous materials are regulated under a variety of federal laws including the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), Occupational Safety and Health Administration (OSHA) standards, Emergency Planning and Community Right to Know Act (EPCRA), and the Toxic Substances Control Act (TSCA). Regulations implementing the requirements of EPCRA are codified in 40 CFR 355, 40 CFR 370 and 40 CFR 372. Under 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity are required to provide reporting information to the State Emergency Response Commission, Local Emergency Planning Committee and local fire department. Inventory reporting to the indicated emergency response parties is required under 40 CFR 370 for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges above reportable quantities for certain hazardous substances under 40 CFR 372. TVA applies these requirements under EPCRA as a matter of policy. The federal law regulating hazardous wastes is RCRA and its implementing regulations codified in Title 40 CFR Parts 260-280. The regulations define what constitutes a hazardous waste and

establishes a “cradle to grave” system for management and disposal of hazardous wastes. Subtitle C of RCRA also includes separate, less stringent regulations for certain potential hazardous wastes.

PAF complies with the Kentucky Division of Waste Management requirements for large quantity generators of hazardous waste (USEPA Handler ID: KY1640013156), as it periodically generates increased quantities of hazardous waste such as during outage maintenance activities. However, PAF generally generates less than 2,200 pounds of hazardous waste per calendar month, the small quantity generator maximum threshold. The most recent Biennial Report available on the USEPA RCRAInfo website indicates generation of 1.0 tons and shipment of 0.4 tons of hazardous waste in 2015. The primary hazardous wastes currently generated include small quantities of waste paint, waste paint solvents, paper insulated lead cable, debris from sandblasting and scraping, paint chips, solvent rags used to clean equipment, and liquid-filled fuses (TVA 2017).

3.6.1.3 Universal Waste

Universal wastes are a subset of hazardous wastes that are widely generated and can include batteries, lamps and high intensity lights and mercury thermostats. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provisions.

3.6.2 Environmental Consequences

3.6.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. As a result, existing solid and hazardous waste management would not change from continuing operations under this alternative. The production and disposal of hazardous and universal wastes are not expected to change under the No Action Alternative.

3.6.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, the plant would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. Under this alternative, coal burning operations at PAF Unit 3 would cease and CCR would be removed and dewatered from Gypsum Disposal Area Stilling Pond 1, Gypsum Disposal Area Stilling Pond 2, northern portion of the Peabody Ash Pond, Slag Pond 2B, and Slag Stilling Pond 2C. No additional CCR solid wastes would be produced. Residual ash and coal dust would be washed from equipment and other areas and managed through the ash handling system.

Other materials that would be removed and typically recycled include used oils, glycols, and refrigerants. Consumer commodities (lubricants, aerosols, window cleaner, etc.) are reused if possible or sent for disposal. Laboratory chemicals would be evaluated for reuse or disposal on a case-by-case basis. Fuels and offspec fuels would be reused or sent for recycling. Bulk chemicals/materials are typically recycled or disposed as applicable. Mercury devices, batteries, light bulbs and e-waste are recycled.

Asbestos-containing materials in building structures and systems would be remediated as necessary to protect the environment and worker health and safety; abatement would occur at the time demolition activities are initiated.

Given that TVA would manage the removal and disposal of solid and hazardous wastes and utilize opportunities for reuse or recycle when available and reasonable, in accordance with local, state, and federal regulations, implementation of Alternative B would provide a minor benefit to the project area.

3.7 Visual Resources

3.7.1 Affected Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated changes resulting from the proposed action. The classification criteria used in this analysis are adapted from the scenic management system developed by the U.S. Forest Service and integrated with planning methods used by TVA. The classification process is also based on fundamental methodology and descriptions adapted from *Landscape Aesthetics, A Handbook for Scenery Management*, Agriculture Handbook Number 701 (U.S. Forest Service 1995).

The visual landscape of an area is formed by physical, biological and man-made features that combine to influence the uniqueness of the landscape. Scenic resources within a landscape are evaluated based on a number of factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent on where and how it is viewed.

Scenic visibility of a landscape may be described in terms of three distance contexts:

1. Foreground. An area within 0.5 mile of the observer, individual details of specific objects are important and easily distinguished.
2. Middleground. From 0.5 to 4 miles from the observer, object characteristics are distinguishable but their details are weak and they tend to merge into larger patterns.
3. Background. In the distant part of the landscape (from 4 to 10 miles from the observer), details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast.

Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed and from changes, including removal of existing features. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the project area within the PAF reservation, as well as the physical and natural features of the surrounding landscape. Parts of the PAF property are devoid of vegetation and most of it has been heavily disturbed by previous industrial activities. The most dominant visual components of the PAF facility include two 600-foot high stacks, one 800-foot high stack, three cooling

towers over 435 feet high, and connecting transmission lines. Other major visual components of the large-scale industrial site include the powerhouse buildings, emission control buildings and ducts, and the coal pile and coal handling facilities.

There are no sensitive viewing receptors within the foreground of the project area. The nearest residential areas are located on the west side of the Green River about 2.5 miles from the southern edge of the PAF property. The PAF facility is located approximately 4 miles from the nearest town, and there are no nearby residences or other environmentally sensitive viewing receptors. The nearest church and cemetery are the Drakesboro United Methodist Church and Ennis Cemetery, located approximately 2.5 miles and 1.2 miles to the southwest of PAF, respectively. Groups that have direct views of the project area include authorized employees, contractors and visitors to the plant site. Views of the project areas are generally restricted to the foreground (i.e., within 0.5 mile) in all directions, however, that may be buffered by nearby vegetation and the local topography.

Although mining operations have substantially altered the topography and appearance of much of the area surrounding the plant, the large-scale industrial PAF facility provides a sharp visual contrast to the surrounding rural landscape. Views of the project area include broadly horizontal buildings and industrial equipment. Predominant focal points include the existing smokestacks and cooling towers and the plumes they emit when PAF is operating. Views of the plumes are heavily influenced by seasonal variations in weather and atmospheric conditions and they are typically more visible during the winter. Scenic attractiveness of the area is minimal and scenic integrity ranges from low to very low (**Table 3-8**).

Table 3-8. Visual Assessment Ratings for Existing Affected Environment

View Distance	Existing Landscape	
	Scenic Attractiveness	Scenic Integrity
Foreground	Minimal	Very Low
Middleground	Minimal	Low
Background	Minimal	Low
Overall Scenic Value Class		Fair

The forms, colors and textures in the affected environment are normally seen through the characteristic landscape. Therefore, the surrounding landscapes are not considered to have distinctive quality. In the foreground, the scenic integrity has been lowered by human alteration such as PAF and residential and commercial development. However, in the middleground and background these alterations become less intrusive in the view of the landscape. Based on the criteria used for this analysis, the overall existing scenic value class for the affected environment is considered to be fair.

3.7.2 Environmental Consequences

3.7.2.1 *Alternative A: No Action Alternative*

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. Existing visual conditions would not otherwise change.

3.7.2.2 *Alternative B: Potential Retirement of Paradise Fossil Plant*

Under the Action Alternative, the PAF Unit 3 would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**.

The potential impacts to the visual environment from a given action are assessed by evaluating the potential for changes in the scenic value class ratings based upon landscape scenic attractiveness, integrity and visibility. Sensitivity of viewing points available to the general public, their viewing distances and visibility of the proposed action are also considered during the analysis. These measures help identify changes in visual character based on commonly held perceptions of landscape beauty and the aesthetic sense of place. The extent and magnitude of visual changes that could result from the proposed action were evaluated based on the process and criteria outlined in the scenic management system.

Under Alternative B, PAF Unit 3 would be retired; however, none of the physical infrastructure currently at the site would be immediately removed. The primary features in the visual environment, including two 600-foot high stacks, one 800-foot high stack, three cooling towers over 435 feet high, and connecting transmission lines leaving the plant site, would remain in place. Therefore, the overall scenic value class would remain fair. The major notable difference in the visual environment following retirement of the PAF Unit 3 would be the elimination of the plume from the stacks. This would have a minor benefit to the visual environment; however, it would not change the overall scenic value class as the rest of the facility would still be in place.

3.8 Transportation

3.8.1 Affected Environment

The transportation network surrounding PAF contains roads and bridges, a railroad, and barge transport on the Green River. This analysis focuses on roadway and railroad traffic. PAF is served by one CSX rail line to the west of the site. Rail access originates from the CSX Transportation mainline at Central City, follows U.S. Highway 431 south for 6.5 miles to Drakesboro, then turns eastward for an additional 5.3 miles to PAF, generally paralleling SR 176. The majority of coal delivered to PAF is via truck, at a volume of approximately 8,000 tons per day, Monday through Saturday. This equates to approximately 200 trucks per day, which travel on highways and private coal hauling roads. A small portion of the coal delivered to PAF in 2018 was transported by barge.

Nearby major highways include the Wendell H. Ford Western Kentucky Parkway and U.S. Highway (US Hwy) 62 (to the north); US Hwy 431 (to the west); and the William H. Natcher Parkway (to the east). The Western Kentucky Parkway is a four-lane divided highway approximately 5.5 miles north of PAF. Traffic generated by operations at PAF is composed of a mix of cars and light duty trucks (two-axle delivery trucks), medium duty trucks (larger two-axle and three-axle trucks) and heavy duty trucks (three- to five-axle trucks and tractor trailers).

The primary roadway providing access to PAF is State Route (SR) 176 which extends from US Hwy 431 in Drakesboro approximately 6 miles east to PAF. SR 70 (Rochester Road) is located approximately 4.5 miles south of PAF. All of these routes are two-lane highways.

The Annual Average Daily Traffic (AADT) on the roadways proximate to PAF are indicated in **Table 3-9**. Traffic associated with PAF, including commuting by the approximately 131 PAF employees and 27 Paradise gas plant employees, the 200 daily coal truck deliveries, comprises a significant proportion of traffic on area roadways.

Table 3-9. Average Daily Traffic Volume on Roadways in Proximity to PAF

Roadway	Year	AADT
SR 176 between Rockport Paradise Road and P and M Haul Road	2017	1,605
SR 176 between Drakesboro and P and M Haul Road	2016	4,199
US Hwy 431 between KY 176 and Western Kentucky Parkway	2017	7,354

Source: Kentucky Transportation Cabinet 2018.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**.

PAF has recently rehabilitated its barge unloader (after not being used in 2017), and is expected to unload coal intermittently from barges during sustained plant runs. Trucked coal would continue to serve as the primary mode of transportation through the end of the current coal supply contract in 2020, at which time delivery methods would be determined through an evaluation of competitive coal supply bids. Traffic levels on nearby roadways and rail lines would otherwise remain the same as existing conditions.

3.8.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

Under the Action Alternative, PAF Unit 3 would be decommissioned. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**.

Under this alternative, rail and roadway traffic to and from PAF would decrease. During retirement activities, a small increase in traffic to and from the site would be anticipated; however, this would be a short-term, minor impact. Retirement of PAF Unit 3 would have a long-term, minor, beneficial impact on traffic levels on nearby roadways. SR 176 and US Hwy 431 would continue to operate with sufficient capacity. The closure would lead to reduction in vehicle miles traveled on these roadways, which is a factor in injury and fatal traffic crash rates. The CSX rail line also would see a reduction in traffic from the retirement of PAF Unit 3. Barge traffic on the Green River associated with PAF would also be reduced.

Current employees at PAF may be required to travel out of the area for work, resulting in an increase in vehicle miles traveled on nearby roadways, and an indirect, long-term, minor impact on nearby roadways.

3.9 Noise

3.9.1 Affected Environment

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is other annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It

can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g. schools, churches, or hospitals) or broad (e.g. nature preserves or designated districts) areas in which occasional or persistent sensitivity to noise above ambient levels exists.

Noise metrics. Sound varies by both intensity and frequency. Sound pressure levels (SPLs), described in decibels (dB), are used to quantify sound intensity. The dB is a logarithmic unit that expressed the ratio of an SPL to a standard reference level. The cycles from high to low pressure each second, also called Hertz, are used to quantify sound frequency. The human ear responds differently to different frequencies. A-weighted decibels (dBA) are used to characterize sound levels that can be sensed by the human ear. “A-weighted” denotes the adjustment of the frequency content of a sound-producing event to represent the way in which the average human ear responds to the audible event. Sound levels discussed in this EA are A-weighted.

Federal Guidelines. Some agencies within the federal government have established noise guidelines for the purpose of protecting citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. According to U.S. Army, Federal Aviation Administration, and the U.S. Department of Housing and Urban Development criteria, residential units and other noise-sensitive land uses are “clearly unacceptable” in areas where the day-night average sound level (DNL) exposure exceeds 75 dBA, “normally unacceptable” in regions exposed to noise between 65 and 75 dBA, and “normally acceptable” in areas exposed to noise of 65 dBA or less. For outdoor activities, USEPA recommends a DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population would be at risk from any of the effects of noise (USEPA 1974).

Ambient Sound Levels. Noise levels vary depending on the housing density and proximity to parks and open space, major traffic areas, or airports. The noise level in a normal suburban area is typically less than 55 dBA DNL, which increases to 60 dBA for an urban residential area, and to 80 dBA in the downtown section of a city (USEPA 1974). Most people are exposed to sound levels of 50 to 55 dBA or higher on a daily basis.

Table 3-10. Common Sounds and Their Levels

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Rock band
Gas lawnmower at 3 feet	90	Food blender at 3 feet
Downtown (large city)	80	Garbage disposal
Heavy traffic at 150 feet	70	Vacuum cleaner at 10 feet
Normal conversation	60	Normal speech at 3 feet
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room

Source: USEPA 1974

Existing Conditions

The Green River borders PAF on the east, while wooded ridges border PAF to the north and south and a partially wooded valley borders it to the west. No residential areas or other sensitive noise receptors adjoin the plant location. Drakesboro United Methodist Church and Ennis Cemetery are the nearest sensitive receptors, located approximately 2.5 miles and 1.2 mile to the southwest of PAF respectively, and Old Paradise Cemetery located approximately 1 mile west of PAF. Along wooded hills about 2 miles to the southwest of PAF is the Sinclair Unit of the Peabody WMA, which is used for recreational purposes. The residences and parks closest to PAF and, therefore, most affected by plant noise, are located southwest of the plant.

During production, PAF emits varying amounts of environmental noise ranging between 59 and 87 dBA (TVA 2017). This environmental noise is created through coal unloading activities and periodic bulldozer operations related to coal pile management and truck operations. Industrial activities, transportation noise and construction noise are common sources of environmental noise emanating from PAF. Coal delivery and unloading and ash-handling activities are the main sources of noise outdoors at PAF. Considerable noise is created when coal is unloaded from railcars with an unenclosed bottom dumper, although coal is currently not delivered to PAF by rail. Heavy equipment used onsite, including the shaker, bulldozers, and others generate additional noise.

Transportation noise encompasses noise from road traffic and rail traffic, with the majority of transportation noise resulting from road traffic. Highway traffic noise is generated by the volume of traffic, the speed of traffic, and the number of trucks in the flow of the traffic (FHWA 2011). An increase in the volume, speed and number of trucks will, generally, generate increased highway noise, but does not severely impact residential areas more than 500 feet from heavily used roadways or more than 100 to 200 feet from lightly used roadways. Railway noise is generated by the speed of the train and the type of engine, wagons and rails (Berglund and Lindvall 1995). The speed of rail operations at PAF is low enough that the noise generated is likely to be low (TVA 2017).

3.9.2 Environmental Consequences

3.9.2.1 *Alternative A: No Action Alternative*

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. As a result, noise levels would otherwise remain unchanged from the existing conditions.

3.9.2.2 *Alternative B: Potential Retirement of Paradise Fossil Plant*

Under the Action Alternative, PAF Unit 3 would be retired. TVA would implement the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. This section analyzes the potential changes related to the decommissioning or retirement of Unit 3. Changes in noise are considered significant if they lead to a violation of any federal, state or local noise ordinance, or substantially increase noise levels at sensitive receptors.

PAF consisted of three generating units, which were constructed between 1959 and 1970 (TVA 2018a). Two of those units were retired in 2017. For the past 60 years, the industrial

and traffic noise emanating from the plant has become a part of the landscape. Retiring PAF Unit 3 would reduce regular production-related noises as well as noise produced by traffic associated with PAF, which would reduce the daily ambient noise levels. Decreasing a portion of this daily noise level would be beneficial to the surrounding environment, which is accustomed to noise levels between 59 and 87 dBA. Long-term, minor, beneficial impacts would occur because of a general decrease of industrial and traffic noises generated by daily activities at PAF Unit 3.

The Proposed Action may have short-term, minor, adverse impacts on the noise environment. The main source of noise would come from decommissioning-related transportation activities. With the elimination of the current 200 daily truck deliveries of coal, it is unlikely that traffic during decommissioning and the resulting noise levels would increase over current levels.

Some limited construction noise may occur during the shutting down of power and energized systems. This work involves installing bulkheads and sealing tunnels and may include construction of facilities to provide alternate power sources and services, such as sump pumps, FAA stack lighting, etc. However, this construction noise would be temporary and would have negligible or no adverse impacts on the surrounding noise sensitive areas.

3.10 Socioeconomics and Environmental Justice

3.10.1 Affected Environment

Social, economic, and sociocultural characteristics of potentially affected populations are assessed in this section using the U.S. Census Bureau (USCB) 2010 decennial census (2010 Census) and the 2012-2016 American Community Survey (ACS) 5-year estimates (2016 ACS). Data for the Commonwealth of Kentucky are included for comparison purposes. These data were obtained utilizing USCB American FactFinder (USCB 2018b). Where appropriate, data from other federal and state agencies are also employed.

The area considered for most of this analysis is the area from which the PAF labor market derives. The PAF labor market area is defined as Muhlenberg County and all adjacent counties, consisting of Butler, Christian, Hopkins, Logan, McLean, Ohio, and Todd counties. In addition, Daviess and Warren counties are included in the labor market area because of the large populations present in these counties and the potential for longer-distance commuter employment. As they are more urban than others in the PAF labor market area, Daviess and Warren counties are listed at the bottom of the tables provided below to better allow for comparison with the more rural counties. In this section, the PAF labor market area is referred to as the affected counties.

3.10.1.1 Demographics and Housing

Population data for the affected counties and the Commonwealth of Kentucky are provided in **Table 3-11**, based on the 2010 Census, 2016 ACS, and 2016 state data. As shown, from 2010 to 2016, population growth in all but two of the affected counties was less than the growth estimated for Kentucky as a whole. Several counties, including Muhlenberg County, recorded population losses over that period. While Kentucky counties in the extreme western and eastern portions of the Commonwealth experienced slow or negative growth, the metropolitan areas of northern and central Kentucky, including Warren County, grew faster than the Commonwealth or U.S. as a whole (Kentucky State Data Center 2016). This

pattern is projected to continue, as demonstrated by the population projections shown in **Table 3-11**.

Table 3-11. Population Change and Future Projections

Geography	2010 Census	2016 ACS Estimate	% Change (2010 – 2016)	2040 Projected Population	% Projected Change (2016-2040)
Kentucky	4,339,367	4,411,989	1.7	4,886,381	10.8
Muhlenberg County	31,499	31,216	-0.9	27,286	-12.6
Butler County	12,690	12,828	1.1	11,269	-12.2
Christian County	73,955	73,936	-0.0	73,527	0.6
Hopkins County	46,920	46,359	-1.2	40,890	-11.8
Logan County	26,835	26,757	-0.3	25,618	-4.3
McLean County	9,531	9,492	-0.4	7,942	-16.3
Ohio County	23,842	24,152	1.3	23,181	-4.0
Todd County	12,460	12,465	0.0	13,092	5.0
Daviess County	96,656	98,724	2.1	110,129	11.6
Warren County	113,792	121,066	6.4	183,705	51.7

Sources: 2010 Census, 2016 ACS; Kentucky State Data Center 2016

Other demographic characteristics of the ten affected counties are summarized in **Table 3-12**, based on the 2010 Census and the 2016 ACS. The populations of affected counties were generally more rural and more aged than the population of Kentucky as a whole. In all but four counties, there were lower percentages of people who were high school graduates or higher than Kentucky as a whole. Muhlenberg County and three other affected counties had higher percentages of noninstitutionalized adults aged 18 to 64 years with disabilities than Kentucky as a whole. For the most part, higher percentages of people in affected counties maintained the same residence between 2015 and 2016 than across the Commonwealth. The exception for this was in two of the three more urbanized counties.

Table 3-12. Demographic Characteristics

Geography	% Rural Pop.	Median Age	% High School or Higher	% Noninst. Labor Force w/ Disability	% Diff. House 1 Yr. Ago
Kentucky	41.2	38.6	84.6	15.8	15.1
Muhlenberg County	68.4	41.5	79.5	18.4	9.3
Butler County	100.0	41.0	77.6	19.7	21.4
Christian County	28.6	28.3	86.0	15.1	14.7
Hopkins County	47.1	41.0	85.5	15.9	13.5
Logan County	75.0	40.6	78.7	15.2	12.8
McLean County	100.0	41.4	83.7	15.0	10.8
Ohio County	73.5	40.6	79.2	19.4	12.9
Todd County	100.0	37.2	76.9	13.3	12.2
Daviess County	27.0	39.1	88.4	14.1	12.7
Warren County	31.2	32.9	87.7	13.7	23.0

Source: 2010 Census, 2016 ACS

According to the 2016 ACS, of the affected counties, Muhlenberg County had the lowest median house value (\$81,400), and all but one of the affected counties had lower median values than Kentucky's median house value of \$126,100. The majority of affected counties, including Muhlenberg County, had higher percentages of owner-occupied housing units and units without mortgages than the Commonwealth. Most affected counties had lower housing rents than Kentucky as a whole.

3.10.1.2 *Employment and Income*

PAF directly employs 131 people. This includes a range of positions such as general laborers, steamfitters, machinists, electricians, analysts, administrators, and supervisors. In affected counties, 6.2 percent of individuals and 11.0 percent of households earn the same salary as the average annual salary of workers employed at PAF based on the 2016 ACS. PAF also has contracts with nearby coal and limestone mining operations and supply companies that support additional employment and account for significant contributions to the area economy. Presently, PAF purchases an average of 1.1 million short tons of coal per year from two underground mines approximately 40 miles from PAF in western Kentucky. While coal production is generally declining locally and nationally, the latest data show that PAF coal consumption amounts to approximately 3 percent of the total coal produced annually from underground coal mines in Kentucky (USEIA 2017). PAF-consumed coal has an annual monetary value of an estimated \$55.7 million. As Kentucky coal mine productivity averaged 3.9 tons per employee labor hour in 2017 (Kentucky Energy and Environment Cabinet 2017), the mining of PAF coal at current average levels provides employment for approximately 135 people.

PAF also has indirect effects to the local economy in that CCR byproducts from PAF are sold to nearby companies. In 2017, almost 59 percent of the gypsum and slag produced as CCR byproducts at PAF was sold to companies for the production of wallboard, roofing materials, and abrasives. The nearby Harsco/Reed Minerals plant, for example, employs 21 people and utilizes PAF bottom ash to produce roofing shingles and abrasives. PAF also affects the local economy through induced effects that result from consumer spending generated through economic activities associated with PAF.

Table 3-13 summarizes 2016 ACS data on employment and income for the affected counties. All counties except Daviess and Warren counties had lower percentages of people in the labor force than Kentucky as a whole. The average unemployment rate for the labor market counties was 7.7 percent, which was roughly equivalent to the statewide rate. However, four counties, including Muhlenberg County, had unemployment rates above that of the Commonwealth, and together these rates averaged 9.4 percent. Based on nonseasonally adjusted data from the U.S. Bureau of Labor Statistics (USBLS)¹, between November 2008 and November 2018, unemployment in the affected counties averaged 7.6 percent, slightly lower than the statewide average of 7.8 percent over the same period (USBLS 2019). In November 2018, total employment in Muhlenberg County was estimated by the USBLS to be 10,152, and across the Commonwealth, employment totaled over 1.9 million. According to the USBLS, the unemployment rate in Muhlenberg County was 4.9 percent in November 2018 and 5.3 percent in December 2018.

Based on the 2016 ACS, per capita income in all affected counties except Daviess County was lower than that of the Commonwealth, with the greatest disparity in Todd County. While not shown on **Table 3-13**, all affected counties except Daviess and Warren counties had median household incomes lower than that of Kentucky as a whole (\$44,811). Based on the 2016 ACS, the median household income in Muhlenberg County was \$4,366 lower than the statewide median.

¹ Seasonally adjusted USBLS data is not available for affected counties; thus, nonseasonally adjusted data were used for comparability between the affected counties and the Commonwealth.

Table 3-13. Employment and Income Characteristics

Geography	% of 16+ Civ. Pop. in Labor Force	Unemployment Rate	% Employed in Ag, Forestry, Fishing, Hunting, and Mining	% Employed in Transpo., Warehousing, and Utilities	Per Capita Income
Kentucky	59.0	7.6	2.5	6.0	\$24,802
Muhlenberg County	51.4	8.4	6.6	8.2	\$19,934
Butler County	53.4	5.4	3.8	4.6	\$20,591
Christian County	48.4	10.4	3.2	4.1	\$19,962
Hopkins County	55.3	6.4	8.1	5.1	\$22,672
Logan County	53.8	7.4	4.7	5.3	\$20,385
McLean County	57.5	7.4	10.0	7.4	\$21,623
Ohio County	54.0	10.7	5.8	4.1	\$19,963
Todd County	54.0	7.9	8.3	7.2	\$19,165
Daviess County	61.1	6.5	2.4	5.3	\$25,026
Warren County	64.6	6.8	1.3	4.8	\$24,060

Source: 2016 ACS

Pertinent civilian employment characteristics for the affected counties are also shown on **Table 3-13**. Of the affected counties, Muhlenberg County had the highest percentage of civilians employed in utilities, transportation, and related industries. All except the more populated, urban counties (Daviess and Warren counties) had higher percentages of civilians employed in mining and related industries than across Kentucky. Although not shown on **Table 3-13**, in Muhlenberg County, the largest percentage of civilian workers was employed in educational services, health care, and social assistance, followed by manufacturing and the retail trade. These industries shared the highest percentage of employees in all other affected counties, although in differing order in some counties.

TVA makes payments in lieu of taxes, also called tax equivalent payments, to states where TVA sells electricity or owns power system assets. The payments total 5 percent of gross proceeds from the sale of power in the prior fiscal year (FY), with some exclusions. In FY2018, TVA made a tax equivalent payment of \$36.2 million to Kentucky (TVA 2018f). Kentucky Revised Statute 96.895 (KRS § 96.895) directs how the funds are apportioned within the state and mandates that an individual county's portion of the total payment is determined by the value of its TVA properties compared with the total value of TVA properties across the Commonwealth. A 2018 amendment to KRS § 96.895 will differently allocate the payments in FY2019 and beyond. More of the general fund allocation, which amounts to 30 percent of the total payment, will be distributed to counties with TVA power assets to encourage economic development in those areas (Kentucky 2018). This means that counties with power assets would receive a larger allocation than in previous years.

3.10.1.3 Environmental Justice

Environmental justice-related impacts are analyzed in accordance with Executive Order (EO) 12898 to identify and address as appropriate disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. TVA is not subject to this EO; however, it routinely considers environmental justice during its NEPA review processes.

Council of Environmental Quality (CEQ) guidance for applying EO 12898 under NEPA directs identification of minority populations when either the minority population of the

affected area exceeds 50 percent or the minority population percentage of the study area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). The CEQ guidance also specifies that low-income populations are to be identified using the annual statistical poverty threshold from the USCB Current Population Reports Series P-60 on Income and Poverty. The current (2017) USCB-provided poverty threshold for individuals under age 65 is \$12,752, and the official poverty rate for the U.S. as a whole is currently 12.3 percent (USCB 2018c).

CEQ defines minority populations as people who identify themselves as Asian or Pacific Islander, American Indian or Alaskan Native, Black (not of Hispanic origin), or Hispanic. Those indicating two or more races are also considered minorities due to necessarily including one of these minorities. Minority and low-income populations may be groups of people living in geographic proximity or scattered groups or individuals sharing common conditions. In addition, the CEQ guidelines direct identification of groups demonstrating differential patterns of consumption of natural resources among minority and low-income populations.

Following CEQ guidance, minority populations within affected counties that exceed the minority percentage of Kentucky as a whole (12.5 percent) are presented as the areas where the chance for disproportional environmental and human health effects may be the greatest. Minority populations were identified using 2016 ACS estimates compiled in Data Profile 5 for each of the affected counties. Low-income populations were defined as those with poverty rates above the Kentucky statewide poverty rate of 18.2 percent, per the 2016 USCB Small Area Income and Poverty Estimates (SAIPE) (USCB 2017). USCB recommends this source, rather than the ACS, when income and poverty are considered at the state or county levels (USCB 2018c). Low-income populations were identified at the county level using the 2016 SAIPE.

With the exception of Christian, Todd, and Warren counties, a greater proportion of the population of affected counties identified itself as White Alone than across Kentucky based on the 2016 ACS (**Table 3-14**). Correspondingly, the minority populations in these counties were smaller proportionally than statewide. Fort Campbell, a U.S. Army installation located in Christian County, may account for the larger minority populations in Christian County and neighboring Todd County. The larger minority population in Warren County is attributable to the urbanized Bowling Green area and the presence of Western Kentucky University.

Based on the 2016 SAIPE, a greater proportion of the population of six of the affected counties, including Muhlenberg County, was living in poverty when compared with the Commonwealth as a whole (**Table 3-15**). In Butler, Logan, McLean, and Warren counties, the proportions were lower than Kentucky as a whole. For informational purposes, the 2016 ACS percentages are also provided in **Table 3-15**.

Table 3-14. Minority Percentages and Ethnicities

Geography	% Minority	% White ¹	% Black / African American	% Am. Indian / AK Native	% Asian	% Native Hawaiian / Pacific Islander	% Some Other Race	% Hispanic / Latino ²
Kentucky	12.5	89.4	9.2	0.7	1.7	0.1	1.1	3.3
Muhlenberg County	7.5	93.8	5.8	0.5	0.6	0.4	0.3	0.6
Butler County	3.6	97.2	1.3	1.0	0.0	0.0	1.3	3.4
Christian County	28.2	75.4	23.2	1.4	2.2	1.0	1.2	7.3
Hopkins County	9.9	92.2	8.0	0.6	0.8	0.0	0.7	1.8
Logan County	9.4	92.8	8.2	0.4	0.1	0.0	0.8	2.6
McLean County	2.3	99.0	1.1	0.4	0.5	0.0	0.3	1.3
Ohio County	4.2	96.6	2.6	0.5	0.9	0.0	0.4	2.8
Todd County	13.5	88.3	9.0	0.8	0.2	0.0	3.7	3.9
Daviess County	8.5	93.6	6.3	0.4	1.4	0.0	0.5	2.7
Warren County	17.9	83.7	10.4	0.8	3.5	0.4	3.3	5.0

Source: 2016 ACS

¹ Race percentages are provided for those reporting a particular race alone or in combination. Less than 3 percent of the U.S. population reported two or more races in the 2010 Census (USCB 2018b); thus, these percentages are closely representative of the whole ethnic group population.

² This group is calculated separately from the other ethnicities and may include overlap from the other categories, as the USCB does not consider Hispanic or Latino a "race."

Table 3-15. Poverty Rates

Geography	2016 SAIPE		2016 ACS	
	Poverty %	Poverty %, All Ppl	Poverty %, Age 18+	Poverty %, Ppl in Families
Kentucky	18.2	18.8	16.7	15.6
Muhlenberg County	19.6	19.7	17.4	15.7
Butler County	17.8	24.6	21.0	21.6
Christian County	20.8	20.3	18.2	17.2
Hopkins County	18.3	16.1	14.2	13.7
Logan County	17.5	18.1	16.7	14.9
McLean County	17.3	18.3	14.6	16.2
Ohio County	20.3	21.2	17.1	18.4
Todd County	20.4	17.2	15.9	13.4
Daviess County	16.4	16.3	14.1	13.1
Warren County	18.5	19.2	17.2	15.0

Source: 2016 SAIPE, 2016 ACS

3.10.2 Environmental Consequences

3.10.2.1 Alternative A: No Action Alternative

Under the No Action Alternative, PAF Unit 3 would continue operations. TVA would implement all of the planned actions related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analyses, as described in **Section 2.1.1** and **Table 2-1**. These actions would result in increased short-term construction employment and the associated local economic benefits. As a result of continued operations at PAF, TVA would incur future maintenance and environmental compliance costs that may have a minor adverse effect on ratepayers.

3.10.2.2 Alternative B: Potential Retirement of Paradise Fossil Plant

There would be no significant environmental justice-related impacts under Alternative B. As shown in **Table 3-14**, the percentage of the population of affected counties that identified as

non-White was smaller than Kentucky as a whole except three of the affected counties. The percentage of the population living below the poverty threshold was generally higher in the affected counties than for Kentucky as a whole. However, due to the lack of significant environmental impacts as described in this chapter and the generally low concentrations of minority populations in the affected counties, no disproportionate human health or environmental impacts to disadvantaged populations are projected. Minor positive indirect effects to minority and low-income populations may occur due to beneficial changes to air quality with implementation of the Proposed Action.

Following the Proposed Action, the 131 people currently employed by PAF may become unemployed. While this decrease in employment represents less than 1.3 percent of total employment as estimated for November 2018 in Muhlenberg County (USBLS 2019), moderate adverse economic impacts to the area would result. The Paradise NGCC plant, which adjoins PAF in Muhlenberg County, would remain in operation and would continue to employ 27 people. TVA would help offset this employment loss by placing some interested employees in available positions across the TVA power service area, provided the employees are willing to relocate. Given the prominence of several other fields in the PAF vicinity, including educational services, health care, and social assistance, manufacturing, and retail trades, current PAF employees may find alternative employment in these other industries. However, based on the 2016 ACS, the median earnings for full-time employment in these industries in affected counties are approximately \$16,000 to \$29,000 less on average than in the utilities industry. PAF employees and any associated family members may also temporarily relocate for work or follow recent depopulation trends and permanently relocate to different locations in the Commonwealth or beyond. These changes may affect familial and community relations and would reduce local expenditures for goods and services.

Mining of PAF coal at 2018 levels provides employment for approximately 135 people in western Kentucky (Kentucky Energy and Environment Cabinet 2017). The mining of limestone for use at PAF and the transportation of limestone and coal to PAF provides additional regional employment. The retirement of PAF Unit 3 may result in indirect employment impacts to the nearby mining and trucking industries, as well as to other businesses either providing goods and services to PAF or purchasing goods and services from PAF (such as a loss of revenue from the sale of CCR byproducts). Unless the coal and limestone mines find alternative markets for the tonnage currently purchased by PAF, moderate indirect adverse economic impacts to the affected counties and a portion of western Kentucky would occur from closure of this facility.

After completion of the 30-day public comment period on the draft EA, the Kentucky Cabinet for Economic Development submitted a 2017 Economic Impact Estimate (EIE) to TVA. The EIE was developed utilizing IMPLAN Group LLC 2016 databases based on information obtained from six federal agencies (U.S. Bureau of County Business Patterns, U.S. Bureau of Economic Analysis, USBLS, USCB, U.S. Department of Agriculture, and U.S. Geological Survey). The EIE employs an economic impact model that inputs the direct impact of employment expenditure (i.e., the average PAF salary and benefits cost) on the economy and then estimates the secondary (indirect) and the consumer-based (induced) effects. Indirect effects result from changes in sales, income, or employment within the PAF region, and induced effects occur through the recirculation of money received through direct and indirect income sources and the subsequent creation of additional jobs and economic activities. In the EIE, the direct, indirect, and induced economic impact of PAF closure was

considered within Muhlenberg County, the Commonwealth excluding Muhlenberg County, and the entire 120-county Commonwealth.

The EIE utilized the assumptions that PAF directly employs 100 people at an average salary of \$117,508 and average annual estimated benefits equal to 42.2 percent of the average salary (\$49,588). Within Muhlenberg County, the EIE estimated PAF closure to affect 194 jobs totaling \$32.7 million in gross domestic product (GDP). In addition to the assumed 100 direct PAF jobs, this includes indirect effects to 23 jobs and induced effects to 71 additional jobs in Muhlenberg County. Across the Commonwealth excluding Muhlenberg County, the EIE predicted impacts to 99 jobs (65 indirect and 34 induced jobs) totaling \$14.1 million in GDP. Altogether statewide, the EIE estimated that PAF closure may affect 100 direct jobs, 88 indirect jobs and 105 induced jobs, or 293 total jobs, associated with over \$46.8 million in GDP. According to the EIE, indirect industries supporting PAF may include coal mining; facility maintenance and repair; facility operational support; wholesale trade; rail and truck transportation; pipeline transportation; employment services; support activities for mining; architectural, engineering, and related services; accounting, tax preparation, bookkeeping, and payroll services; commercial and industrial machinery equipment rental and leasing; legal and environmental services; and likely others. Induced effects from PAF could occur in food services, plumbing, health care, barbershops, clothing sales, emergency services, landscaping, legal services, financial services, real estate, retail stores, automobile dealers, services stations, pet care, recreational activities, and similar industries. The assumption of 100 PAF employees is about a quarter less than the actual number of 131 current employees; if the EIE assumed 131 PAF employees, the resulting quantified economic impacts would have been greater.

Using the actual number of current employees, the retirement of PAF Unit 3 may result in the loss of approximately 118 jobs within Muhlenberg County that are indirectly associated with PAF. Across the Commonwealth excluding Muhlenberg County, jobs lost that are indirectly associated with PAF may total around 124. This would affect less than 1.2 percent of total employment in Muhlenberg County and less than 0.01 percent of total employment across the Commonwealth, as estimated for November 2018 (USBLS 2019). Based on this, moderate indirect adverse economic impacts to the area would result with PAF retirement.

Based on TVA economic analyses, TVA tax equivalent payments to the Commonwealth of Kentucky are expected to decrease with implementation of the Proposed Action due to the reduction in value of PAF. Any change in the allocation of TVA tax equivalent payments to Muhlenberg County would be determined by the Commonwealth. The amount of funding allocated to specific purposes in Muhlenberg County, including any funds to Muhlenberg County Schools, is determined by the county. The Paradise NGCC plant, which adjoins PAF in Muhlenberg County, would remain in operation and would partially offset this reduction due to an expected additional allocation to the county, per amendments to KRS § 96.895.

Retiring PAF would eliminate projected future maintenance and environmental compliance costs, and long-term savings would be realized by TVA. These savings would assist TVA in maintaining lower rates, to the indirect benefit of TVA energy consumers.

3.11 Cumulative Impacts

The CEQ regulations (40 CFR §§ 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 USC § 321 et seq.) define cumulative impact as: "...the

impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions (RFFAs) regardless of what agency (federal or nonfederal) or person undertakes such other actions.” (40 CFR § 1508.7).

A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of a project when added to other past, present and RFFAs (40 CFR § 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions and, therefore, incorporate the cumulative impacts of past and present actions.

3.11.1 Scoping for Cumulative Impacts Analysis

TVA evaluated a full range of environmental resource issues associated with Alternative B for inclusion in the cumulative effects analysis. The landscape surrounding the existing PAF facility is already subject to environmental stressors associated with industrial operations and previous disturbance of the site. Consequently, as has been described in prior subsections of this EA, the existing quality of environmental resources potentially directly or indirectly affected by project activities is generally low.

This analysis is limited to those resource issues potentially adversely affected by project activities. Accordingly, air quality, surface water, groundwater, aquatic ecology, threatened and endangered species, solid and hazardous waste, and visual resources are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be negligible. Primary resource categories specifically considered in this cumulative effects assessment include noise, transportation, and socioeconomics and environmental justice.

3.11.2 Geographic Area of Analysis

The appropriate geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, the lands and water resources within a 5-mile radius of the proposed action was considered appropriate for consideration in this analysis.

3.11.3 Identification of “Other Actions”

Past, present and reasonably foreseeable future actions (RFFAs) that are appropriate for consideration in this cumulative analysis are listed in Table 3-16. These actions were identified within the geographic area of analysis as having the potential to, in aggregate, result in larger and potentially adverse impacts to the resources of concern. This section supplements preceding analyses that include in some degree the potential for cumulative adverse impacts to the region’s environment that could result from the implementation of the projects proposed to manage CCR at PAF. TVA would implement the RFFAs related to the current and future management and storage of CCRs at PAF, which have either been reviewed or will be in subsequent NEPA analysis, as described in **Section 2.1.1** and **Table 2-1**.

Table 3-16. Summary of Other Past, Present, or Reasonably Foreseeable Future Actions in the Vicinity of the Proposed Action

Action	Description	Project Type
Closure of Units 1 and 2	TVA closed Units 1 and 2 in April 2017.	Past
Paradise Combined Cycle Plant	Natural gas plant located in Drakesboro, Kentucky that began commercial operation in April 2017.	Past
Gypsum Dewatering Facility*	Construction of a gypsum dewatering facility, including construction and operation of a dewatering facility building, two de-aeration tanks and two gypsum effluent water clarifiers, and a Gypsum Storage Pad Area.	RFFA
Dry Fly Ash Conversion for Unit 3*	TVA is nearing completion of conversion of Unit 3 for dry fly ash and construction of two storage silos, one dry unloading spout, and truck weigh scale under each silo.	RFFA
Gypsum Pond Instrumentation Installation*	Associated with Gypsum Dewatering Facility	RFFA
Process Water Basins*	Closure of the existing 2A/2B Impoundment and construction of Process Water Basins.	RFFA
Peabody Ash Impoundment Closure*	Closure of the Peabody Ash Impoundment	RFFA
2A/2B Ash Impoundment Closure*	Closure of the Slag Impoundment 2A/2B and Stilling Impoundment 2C	RFFA
Peabody Dike*	Construction of a divider dike in the Peabody Ash Impoundment	RFFA
Gypsum Stack Closure*	Closure of the Gypsum Disposal Area and grading a protective cover system.	RFFA
Daniels Run Coal Fines Impoundment Closure*	Closure of the Daniels Run Pond 3 Coal Fines Impoundment	RFFA
Landfill Cell 1A	TVA would construct and operate one cell (Cell 1A) of a landfill for disposal of dry CCRs generated at the plant on PAF property located approximately 0.5 mile southeast of the plant.	RFFA
Coal Yard Closure	Closure of the coal yard at PAF.	RFFA
Chemical Impoundment Closure	Closure of the chemical impoundment at PAF.	RFFA
Deconstruction and demolition of PAF Unit 3	TVA would deconstruct and demolish Unit 3 at PAF.	RFFA

*project description provided in Section 2.1.1 and Table 2-1.

Actions that are listed as having a timing that is “past” or “present” inherently have environmental impacts that are integrated into the baseline condition for each of the resources analyzed in this chapter. However, these actions are included in this discussion to provide for a more complete description of their characteristics. Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis.

3.11.4 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 3. These combined impacts are defined by the CEQ as “cumulative” in 40 CFR Section 1508.7 and may include individually minor, but collectively significant actions taking place

over a period of time. The potential for cumulative effects to the identified environmental resources of concern are analyzed below for Alternative B.

3.11.4.1 Noise

The decommissioning of the PAF Unit 3 under Alternative B would result in short-term, minor, adverse impacts on the noise environment from decommission-related transportation activities on local roadways. RFFAs, such as the construction of CCR projects or the deconstruction and demolition of PAF Unit 3, could also result in short-term, minor, adverse impacts to noise. Noise generated by construction or demolition projects is expected to be minor with a relatively minor amount of heavy machinery needed to carry out those projects. Most construction or demolition activities would occur during the day on weekdays; however, construction activities could occur at night or on weekends, if necessary. All of the construction activities occur within the PAF site boundary.

Operations of the landfill would have permanent noise impacts from heavy machinery. However, as mentioned in the previous sections, there are no sensitive receptors near PAF. Consequently, no sensitive receptors would be adversely impacted by the RFFA projects. When considered together, the short-term and intermittent nature of the impacts from the proposed action would be minor and would not be expected to contribute to a cumulative impact.

3.11.4.2 Transportation

The retirement of the PAF Unit 3 under Alternative B would have little effect on local traffic and, following retirement, local traffic not associated with CCR projects would be substantially reduced from current levels. The construction of relatively foreseeable future projects, such as the CCR projects, or the demolition of PAF could contribute to a short-term increase in local traffic on nearby roadways. When considered together with the proposed action, the short-term and intermittent nature of the impacts would be minor and would not be expected to contribute to a cumulative impact.

3.11.4.3 Socioeconomics

The retirement of the PAF Unit 3 under Alternative B would result in moderate adverse economic impacts from the loss of about 194 jobs due to the direct, indirect and induced effects of the retirement. The Paradise NGCC plant, which adjoins PAF in Muhlenberg County, would remain in operation and would continue to employ 27 people. As noted in TVA's previous analyses of the CCR activities, demographic characteristics of the project area are expected to change temporarily in response to an increased construction workforce, but this change would not be significant. No additional permanent workers would be employed during operation of the landfill or dewatering facilities. The RFFAs are not anticipated to contribute to additional impacts. Overall, the cumulative impacts associated with this project are expected to be moderate.

3.12 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by the CEQ and the courts. The proposed action would not cause any unavoidable adverse environmental impacts.

3.13 Relationship of Short-Term Uses and Long-Term Productivity

PAF would be retired and actions related to decommissioning, deactivation and decontamination would be implemented. In the long term, the site could become productive if commercial or industrial facilities were to be established, thereby producing employment opportunities and tax revenue and enhancing long-term productivity of the site.

3.14 Irreversible and Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources would occur when resources would be consumed, committed, or lost because of the project. The commitment of resources would be irreversible if the project started a process (chemical, biological, or physical) that could not be stopped. Similarly, commitment of a resource would be considered irretrievable when the project would directly eliminate the resource, its productivity, or its utility for the life of the project and possibly beyond. Retiring PAF would not result in any irreversible or irretrievable commitments of resources.

CHAPTER 4 – LIST OF PREPARERS

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Project Role: Surface Water

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CHAPTER 5 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

5.1 Federal Agencies

- U.S. Army Corps of Engineers, Louisville District
- U.S. Fish and Wildlife Service

5.2 State Agencies

- Kentucky Department for Environmental Protection
- Kentucky Department for Energy Development and Independence
- Kentucky Department of Natural Resources
- Kentucky Energy and Environment Cabinet
- Kentucky Heritage Council
- Kentucky Fish and Wildlife
- Kentucky State Clearinghouse
- Kentucky State Historic Preservation Officer
- Natural Resources Conservation Service

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CHAPTER 6 – LITERATURE CITED

Berglund, B., and T. Lindvall. 1995. Community Noise. Retrieved from <http://www.nonoise.org/library/whonoise/whonoise.htm#4.2.2.2>. Accessed October 2, 2018.

Carey, D.I., and J. F. Stickney. 2004. Groundwater Resources of Muhlenberg County, Kentucky. Kentucky Geological Survey. County Report 89, Series XII. Retrieved from <http://www.uky.edu/KGS/water/library/gwatlas/Muhlenberg/Muhlenberg.htm>. Accessed October 2018.

Duvaul, R.W., and B.W. Maxwell. 1962. Availability of Ground Water in McLean and Muhlenberg Counties, Kentucky. U.S. Geological Survey Hydrologic Investigations Atlas HA-29. Retrieved from <http://www.uky.edu/KGS/water/library/gwatlas/Muhlenberg/GWavailability.htm>.

Federal Highway Administration (FHWA). 2011. Highway Traffic Noise: Analysis and Abatement Guidance. December 2011.

Iowa State University. 2018. Monthly Average Mean Temperatures, IEM “Climodat” Reports. Retrieved from <http://mesonet.agron.iastate.edu/climodat/?network=KYCLIMATE>. Accessed October 3, 2018.

Kentucky, Commonwealth of. 2018. Other Changes. Retrieved from <https://taxanswers.ky.gov/Other-Changes/Pages/default.aspx>. Accessed October 2, 2018.

Kentucky Energy and Environment Cabinet. 2016. 2016 Integrated Report to Congress on the Condition of Water Resources in Kentucky Volume II. 303(D) List of Surface Water. Retrieved from <http://water.ky.gov/waterquality/Pages/303dList.aspx>

_____. 2017. Division of Mine Safety Annual Report. Retrieved from <http://minesafety.ky.gov/Department%20Annual%20Reports/2017%20Annual%20Report.pdf>. Accessed October 3, 2018.

Kentucky Pollutant Discharge Elimination System (KPDES). 2018. KPDES permit number KY0004201. June 14, 2018.

Kentucky State Data Center. 2016. Projections, Vintage 2016. Kentucky State Data Center, Department of Urban and Public Affairs, College of Arts and Sciences, University of Louisville. Retrieved from <http://ksdc.louisville.edu/data-downloads/projections/>. Accessed October 3, 2018.

Kentucky State Nature Preserves Commission (KSNPC). 2018. Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities for Muhlenberg County, Kentucky. Retrieved from http://naturepreserves.ky.gov/pubs/publications/County_Reports/Muhlenberg.pdf. Accessed October 13, 2018.

Kentucky Cabinet for Economic Development. 2018. Potential Paradise Fossil Plant Retirement Effects. Report submitted to TVA. Kentucky Cabinet for Economic Development, Office of Workforce, Community Development, and Research, Frankfort..

Kentucky Transportation Cabinet. 2018. Traffic Counts. Retrieved from <https://maps.kytc.ky.gov/photolog/?config=TrafficCounts>. Accessed October 5, 2018.

National Weather Service (NWS). 2018. Climatology – Bowling Green, Kentucky. Retrieved from <https://www.weather.gov/lmk/clibwg>. Accessed October 9, 2018.

Stantec. 2018a. 2017 Annual Groundwater Monitoring and Corrective Action Report. TVA Paradise Fossil Plant Gypsum Disposal Area Multi-Unit CCR Unit.

_____. 2018b. 2017 Annual Groundwater Monitoring and Corrective Action Report. TVA Paradise Fossil Plant Peabody Ash Pond CCR Unit.

_____. 2018c. 2017 Annual Groundwater Monitoring and Corrective Action Report. TVA Paradise Fossil Plant Slag Ponds Area Multi-Unit CCR Unit.

Starn, J.J., R.W. Forbes, C.J. Taylor, and M.F. Rose. 1993. Geohydrology of Parts of Muhlenberg, Ohio, Butler, McLean, Todd, and Logan Counties, Kentucky. U.S. Geological Survey Water Resources Investigations Report 93-4077.

Tennessee Valley Authority (TVA). 1996. Development of Ash Disposal Capacity at Paradise Fossil Plant Environmental Assessment. Muhlenberg County, Kentucky. August 1996.

_____. 1998. Jacobs Creek Bioassessment Report – Paradise Steam-Electric Plant. Resource Group, Water Management. Chattanooga, Tennessee.

_____. 2004. Paradise Fossil Plant Disposal of Coal Wash Fines Supplemental Environmental Assessment. Muhlenberg County, Kentucky.

_____. 2008. Unionid Mussel and Habitat Survey of the Green River at a Proposed Dredge Site Near the Paradise Fossil Plant. Muhlenberg County and Ohio County, Kentucky. Unpublished Report, CEC No. 18747.

_____. 2009. Entrainment and Impingement of Fish at Paradise Fossil Plant during 2006 through 2008. Environmental Stewardship and Policy.

_____. 2012. Biological Monitoring of the Green River in the Vicinity of Paradise Fossil Plant during November 2011. Tennessee Valley Authority, Biological and Water Resources. Chattanooga, Tennessee.

_____. 2013a. Paradise Fossil Plant Units 1 and 2 Mercury and Air Toxics Standards Compliance Project Final Environmental Assessment. Muhlenberg County, Kentucky.

_____. 2013b. Coal Combustion Residue Impoundment Round 11 – Dam Assessment Report. Cumberland Fossil Plant Dry Ash Storage/Ash Pond, Cumberland City, Tennessee.

_____. 2015. 2015 Integrated Resource Plan and Final Supplemental Environmental Impact Statement.

_____. 2016. Ash Impoundment Closure Environmental Impact Statement. Anderson

County, Tennessee.

- _____. 2017. Paradise CCR Management Operations Environmental Assessment. Tennessee Valley Authority.
 - _____. 2018a. Paradise CCR Management and Process Water Basins Supplemental Environmental Assessment.
 - _____. 2018b. Email from Ashley Pilakowski (TVA) to Blair Wade (HDR) and Charles Nicholson (HDR) regarding access to air quality for TVA emissions. July 26, 2018.
 - _____. 2018c. Sulfur dioxide and NOx emissions at Paradise Fossil Plant. Retrieved from <https://www.tva.gov/Environment/Environmental-Stewardship/Air-Quality/Paradise-Fossil-Plant-Emissions>. Accessed September 18, 2018.
 - _____. 2018d. Email from Chevales Williams (TVA) to Blair Wade (HDR) and Mark Filardi (HDR) regarding measured flows at Outfall 002. November 15, 2018.
 - _____. 2018e. TVA Natural Heritage Database. Data Received September 2018.
 - _____. 2018f. TVA Tax Equivalent Payments Total Nearly \$524 Million in 2018. Retrieved from <https://www.tva.com/Newsroom/Press-Releases/TVA-Tax-Equivalent-Payments-Total-Nearly-524-Million-in-2018>. Accessed October 2, 2018.
 - _____. 2018g. 2019 Integrated Resource Plan. Retrieved from <https://www.tva.gov/Environment/Environmental-Stewardship/Integrated-Resource-Plan>. Accessed October 2018.
- U.S. Army Corps of Engineers (USACE). 2011. Louisville District – Green River Charts, Chart No 43. Retrieved from <http://www.lrl.usace.army.mil/optm/article.asp?id=133>. Accessed April 17, 2013.
- U.S. Bureau of Labor Statistics (USBLS). 2019. Local Area Unemployment Statistics. Retrieved from <https://data.bls.gov/PDQWeb/la>. Accessed on February 8, 2019.
- U.S. Census Bureau (USCB). 2017. Small Area Income and Poverty Estimates: 2016. Report Number P30-02. Retrieved from <https://www.census.gov/library/publications/2017/demo/p30-02.html>. Accessed 2 October 2018.
- _____. 2018a. State & County QuickFacts – Muhlenberg County, Kentucky. Retrieved from <https://www.census.gov/search-results.html?searchType=web&cssp=SERP&q=Muhlenberg%20County.%20KY>. Accessed October 2018.
 - _____. 2018b. American FactFinder. [Online Database]. Retrieved from <https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>. Accessed August 29, 2018.
 - _____. 2018c. Income and Poverty in the United States: 2017. Report Number P60-259. Retrieved from

- <https://www.census.gov/content/dam/Census/library/publications/2018/demo/p60-263.pdf>. Accessed October 2, 2018.
- U.S. Energy Information Administration (USEIA). 2017. Annual Coal Report. Retrieved from <https://www.eia.gov/coal/annual>. Accessed September 28, 2018.
- U.S. Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety, EPA-550/9-74-004, Washington, D.C. Retrieved from <http://nepis.epa.gov/Exe/ZyNET.exe/2000L3LN.TXT?ZyActionD=ZyDocument&Client=EPA&Index=Prior+to+1976&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CInd ex%20Data%5C70thru75%5CTxt%5C00000001%5C2000L3LN.txt&User=ANONY MOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150q16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS &BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPU RL#area>. Accessed January 2016.
- _____. 2015. Designated Sole Source Aquifers in EPA Region IV. Retrieved from <http://www.epa.gov/safewater/sourcewater/pubs/reg4.pdf>. Accessed September 2015.
- _____. 2016. National Ambient Air Quality Standards (NAAQS). Retrieved from <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Updated December 20, 2016.
- _____. 2018a. Kentucky Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, EPA Green Book. Retrieved from https://www3.epa.gov/airquality/greenbook/anayo_ky.html. Accessed October 4, 2018.
- _____. 2018b. Interactive Map of Air Quality Monitors. Retrieved from <https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=>. Accessed October 5, 2018.
- _____. 2018c. 2008 and 2011 National Emission Inventory (NEI). Retrieved from <https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data>. Accessed October 4, 2018.
- _____. 2018d. Air Markets Program Data. Retrieved from <https://ampd.epa.gov/ampd/>. Accessed October 4, 2018.
- _____. 2018e. Disposal of Coal Combustion Residuals from Electric Utilities. Accessed October 16, 2018.
- U.S. Fish and Wildlife Service (USFWS). 2018. IPaC Resource List. Retrieved from <https://ecos.fws.gov/ipac/location/index>. Accessed October 10, 2018.

U.S. Forest Service (USFS). 1995. Landscape Aesthetics, A Handbook for Scenery Management. Retrieved from https://www.fs.fed.us/cdt/carrying_capacity/landscape_aesthetics_handbook_701_no_append.pdf. Accessed October 2, 2018.

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A

Responses to Public and
Agency Comments on the
Draft EA



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APPENDIX A –Responses to Public and Agency Comments on the Draft EA

Introduction

The public and agency involvement in the preparation of this EA is described in Section 1.5 of the EA. Comments on the draft EA were accepted during a 30-day public comment period November 19, 2018, through December 19, 2018, via the TVA website, mail, and e-mail.

The comments submitted to TVA are reprinted in Appendix B. This appendix restates the comments received and provides responses to the comments. The comments are organized by topical area. Several of the topics were addressed by multiple comments and these are consolidated into the comment statements listed below. The names of the commenters associated with each topic are listed with the comment statement. Several comments were submitted directly to the TVA Board of Directors by the public and agencies after the closure of the comment period. These comments addressed topics included in the previously submitted comments and are not otherwise addressed below.

The Sierra Club submitted a form letter in support of the potential retirement of PAF and Bull Run Fossil Plant (evaluated under a separate EA). The letter also stated that TVA should provide a just transition for TVA employees and the surrounding communities affected by the potential retirement of these facilities. The letter was signed by 613 Sierra Club members and contained individualized messages from 274 Sierra Club members. The individualized messages addressed topics raised in other comments and are not otherwise addressed below.

In addition to the comments summarized below, during the public review period, over 1,650 letters of opposition were sent to the TVA Board of Directors from Muhlenberg County students, teachers, staff, Board of Education members, and residents. Each of these letters expressed opposition to the closure of PAF and writers requested that the Board keep the plant in operation. Most letters expressed concern that the plant's closure would have a severe impact on the county's economy as well as to the school system. Many of the students, teachers, and administrators stated that the loss of TVA jobs would impact their families, friends and the community and that the plant's closure would force people to leave the county, harming other businesses in the county (examples provided by commenters of businesses impacted include local trucking companies, grocery stores, and restaurants). Many expressed concern that the local school system would lose students and tax revenue because of the closure. According to commenters, the loss of funding would adversely impact the ability of the school system to provide for teacher salaries, educational supplies, and extracurricular activities.

Purpose and Need

Paradise Unit 3 provides reliable coal-fired generation that is not subject to the fuel price volatility and potential fuel supply disruptions of the gas-fired plant built to replace Paradise Units 1 and 2. Unit 3 therefore provides a secure energy source and a reliable backup in extreme situations. *Jerry Amos; Ryan B (no last name given); Tammy Brown; Joan McClellan; Jonathan McCay; John Durbin; James Rogers; Javene Martin; Darrel McClellan; Barry Atcher; Landon Atcher; Mark Combs; James Hendricks; Stephen Hopgood; Charles Shelton; Roger Southerland; Cheryl Werner; Kimberly White*

Response: TVA system planners performed an economic evaluation of the plant retirement which takes into account fuel price volatility. Impacts of fuel price volatility were evaluated against high and low gas price sensitivities. Evaluations indicate that the balance of the coal fleet partly replaces generation of the retired plant, muting impacts during periods of higher natural gas prices. Reducing the coal fleet would not materially impact TVA's fuel resiliency. Section 1.2 of the final EA has been revised to address the fuel resiliency issue raised in this comment.

Paradise Unit 3 is unique among TVA coal plants utilizing a locally mined coal that does not require transportation over long distances. *Gary W. Jones – Muhlenberg Alliance for Progress; John Durbin; Jason Decker*

Response: TVA system planners performed an economic evaluation of PAF Unit 3 which reflected forecasted fuel prices including transportation costs and premiums typically incurred. TVA continually evaluates fuel forecasting methodology based on historical results and marketplace shifts, and uses this information to make necessary updates to future forecasts. As part of this evaluation, TVA also conducted an analysis that reduced the premiums associated with the local fuel source. The differences in the results of this analysis and the analysis with greater premiums for the local fuel source were small.

The lack of fuel flexibility from many different mines and/or geographic locations is listed as a need for the proposed retirement. As one of the top five coal producing states, Kentucky has the ability to supply fuel from many different mines and geographic locations. *Senator Rand Paul*

Response: The EA acknowledges the importance of fuel flexibility. The analysis of the proposed retirement considered the flexibility of Paradise Unit 3 in being able to use coal sourced from two major basins and transported by truck, rail, or barge.

Regarding fuel flexibility, Unit 3 has the most flexibility in the TVA fleet for receiving coal from different areas and by different means of transportation. It can also burn coal of different quality and sulfur content without affecting unit reliability or performance. *Jason Decker; John Durbin; Deric Doss*

Response: See the response to the preceding comment. The ability of PAF to burn coal of different quality and sulfur content was considered in the analysis of Unit 3's retirement.

The description of the condition of Paradise Unit 3 is based on outdated 2010-2015 information. It fails to address the recent total revamp of the superheater section of the boiler, allowing much faster startup; new cyclones throughout the boiler; the 90 percent completion of the ash handling / dewatering system, exceeding 2023 environmental standards; and the new EX 2000 exciter controls and Mark 6 modular controls. These investments have resulted in greatly improved 2018 plant performance and a top decile EFOR rating. The investments would also be wasted if Unit 3 is retired. Anonymous; John Durbin; Ryan Driskill; Thomas Wilkerson; Brad Tudor; Barry Atcher; Mark Combs; Shawn Cornette; Jason Decker; Deric Doss; Larry Dunn; Coneathea Smith-Derr; Mark Combs; Burt Fitzhugh; Greg Fiorella; Patty Fiorella; Kelly Free; Chad Halcomb; Charles Payne; Carole Hudson; April Jernigan; Alice Penrod; Martha Riggs; James Robards; Cortney Sweet; Rick Vinson; Alex Williams

Response: TVA used data from 2015-2017 to make benchmark comparisons, as peer data generally lags approximately 6 months, when stating that Paradise Unit 3 performance is in the bottom quartile. Paradise Unit 3's 2018 EFOR of 18.3% was slightly higher than the three year average of 16.7%, which ranked in the bottom quartile. In May 2018, the unit was placed in an operational "must-run" status and ran well, but it was not cycled on and off during this period as it would be under normal operations. As Paradise Unit 3 was not designed to follow load or frequently cycle on and off, it is generally less effective and more costly operating in a cycling manner than other gas and coal units in the portfolio.

TVA system planners utilize an industry standard least-cost planning approach for economic analysis of the TVA power system. Prior investments were made anticipating load growth and continued operation. As the load outlook changes, TVA evaluates options for the fleet considering future costs and benefits, while viewing prior investments as sunk costs.

The DEA states that Unit 3 does not meet TVA's current portfolio needs and is in the bottom quartile of U.S. coal plants for forced outage occurrences. Unit 3, however, is leading the TVA coal fleet in EFOR and exceeding the fiscal year target, leading the fleet in safety, and has been under budget for NFOM [Non-Fuel Operating and Maintenance] and has averaged \$1.6 million in continuous improvements over the last two years. Jason Decker; Deric Doss; Larry Dunn

Response: Paradise Unit 3 was designed to provide base load generation. Increases in nuclear generation, which produces power at a lower cost per MWh, have displaced Paradise Unit 3 as baseload generation. TVA used data from 2015-2017 to make benchmark comparisons, as peer data generally lags approximately 6 months, when stating that Paradise Unit 3 performance is bottom quartile. Paradise Unit 3's 2018 EFOR of 18.3% was slightly higher than the three year average of 16.7%, which ranked in the bottom quartile. In May 2018, the unit was placed in an operational "must-run" status and ran well, but it was not cycled on and off during this period as it would be under normal operations. Paradise Unit 3 was not designed to follow load or

frequently cycle on and off, and as such, is more costly and less effective operating in this manner than other gas and coal units in the portfolio.

The DEA states that large capital expenditures are necessary for Unit 3 to continue to operate and comply with the CCR and Effluent Limitation Guidelines rules, and construct a new gypsum dewatering facility and dry fly ash handling system. These facilities, however, are nearing completion. *Jason Decker; Brad Tudor*

Response: TVA system planners utilize an industry standard least-cost planning approach for economic analysis of the TVA power system. Prior investments were made anticipating load growth and continued operation. As the load outlook changes, TVA evaluates options for the fleet considering future costs and benefits, while viewing prior investments as sunk costs.

PAF Unit 3 has significant future capital needs to support compliance with the CCR Rule. There may also be the need for significant future capital needs to comply with Effluent Limitation Guidelines when they are finalized. Regarding CCR compliance, the project for gypsum dewatering has not yet been completed and would occur under either Alternative.

According to information provided by TVA after the DEA was issued for public comment, TVA anticipates spending about \$107 million per year through 2023 for capital costs and environmental compliance at PAF. These costs are consistent with reported FY 2017 and 2018 costs, and do not support the claim of greatly increased future capital costs. *Ryan Driskill*

Response: See the response to the preceding comment. The FY 2017 and FY 2018 costs did not reflect the CCR and ELG compliance costs, which would greatly increase future capital costs.

Additionally, Paradise Unit 3 has experienced material condition deterioration not uncommon in an aging coal plant, resulting in reliability challenges and the need for continued large investments, including significant expenditures necessary to replace a steam turbine rotor.

Recent turbine and generator control upgrades allow the plant to safely operate at lower loads and vary its output from 400 to 1,000 MW. This provides increased load flexibility and could reduce fleet shutdown and startup costs during low system demand.

Anonymous

Response: Operating ranges are updated periodically by TVA's Power Operations, as warranted. Paradise Unit 3 was not designed to follow load or frequently cycle on and off. While the unit may have a greater operating range in the future, it is generally less effective and more costly operating in a cycling manner than other gas and coal units in the portfolio.

The DEA does not describe TVA's forecasted coal prices. *Ryan Driskill*

Response: TVA fuel price forecasts are based on published industry forecasts, historical trends, and TVA-specific factors. The forecasting methodology is continually evaluated based on

historical results and marketplace shifts, and this information to make necessary updates to future forecasts.

The EA data is based on the 2015 Integrated Resource Plan and its assumption that natural gas prices remain relatively low. Natural gas prices have increased since 2015 and the December 2018 price was \$4.43/MMBtu. *Jason Decker*

Response: While natural gas prices are subject to short-term volatility, such as rising higher for a few weeks during cold snaps, TVA commodity forecasters believe that long term trends still point to relatively low natural gas prices for the foreseeable future. The 2018 annual average Henry Hub gas spot price was only slightly higher than the 2015-2017 three year average. Additionally, annual average prices have remained relatively low since 2008. This is due primarily to the significant growth in shale gas production. TVA's forecasts are generally consistent with U.S. Energy Information Administration benchmarks and peer group forecasts.

Because the DEA fails to provide the cost estimates necessary to support TVA's stated need to retire Unit 3, the asserted "need" to retire Unit 3 is not demonstrated. These cost estimates include those of projects associated with compliance with the Coal Combustion Residuals Rule (most of which, according to the DEA, will be carried out whether the unit is retired or not), and the cost of the future rotor replacement. The DEA also does not address how TVA will recoup the massive investments in pollution control technology at Unit 3 over the last 10 to 15 years. The continued operation of the already upgraded and paid for Unit 3 seems like a smarter decision than TVA's proposed expenditure of \$8 billion on new generating facilities over the next 20 years. *Jason D. Witt – Murray Energy Corporation; Senator Rand Paul; Ryan Driskill*

Response: TVA system planners utilize a standard least-cost planning approach common in the utility industry for economic analysis of the TVA power system. Prior investments were made anticipating load growth and continued operation. As the load outlook changes, TVA evaluates options for the fleet considering future costs and benefits, while viewing prior investments as sunk costs.

Paradise Unit 3 has significant future capital needs to support compliance with the CCR Rule. Future capital needs to comply with Effluent Limitation Guidelines, once they are finalized, may also be significant. Regarding CCR compliance, not all of the projects have been completed and the remaining work necessary to complete them could be avoided if TVA decides to retire Unit 3 in 2020.

Additionally, Paradise Unit 3 has experienced material condition deterioration not uncommon in an aging coal plant, resulting in reliability challenges and the need for continued large investments, including significant expenditures necessary to replace a steam turbine rotor.

Regarding the \$8 billion projected expenditures for renewables for the next 20 years, obligations related to existing wind contracts account for about two-thirds of that amount. The balance reflects forecasted spend for solar additions when economic and to meet customer demand.

The DEA does not describe the revenue generated by Unit 3 in recent years or expected future revenues. Because the stated need to retire Unit 3 is based, in large part, on economics this revenue and associated plant profitability information should be included in a more detailed discussion of the economics of operating Unit 3. *Ryan Driskill; Emily Carder*

Response: TVA system planners utilize a standard least-cost planning approach common in the utility industry for economic analysis of the TVA power system, considering options for meeting capacity and energy needs. TVA currently does not produce profit and loss statements by plant, as plants play different roles in meeting system needs. Taking a system-wide view ensures that the whole is optimized, including consideration of whether the cost of replacement energy and capacity is more economic than the ongoing costs for existing resources.

TVA stated that its decision to retire PAF Units 1 and 2 and construct the Paradise combined cycle plant was to comply with the Mercury and Air Toxics rule. In making this decision TVA committed to spending approximately \$450 million (including interest) more than the cost of retrofitting Units 1 and 2 to comply with MATS. *Ryan Driskill*

Response: In November of 2013, the TVA Board made the determination that it was advantageous to retire Paradise Units 1 and 2 for a number of reasons. These reasons included compliance with Mercury and Air Toxics Standards; reduced plant emissions, water consumption, and production of CCRs; future expenditures for dry ash conversion facilities; and a more diverse generation portfolio. The Paradise Combined Cycle Plant has allowed TVA to take advantage of relatively low gas prices and pass that benefit along to customers. It is also better able to respond to short-term changes in the demand for electricity.

The 5 million tons of accumulated coal fines from the former coal wash plant have the potential to provide \$150 million in fuel cost savings over the next 15 years at the current 10% blend rate. The continued use of these coal fines for fuel would avoid the estimated \$30-40 million cost of closing the Daniels Run coal fines area. The coal fines provide fuel flexibility and potential cost savings. *Anonymous; Jason Decker; Shawn Cornette*

Response: The Daniels Run main coal impoundment contains approximately 5 million tons of coal fines that have been identified for potential blending and use at Paradise Unit 3. These coal fines must be blended with other coal sources in order to meet environmental compliance requirements and maintain unit reliability. While use of the coal fines could provide savings, costs related to harvesting and processing the fines reduce estimated savings to somewhere between \$0 and \$10 per ton on a delivered MMBTU basis, or \$0 to \$50 million in total. Considering TVA's long-term commodity and generation forecasts, it would take about 20 years to achieve potential savings. Regardless of any plans to harvest additional coal fines, there will still be required costs associated with closure of this impoundment.

The DEA does not consider alternative means of complying with various CCR and wastewater management rules. EPA is making compliance with the CCR Rule less burdensome through the July 2018 CCR Rule amendment and other actions. Additional similar actions related to CCR and ELG compliance are anticipated. The increased

beneficial reuse of CCR should also be considered among the alternative compliance scenarios; Unit 3 CCR reuse could drive economic development in the region. *Tyler White – Kentucky Coal Association*

Response: Paradise Unit 3 has significant future capital needs to support compliance with the CCR Rule. Compliance with the Effluent Limitation Guidelines (ELG), once they are finalized, may also require significant future capital needs. While the revised CCR Rule amendment provides some relief on the compliance timelines, the remaining work for the CCR compliance projects could be avoided by the retirement in 2020. ELG requirements are no longer expected to require zero liquid discharge; however, a significant reduction in liquid discharge is still anticipated which would require substantial O&M and capital expenditures. The beneficial reuse of CCR is discussed in Section 2.1.1 and Section 3.6.2.2 of the EA.

TVA's 2015 Integrated Resource Plan does not mandate the proposed retirement. Given that the 2019 Integrated Resource Plan is underway, it is premature to consider the Unit 3 retirement. *Jason D. Witt – Murray Energy Corporation*

Response: The recommendations of the 2015 IRP will remain in effect until the TVA Board adopts the 2019 IRP, which is expected in August 2019. The target supply mix adopted by the TVA Board through the 2015 IRP included the potential retirement of up to 2,600 MW of coal-fired generation by 2033. While the 2015 IRP did not identify specific plants or units in the projected retirement of 2,600 MW of coal generation, the recent analyses conducted by TVA, including those described in the EA, identified PAF Unit 3 as a high priority candidate for retirement. TVA system planners are constantly evaluating market and system conditions to make appropriate asset recommendations to the TVA Board of Directors.

The proposed retirement is contrary to the purpose and mission of TVA. The purpose of TVA includes providing for the national defense. The mission of TVA includes providing low-cost reliable energy and supporting economic development. The proposed retirement would be contrary to the interest of national defense by reducing the diversity and reliability of the power system, contrary to providing reliable energy at a low cost, and contrary to economic development. *Senator Rand Paul*

Response: TVA's statutory objective is to provide reliable electric service at the lowest system cost. TVA system planners use a standard least cost planning approach that is common in the utility industry, allowing TVA to make asset decisions that support low rates and drive economic development. TVA maintains a diverse generation portfolio made up of nuclear, coal, gas, hydro, renewables, and demand side programs, which allows TVA to respond to changes in fuel and other costs and maintain low rates. An asset portfolio without PAF Unit 3 would have a small reduction in coal generation, as well as have lower CO₂ emissions, water consumption, and waste production.

Additionally, TVA conducted a fuel resiliency study, selecting a third party (IHS Markit) to develop a framework to evaluate TVA's fuel resiliency with and without the potential retirement. The study evaluated the fuel resiliency of all generating assets in the portfolio using the following criteria: fuel supply; fuel delivery; inventory; and backup contingencies. The study

indicated that TVA's overall fuel supply position is among the most resilient in the U.S. due to a well-diversified generation portfolio, advantageous location with respect to major gas pipelines, access to multiple coal supply and transport options, and a strong and resilient program to secure nuclear fuel. The study findings indicate that reducing the coal fleet would not materially impact TVA's fuel resiliency or its ability to provide reliable energy at the lowest system cost.

The DEA asserts that Paradise is unreliable and inefficient. This is incorrect as the new turbine controls have greatly improved reliability resulting in a top 2 record run for Unit 3 before it went offline for the fall outage. Having fuel stored onsite also increases reliability. John Durbin

Response: TVA used data from 2015-2017 to make benchmark comparisons, as peer data generally lags approximately 6 months, when stating that PAF Unit 3 performance is bottom quartile. Unit 3's 2018 EFOR of 18.3% was slightly higher than the three year average of 16.7%, which ranked in the bottom quartile. In May 2018, the unit was placed in an operational "must-run" status and ran well, but it was not cycled on and off during this period as it would be under normal operations. As Unit 3 was not designed to follow load or frequently cycle on and off, it is generally less effective and more costly operating in a cycling manner than other gas and coal units in the portfolio.

In addition to completing the EA, TVA conducted a fuel resiliency study, selecting a third party (IHS Markit) to develop a framework to evaluate TVA's fuel resiliency with and without the potential retirement. The study evaluated the fuel resiliency of all generating assets in the portfolio using the following criteria: fuel supply; fuel delivery; inventory; and backup contingencies. The study indicated that TVA's overall fuel supply position is among the most resilient in the U.S. due to a well-diversified generation portfolio, advantageous location with respect to major gas pipelines, access to multiple coal supply and transport options, and a strong and resilient program to secure nuclear fuel. The study findings indicate that reducing the coal fleet would not materially impact TVA's fuel resiliency or its ability to provide reliable energy at the lowest system cost.

TVA's claim of the desirability of a balanced portfolio is questionable. According to its most recent FY 2018 10-K report, purchased power made up 13% of TVA's 2018 generating assets, close to the 19% provided by coal. Retiring two more coal plants will further unbalance the portfolio. TVA is increasingly relying on natural gas which has high price volatility. For example, the Henry Hub natural gas price increased 51.7% between September 10 and December 4, 2018. TVA should show the pricing spectrum and cost per megawatt for natural gas combined cycle plants at each given price point for natural gas and explain the breakeven point to provide a true picture of the cost of gas and coal generation. John Durbin; Mark Combs; Rita Smith

Response: TVA maintains a diverse generation portfolio made up of nuclear, coal, gas, hydro, renewables, and demand side programs, which allows TVA to respond to changes in fuel costs and maintain low rates. An asset portfolio without PAF Unit 3 would have a small reduction in coal generation, as well as have lower CO₂ emissions, water consumption, and waste production.

Negotiated long term power purchase agreements (PPAs) are the largest share of TVA's power purchases (88%) and include the following fuel types: coal, natural gas, hydroelectric, and renewables. Short term PPAs and spot market purchases represent the balance and are generally made for either reliability or economic reasons. Under the current load outlook, economic analysis indicates that PAF Unit 3 capacity would eventually be replaced with a combination of solar and gas generating resources at lower cost and lower risk.

TVA system planners performed an economic evaluation of the plant retirement which takes into account fuel price volatility. Impacts of fuel price volatility were evaluated against high and low gas price sensitivities. Evaluations indicate that the balance of the coal fleet partly replaces generation of the retired plant, muting impacts during periods of higher natural gas prices. TVA continually evaluates fuel forecasting methodology based on historical results and marketplace shifts, and uses this information to make necessary updates to future forecasts and sensitivities.

The fact that TVA purchased 13% of the energy it provided in 2018, with a significant portion purchased from the spot market, indicates that TVA does not have sufficient generating capacity. The DEA states that the majority of generation currently provided by Unit 3 would, after the retirement, be replaced by increased NGCC generation. It therefore appears that, following the Unit 3 retirement, TVA would be relying more on purchased power, most likely at greater expense. *Ryan Driskill*

Response: Negotiated long term power purchase agreements (PPAs) are the largest share of TVA's power purchases (88%) and include the following fuel types: coal, natural gas, and renewables. Short term PPAs and spot market purchases represent the balance and are generally made for either reliability or economic reasons. Under the current load outlook, economic analysis indicates that PAF Unit 3 capacity would eventually be replaced with a combination of solar and gas generating resources at lower cost and lower risk. These eventual replacements would likely be a combination of new TVA resources and PPAs.

The assertion that the load is flat is questionable given that TVA sold more power during FY 2018 than in the previous 5 years according to the most recent 10-K report. TVA has issued several recent Conservative Operation Alerts and Power Supply Alerts indicative of inadequate generation and recently experienced the 2nd highest peak demand for the month of November. *John Durbin*

Response: TVA plans for load under normal weather conditions, along with reserves to respond to actual weather and outage events as they occur. In 2018, the region experienced several cold snaps in January as well as warm weather into September, October and even early November, contributing to higher than planned sales for the year. Fall 2018 was a challenging time for TVA and other utilities in the southeast, as this unseasonably warm weather occurred during months when TVA typically conducts planned maintenance activities. TVA is implementing lessons learned to inform future outage planning.

The projection of flat or declining load demand is questionable given the large increase in worldwide energy demand projected by the Energy Information Administration. The recent 3 to 4% growth rates in US GDP, along with the anticipated corporate capital expenditure growth encouraged by the recent tax bill also indicate future load growth. The proposed retirement would harm TVA's ability to meet this load growth. *Ryan Driskill*

Response: The 2018 EIA Annual Energy Outlook projects an annual energy consumption growth rate of 0.4% from 2017 to 2050 with the 2007 peak being surpassed in 2033. Additionally, TVA system planners project load growth specific to factors present in the TVA service area. Growth in population is offset by efficiency impacts, stemming from DOE codes and EE standards as well as economic investments. For this and other reasons, U.S. GDP growth has been increasingly decoupled from power demand in recent years.

NEPA Compliance Process

The 30-day comment period for the DEA is not sufficient for meaningful public review and comment, given the significant and far-reaching economic consequences for western Kentucky from retiring Unit 3. This is amplified by the release of the DEA just before Thanksgiving and during the beginning of the Christmas holiday season. The short comment period is also not sufficient time to allow the review of the thousands of pages of information comprising the 37 reports cited in the DEA. TVA should allow a comment period of at least 90 days and postpone the planned February 2019 decision on Unit 3 retirement until the TVA Board is fully staffed. *Jason D. Witt – Murray Energy Corporation, Tyler White – Kentucky Coal Association, Senator Rand Paul*

Response: The duration of the comment period as well as the format for public involvement (i.e. response through written comments) were selected to facilitate timely and meaningful public input and TVA received a high number of public comments during the comment period. Because TVA continues to have seven active Board members, a quorum for decision-making is maintained and there is no impact on the Board's ability to provide policy direction and oversight.

The DEA, in analyzing only two alternatives, does not consider the full range of reasonable alternatives required by NEPA. Potential alternatives to retirement and full decommissioning include operating Unit 3 as a peaking unit and idling Unit 3 to preserve it for use as a hedge against natural gas price volatility, to serve as security against disruption in the national electric power grid, or to meet future load growth. *Jason D. Witt – Murray Energy Corporation, Tyler White – Kentucky Coal Association*

Response: Paradise Unit 3 was designed to provide base load generation. Increases in nuclear generation, which produces power at a lower cost per MWh, have displaced PAF Unit 3 as baseload generation. Unit 3 was not designed to follow load or frequently cycle on and off in the manner of a typical peaking unit. As such, it is more costly and less effective operating the unit in this manner than other gas and coal units in the portfolio.

TVA system planners performed an economic evaluation of the proposed plant retirement which takes into account fuel price volatility. The results indicate that the balance of the coal fleet partly replaces generation of the retired plant, muting impacts during periods of higher natural gas prices or other contingencies. Idling Unit 3 with the ability to operate it in the future is therefore not necessary or economically feasible.

Because the proposed retirement is highly controversial, per TVA's NEPA procedures the proposed retirement should be the subject of an environmental impact statement that addresses the full range of alternatives and has extensive public involvement. Tyler White – Kentucky Coal Association

Response: Under TVA's NEPA procedures (Instruction IX - Environmental Review, 5.4.1(4)), an EIS would be required if the environmental impact of an action, rather than the action itself, is expected to be highly controversial. Such controversy over the environmental impacts is based on the analysis techniques, supporting evidence, and related factors. This is consistent with the Council on Environmental Quality's NEPA implementing procedures at 40 CFR 1508.27(b)(4) and court rulings in NEPA litigation. TVA did not identify any potential impacts of the proposed retirement about which there is disagreement with respect to the characterization of the effects on the quality of the human environment.

As noted elsewhere in Appendix A, TVA received comments from the public regarding its analysis that have resulted in several revisions to the EA. However, these comments do not reflect controversy regarding the characterization of the environmental effects. TVA's environmental review supports the determination that an EA is an appropriate level of NEPA review because the retirement of PAF Unit 3 would not result in significant impacts on the human environment.

The DEA was prepared primarily by three individuals with stated experience and education that does not include finance. It should include a detailed financial analysis of the proposed Unit 3 retirement completed by an entity competent in the field of finance. Ryan Driskill; Ellery Esposito

Response: TVA system planners performed an economic evaluation of the plant retirement; the results of this evaluation are incorporated into the EA. This economic evaluation accounts for fixed and variable costs at each plant and across the system. TVA system planners include economists, financial experts, engineers, and other qualified and experienced personnel who use an industry standard model and least cost planning approach. Some of these planners contributed to the EA and are included in the list of preparers of the EA.

Description of Alternatives and Mitigation Measures

TVA should making a concerted effort to provide its workers and local communities with just transitions following the retirement of Paradise. This should include working with local leaders and the public to create transition plans and re-using the plant site to bring new jobs and economic opportunities to the region. These opportunities should include industrial and non-energy uses, as well as renewable energy resources. *Matthew Miller – Sierra Club, and Stephanie Kodish – NPCA; Maggie Shober – Southern Alliance for Clean Energy; Mariah Harrod; Deena Heller, Donna Helmick; JoAnn McIntosh; Mary McKittrick*

Response: As done with other TVA sites impacted by fleet changes, if TVA decides to retire PAF Unit 3, TVA would work with employees to help them through the transition. TVA values the contributions of its employees, and their commitment to working efficiently and safely. If TVA decides to retire PAF, TVA would seek to place as many affected employees as possible into other TVA positions if they were willing to relocate. TVA is sensitive to local economic impacts and would conduct additional studies in the future, with public and agency involvement, to determine the best reuse of the property.

The proposed retirement will have a significant economic impact on the local area, including on the school system. If it is not economical to operate the plant, please consider replacing it with another gas plant at the site. While not replacing the number of jobs lost, this would soften the economic impacts. *Erica Maxwell*

Response: TVA is sensitive to local economic impacts. While this EA only deals with the impacts from the potential decision to retire Paradise Unit 3, TVA will conduct additional studies in the future to determine the best reuse of the property.

Environmental Impacts Analysis

The DEA does not adequately describe the large and extensive environmental benefits that would result from retiring Paradise. These include the under-assessment of the significance of the reductions in emissions of air pollutants, resulting in the DEA's conclusion of only "minor" improvements in air quality. NO_x emissions are a particular concern due to the numerous hours, largely during startup and shutdown when NO_x emission rates were much higher than the annual average emission rate. These spikes in NO_x emissions, partially addressed through the 8-hour NAAQS for ozone, would likely increase if Paradise continues to operate and is subject to more frequent startup and shutdown. Recent Paradise NO_x emissions rates are also much higher than in 2005 when the SCR NO_x emission controls were installed, suggesting deteriorating plant performance. *Matthew Miller – Sierra Club, and Stephanie Kodish – NPCA; Tyler White – Kentucky Coal Association; Maggie Shober – Southern Alliance for Clean Energy*

Response: As described in Section 3.1 of the EA, the emissions reductions at PAF for NO_x, SO₂ and mercury have been dramatic (over 90 percent) in recent years. These emission

improvements, largely due to added emission control technology, dwarf the small additional reductions that can be achieved by the proposed plant shutdown. Based on region-wide emissions from other sources (motor vehicles, industries, other power plants), the PAF shutdown would result in minor improvements in air quality. The EA does recognize that there will be substantial reductions in TVA's system-wide emissions of SO₂ (6 percent), NO_x (11.5 percent), mercury (9 percent) and CO₂ (4.4 percent).

The “primarily qualitative” analysis of air pollutants cites air monitoring results from Hopkinsville and Bowling Green, Kentucky, each of which is at least 31 miles from PAF. Several other coal-fired power plants and other large industrial plants, as well as other sources, emit air pollutants captured by these monitors. Because of the multiple sources, it is not possible to quantify the “portion” of regional pollutants produced by PAF and their impacts. *Ryan Driskill; Tyler White – Kentucky Coal Association*

Response: The difficulty in parsing out relative impacts of PAF, and the fact that the remaining plant emissions are a tiny fraction of regional emissions, is why a qualitative rather than quantitative approach was used in the EA.

According to Table 2-2 in the DEA, the continued operation of Unit 3 would result in minor impacts to air quality, no impact to surface water, groundwater, visual resources, and environmental noise, and no effect on threatened and endangered species. This indicates that Unit 3 is not a threat to the environment and do not provide justification for the proposed retirement. *Ryan Driskill; Tyler White – Kentucky Coal Association*

Response: Table 2-2 in the EA summarizes the impacts of the No Action Alternative, the continued operation of Unit 3. These impacts are described in more detail in Chapter 3. Continued operation would result in the continuation of the current impacts of operating Unit 3, as well as the impacts of the associated future CCR management activities. While environmental factors are considered by TVA in the EA, the purpose and need for the proposed retirement of PAF is based on economics and not the expected change in environmental impacts that would result from retirement.

The DEA does not adequately address the environmental benefits that would result from the reduction in CO₂ emissions if Paradise is retired. Using the pre-2017 social cost of carbon of \$42/ton, Paradise emissions cause at least \$131 million of harm in 2017. The resulting climate change impacts are described in detail in the 2018 Fourth National Climate Assessment. The DEA should more fully assess the benefits of the greenhouse gas reductions that would result from retirement. *Matthew Miller – Sierra Club, and Stephanie Kodish – NPCA*

Response: The social cost of carbon (SCC) metric is controversial and is affected greatly by economic assumptions. Therefore, TVA is not using the SCC metric in the EA as a basis for quantifying costs associated with the alternative of continued facility operation.

The DEA does not adequately analyze the environmental impact of the decommissioning activities, such as the chemical impoundment closure or of Unit 3 deconstruction and

demolition. These reasonably foreseeable actions are improperly segmented from the action of retiring Unit 3. Jason D. Witt – Murray Energy Corporation, Tyler White – Kentucky Coal Association

Response: This EA evaluates the potential environmental and socioeconomic impacts of the proposed retirement of PAF. If TVA decides to retire PAF Unit 3, actions associated with any deconstruction and demolition of PAF will be considered in future NEPA reviews. Similarly, any associated CCR activities that have not already been assessed under NEPA would be addressed in future NEPA reviews.

As part of its decision process, TVA should weigh the consequences of the increased pollution that would be produced by other coal plants following the Unit 3 retirement. Increasing generation at other coal plants with higher emission rates than Unit 3 would result in a net increase in emissions. Without information on the other plants that would provide the replacement power, it is impossible to make an informed decision. Ryan Driskill

Response: As part of its recent analysis of its generating assets (see Sections 1.1 and 1.2), TVA modeled the future operation of its generating assets with and without the retirement of PAF Unit 3. This analysis is based on TVA's current power supply plan. The results of this analysis show that a majority of the generation currently provided by PAF Unit 3 would, following the retirement of PAF, be replaced by increased generation from NGCC plants. Most of the remainder would be replaced by increased generation at other coal plants, and a small amount by renewable resources. As described in Section 3.1.2.2, the retirement of Unit 3 would result in system-wide decreases in annual emissions over the decade following retirement of up to 6.0 percent for SO₂, 11.5 percent for NO_x, 9.0 percent for mercury and 4.4 percent of CO₂.

The EA states that closing PAF decreases possible accidents on certain roadways at Paradise. It does not address the fact that several area residents have to travel to southern Indiana and even as far as Chicago for work following the previous Paradise retirements. Such travel would likely increase with the Unit 3 retirement. Annie Combs

Response: Section 3.8.2 of the Final EA has been revised to describe the potential for indirect, long-term, minor impacts on nearby roadways as current employees at PAF may be required to travel out of the area for work, resulting in an increase in vehicle miles traveled. Despite such travel, traffic in the vicinity of PAF would still greatly decrease. Section 3.10.2 of the Final EA has been revised to describe other potential impacts from relocations or travel out of the area for work.

The data used for the assessment does not consider the effects of recent upgrades to air pollutant emission control equipment. NO_x emissions have dropped about 98% compared to 1997. SO₂ emissions have dropped 99% compared to 1997. Also, carbon emissions have dropped 82% since 2012. Ashley Gootee

Response: The cited large emissions decreases are shown in Figures 3-2 and 3-3 in the EA. Due to those large decreases, the potential for further air quality improvement is appropriately characterized as "minor" in the EA.

Economic Impact Analysis

Unit 3 provides approximately 132,370 tons of bottom ash annually to the nearby Harsco/Reed Mineral plant, where the boiler slag is used in the manufacturing of roofing shingles and abrasive products. Harsco employs 21 people and pays TVA approximately \$1.32 million per year for the bottom ash. This is not addressed in the DEA. *Anonymous; Ryan Driskill; Jason Decker*

Response: Bottom ash production/sales and revenue are heavily dependent on generation at the plant and vary year to year with TVA load demand and unit availability. TVA cannot share competitive pricing information covered by a non-disclosure agreement which includes revenue. However, Section 3.10.2 of the EA has been revised to include additional information about CCR by-products, and potential impacts to industries associated with PAF Unit 3.

Three Murray Energy Corporation coal mines in western Kentucky produced 4.8 million tons of coal in 2018, of which 29% (1.4 million tons) was for delivery to Paradise Unit 3. The three mines are scheduled to produce 5.5 million tons of coal in 2019, with 36% (2.0 million tons) for delivery to Paradise. The retirement of Paradise would have a significant negative impact on these mines which employ approximately 700 people with wages and benefits of over \$75 million. The impacts of this would be much greater than the "minor indirect adverse economic impacts to the affected counties and a portion of western Kentucky" stated in the DEA. *Jason D. Witt – Murray Energy Corporation*

Response: TVA acknowledges that the retirement of PAF Unit 3 would result in adverse economic impacts to the plant area, including mines and other industries supplying goods and services to the plant. Overall, however, as discussed in Section 3.10.2.2, the retirement of PAF Unit 3 is expected to affect less than 2 percent of employment in Muhlenberg County and less than 0.01 percent of employment in the Commonwealth of Kentucky. Any decisions made by TVA regarding its power generation assets must be done in the best interests of all of its customers, employees and residents across the Tennessee Valley.

The DEA does not adequately consider the indirect employment impacts of the proposed retirement. While the DEA recognizes that the transportation and limestone mining industries will be impacted, no attempt is made to quantify the extent of these impacts. Up to 200 contractors, many from outside the local area, sometimes work at PAF during outages. Indirect job losses affecting other industries including the retail, restaurant, and service industry sectors are also not addressed. Several local businesses rely almost solely on business from PAF employees. A Penn State University study projects that every coal mining job results in the creation of 11 jobs in the mining region. A study of the Kentucky coal industry suggests that each coal mining job creates 1.13 jobs in other sectors of the Kentucky economy. The proposed retirement could therefore result in the

loss of 500 to over 2,000 jobs in Muhlenberg County and the surrounding counties. *Jason D. Witt – Murray Energy Corporation, Tyler White – Kentucky Coal Association; Stetson Atcher; Cris Crowley; Ryan Driskill; Clayton Adams; Logan Porter – Greater Muhlenberg Chamber of Commerce; Eric Bletzinger – Muhlenberg County Board of Education; Rick Combs; Alison Davis – University of Kentucky*

Response: Section 3.10.2 of the EA has been revised to include additional information on the employment and other economic impacts that would result from the retirement of PAF. TVA acknowledges that the retirement would have adverse economic impacts on the Muhlenberg County area.

The statement in the DEA that the proposed retirement will have “positive indirect economic impacts throughout the Southeast region” because Alabama, Mississippi, and Tennessee will receive additional in lieu of tax payments unnecessarily confuses the analysis. It is cold comfort to those losing their jobs as a result of the retirement and may not be accurate as TVA plans to retire coal units in other states as well. It also does not take into account the taxes paid by Kentucky companies supporting Unit 3. *Jason D. Witt – Murray Energy Corporation, Tyler White – Kentucky Coal Association*

Response: TVA considered many impacts to the local community around Paradise, including in lieu of tax payments. Any decisions made by TVA regarding its power generation assets must be done in the best interests of all of TVA’s customers, employees and residents across the Tennessee Valley.

The DEA grossly underestimates the future job loss resulting from the proposed retirement. It assumes that the affected TVA employees would transfer to other TVA facilities or find jobs in other fields in the Muhlenberg area. It states that the resulting unemployment would be less than 2% of the total employment in Muhlenberg County and the direct adverse economic effects would be “minor.” This analysis does not note that the affected employees are highly skilled and not trained for the suggested employment in educational services, medical care, and other alternative employment which pay much less than utility industry jobs. *Senator Rand Paul; Jason Arnold; Ryan Driskill; Rick Combs; Alison Davis – University of Kentucky; Mitchell Cundiff; Kelly Free; Ashley Gootee; Victoria Grace; Nicholas Gottschling; Wesley Hutchens; April Jernigan; Sherrie Lewis; Randal Martin; Curtis McGehee; Billy Moore; Michael Moore; Kimberly Nelson; Jamie Oates; Jamie Putman; Candace Renfrow; Pennye Rogers; Barbara Scott; Brent Sherrod II; Pat Southwood; Dennis Spicer; James Stratton; Rick Vinson*

Response: Section 3.10.2.2 of the EA has been revised to provide a more detailed description of job losses that would result from the retirement of PAF. This discussion acknowledges that employment in the Muhlenberg area in other fields would likely pay less than utility industry employment. TVA would help provide a just transition for employees interested in positions available across the TVA service area and such transitions would involve providing the transitioning employees additional training.

The western Kentucky coal mines that provide coal to Paradise and other coal plants are a vital part of the area's economy and provide vital jobs that will be lost if Paradise is closed. *Brad Baker; Casey Daugherty; Scott Rogers; James Rogers; Donna Bilbro; Laura Goodridge; Jimmy Hunt; Michael Matthews; Jamie Oates; Janine Schmitt; Barbara Scott; Brent Sherrod II; Jerad Young*

Response: Section 3.10.2.2 of the EA has been revised to provide additional information on the economic impacts, including loss of employment that would result from the retirement of PAF.

The DEA on page 46 concludes that “minor positive indirect effects to minority and low income populations may occur due to beneficial changes to air quality” from the proposed retirement. This conclusion ignores the effect of the loss of direct and indirect employment from the retirement and the resulting deterioration of economic conditions in an already economically distressed area, which would disproportionately negatively affect minorities. *Ryan Driskill; Bryan Buchanan; Ryan Clark; Laura Fleming; Victoria Grace; Sabrina Hooper; Michael Matthews; Misty Perkins; James Perkins*

Response: Section 3.10.2.2 of the EA has been revised to provide additional information on the economic impacts, including loss of employment, that would result from the retirement of PAF.

The Paradise area continues to suffer from the economic impacts of the retirement of Units 1 and 2 which resulted in the loss of jobs, reduction of in lieu tax payments, and loss of revenue to the Muhlenberg County School Board. Similar impacts would result from the Unit 3 retirement. How does this fulfill TVA's mission of economic development? *Anonymous; Stetson Atcher; John Durbin; James Rogers; Logan Porter – Greater Muhlenberg Chamber of Commerce; Barry Atcher; Landon Atcher; Emily Carder; Michael Carder; Brandon Coin; Stacey Cornette; Ashley Gootee; Nancy Long; Randal Martin; Jerrold Moore; Misty Perkins; Logan Porter; April Spears; Bryson Spears*

Response: Economic development is part of TVA's overall mission of service to the Valley, and so the assessments used to make the recommendation to retire Unit 3 included impacts to the local and Valley economy. Based on TVA economic analyses, TVA tax equivalent payments to the Commonwealth of Kentucky are expected to decrease with the retirement of PAF Unit 3 due to the reduction in value of PAF. Any change in the allocation of TVA tax equivalent payments to Muhlenberg County would be determined by the Commonwealth. The amount of funding allocated to specific purposes in Muhlenberg County, including any funds to Muhlenberg County Schools, is determined by the county. The Paradise NGCC plant, which adjoins PAF in Muhlenberg County, would remain in operation and would partially offset this reduction due to an expected additional allocation to the county, per amendments to Kentucky Revised Statute § 96.895. Findings indicate retirement of PAF, while having adverse impacts to the Muhlenberg County area, would not adversely impact TVA's seven-state region. This and any decisions made about power generation assets are done in the best interests of all TVA customers, employees and the residents of the Tennessee Valley.

The DEA does not address the loss of revenue to the State of Kentucky provided by Unmined Mineral Taxes and Coal Severance Taxes that would result from the reduction in Kentucky mining following the retirement of Unit 3. *James Rogers*

Response: TVA does not pay these taxes directly and therefore does not have information on these tax payments or rates. The decrease in these payments would be an adverse impact of the proposed retirement.

There is much more at stake than job loss; the welfare of the entire river system is too. Barge transportation on area rivers, including the transportation of coal by barge, creates jobs that are important to area businesses and communities that depend on these rivers for their livelihood and recreation. The Paradise retirement would harm the welfare of the river system. *Jon Pittman*

Response: Most of the coal currently delivered to PAF is transported by truck, with a small amount delivered by barge when PAF coal use is greater than normal. The proportion of coal delivered to PAF by barge could increase in the future, should TVA decide to continue operating Unit 3. The proposed retirement could, therefore, adversely affect future barge traffic and associated employment, as described in Section 3.10.2 of the EA. Other impacts to area rivers and streams are described in Sections 3.2 and 3.4.

General Support

Paradise should be retired because of the environmental consequences of its continued operation, its lack of fit with TVA's current portfolio needs, and the many benefits of retirement described in the DEA. *Matthew Miller – Sierra Club, and Stephanie Kodish – NPCA; Tom Morris – Cumberland Chapter of the Sierra Club; Stacey Hollander; Daniel Joranko – Tennessee Interfaith Power and Light*

Response: Comment noted.

We support the retirement of Paradise and Bull Run. Coal is increasingly less economically viable and has too many risks. The DEAs confirm that the TVA power supply will remain secure and reliable following the retirements, which will also save TVA customers money and reduce air, water, and coal ash pollution. The retirements should be accompanied by a just transition to TVA employees and the surrounding communities as TVA moves to clean, reliable, low-cost energy. *Kurt Rudolph; 613 Sierra Club Members.*

Response: If a retirement decision is made, TVA would help provide a just transition to TVA employees and the surrounding communities by placing some interested employees in available positions across the TVA power service area.

I strongly support closing the Bull Run and Paradise plants. Both plants emit significant quantities of carbon, the impacts of which were recently documented in the 2018 Fourth National Climate Assessment. The recent State of the Carbon Cycle Report documents

that reduced energy emissions can be achieved by fuel switching to renewables and natural gas while GDP continues to increase. The energy generated by the two plants should be replaced, if necessary, by renewables and/or low carbon emitting technologies. *Melanie Mayes; Ann Ercelawn; Ronald Broadwater*

Response: As described in Section 3.1.2.2, the energy generated by PAF would be replaced over the next decade by natural gas combined cycle generation and smaller amounts of renewable energy and increased generation by other coal plants. Overall, CO₂ emissions would decrease following the PAF retirement.

Retire Unit 3. *Ann Adamek; Ed Allgeier; Marilyn Burkle; Pete Dolan; Suzan Graiser; Nancy Hall; Eric Hansen; Mariah Harrod; Deena Heller; Donna Helmick; James Hill; Jordan Hooper; Kirsten O'Daniel; Carol Luthi; Russell Oliver; Marilyn Pierson; James Porter; Marylee Schanen; Richard Schell; Judy Schulz; Mary Yunker; Stefanie Zoeller; Scott (only first name provided)*

Response: Comment noted.

Retire Unit 3 and replace it with clean energy, particularly renewables. *David Banahan; Doug Abel; Melodie Metje; Ron Pullen; Michael Beeby; Gerard De Grandis; Sam Dornan*

Response: As described in Section 3.1.2.2, TVA expects that the energy generated by PAF would be replaced over the next decade by NGCC generation and smaller amounts of renewable energy and increased generation by other coal plants. The intermittent nature of renewables and its cost dictates the extent to which the PAF generation could be replaced with renewables. Overall, however, TVA anticipates that CO₂ emissions and waste generation would decrease following the PAF retirement.

The health of our people and the planet outweighs the risk of a few jobs. It's time to move forward with jobs of the future instead of providing unhealthy jobs. *Harvey Roberts; Edward Moore; Carol Luthi; James Porter; Ronald Whitmore*

Response: Comment noted.

General Opposition

On behalf of my constituents, I am strongly opposed to the potential retirement of the Paradise Fossil Plant. *Senator Rand Paul; Georgann Thompson; Gary Wheeler*

Response: When making decisions about its power generation assets, TVA must consider the best interests of all of TVA customers, employees and the residents of the Tennessee Valley.

The Board of Directors of the Muhlenberg County Alliance for Progress strongly encourages TVA to keep Unit 3 in operation. *Gary W. Jones – Muhlenberg Alliance for Progress*

Response: Any decisions made by TVA regarding its power generation assets must be done in the best interests of all of its customers, employees and residents across the Tennessee Valley. The adverse economic impact on Muhlenberg County is described in the EA and considered in TVA's decision whether to retire this asset.

It does not make economic sense to shutter an asset that is very valuable for jobs and other reasons. Bill Kurtz; Thomas Moosbrugger; Dorothy Alexander

Response: Any decisions made by TVA regarding its power generation assets must be done in the best interests of all of its customers, employees and residents across the Tennessee Valley.

The Paradise plant is a vital part of the Muhlenberg County area. Retiring it will result in the loss of numerous jobs, closure of local businesses, harm to area schools, out migration, and harm the future of the community. Anonymous (2); Landon Atcher; Kari Atcher; Sherry Atcher; Stetson Atcher; Karen Arnold; Earl Barnard; Barry Barnard; Donna Bilbro; Jimmy Bivins; Eric Bletzinger – Muhlenberg County Board of Education; Amy Bolen; Pamela Boggess; Clarence Brewer; Tina Brewer; Brooklin Brooks; James Brown; Stepahnie Bryant; Bryan Buchanan; Blake Cabbage; Michael Carder; Lauren Cartwright; Sarah Cary; Ryan Clark; Matthew Chumley; Chris Cleveland; Brandon and Leann Coin; David and Brenda Coin; Joseph Coin; Kimberly Coin; Linda Combs; Annie Combs; Jeff Corlew; Saundra Cornett; Stacey Cornette; Jessica Cotton; Anndee Daniel; Jason Decker; Wilford Dorroh; Dianna Drake; Larry Dunn; John Durbin; William Evans; Erica Ewings; Andrew Fields; Greg Fiorella; Patty Fiorella; Thomas Fletcher; Gail Foulks; Michael Garrett; Kyle Geary; Brenda Gibson; Laura Goodridge; John Gootee; Brenda Gregory; Robert Gunn; Billie Hadley; Aaron Hagan; Zach Hayward; Shara Heacock; James Hendricks; Sabrina Hooper; Phillip Hill; Carole Hudson; Harry Hudson; James Hunt; Daniel Ingram; Steve Ingram; Tina Ingram; April Jernigan; Gary W. Jones – Muhlenberg Alliance for Progress; Brian Jones; Jack Jones; Libby Knight; David Levy; Sherrie Lewis; Brian and Candace Lile; Nancy Long; Ben Marks; David Martin; Randal Martin; Jonathan McCay; Darrel McClellan; Joan McClellan; Donald McConnell; Curtis McGehee; Mary McPherson; Stacey Miller; Billy Moore; Steve Michael; Michael Moore; John Naron; Kimberly J Nelson; Jamie Oates; Matt Oates; Greg O'Brien; Denny Pendley; Pamela Pendley; Doug Perdue; Misty Perkins; James Perkins; Vernon Perry; Rita Peterson; Jerry Pogue; Gerald Powers; Linda Powers; Stephen Powers; Jamie Putman; Terry Rabdolph; Terry Reed; Candace Renfrow; Mary Lou Richardson; Jamie Rigney; James Robards; Pennye Rogers; Chris Rose; Mark Rutherford; Michael Ryan; Barbara M Scott; Eric Sharp; Richard Shaver; Brent Sherrod II; Coneathea Smith-Derr; April Spears; Bryson Spears; Fred and Linda Stalls; Jessica Stanley; Willie Stevenson; Denny Stewart; James Stratton; David Summers; David Thompson; Randy Tillman; Brad Tudor; Jeanetta Turner; Jonathon Uzzle; Craig Van Hoorn; Rick Vinson; James Walley; Phillips Walley; Morris Wells; Kimberly White; Brittany White; Anita Wilkerson; Thomas Wilkerson; Alex Williams; Jarred Williams; Katie Willis; Robert Wilson; Vickie Wilson; Becky Young; Chandler Young

Response: The impacts of retiring PAF Unit 3 on the community are described in Section 3.10 of EA.

Do not retire the Unit 3. Dorothy Alexander; Peggy Adams; Franklin Alongi; David Beckhart; Cheryl Bibb; Tamberly Brewer; Bruce Carlson; Michael Carter; Bryan Clower; Sheba Cramer; Amanda Davis; Darin Estes; Teresa Francis; Thomas Furgason; Michael Gordon; Heather Main; Douglas Mayhugh; Jason McNeily; Cortney Sweet; Georgann Thompson; Kim Watkins

Response: Comment noted.

Do not retire Unit 3. Retirement could result in closure of the ACT Christian Academy. Andrea Blake; Paulena Brantley; Brooklin Brooks; Emily Carder; Deborah Fletcher; Angela Latham; Kelly Latham; Jackie Martin

Response: Adverse economic impacts to the Muhlenberg County area are described in Section 3.10 of the EA.

TVA has aggressively reduced the coal fleet from 60% to 20% of capacity over the last decade. TVA should pause with future coal retirements until the future unfolds so as to not lose proven technology. Tammy Brown; Wilford Dorroh; Gary Southerland

Response: Any decisions made by TVA regarding its power generation assets are done in the best interests of all of its customers, employees and residents across the Tennessee Valley. Coal-fired generation currently provides about 24 percent of the TVA system capacity. The retirement of PAF, as well as the potential retirement of Bull Run Fossil Plant, which is also currently under consideration, would reduce coal capacity by about 25 percent. In order to determine the effects of the retirement on the TVA system, TVA conducted a fuel resiliency study, selecting a third party (IHS Markit) to develop a framework to evaluate TVA's fuel resiliency with and without the potential retirement. The study evaluated the fuel resiliency of all generating assets in the portfolio using the following criteria: fuel supply; fuel delivery; inventory; and backup contingencies. The study indicated that TVA's overall fuel supply position is among the most resilient in the U.S. due to a well-diversified generation portfolio, advantageous location with respect to major gas pipelines, access to multiple coal supply and transport options, and a strong and resilient program to secure nuclear fuel. The study findings indicate that reducing the coal fleet would not materially impact TVA's fuel resiliency or its ability to provide reliable energy at the lowest system cost.

Paradise unit 3 is an important plant for TVA to stay competitive in the power industry and is a good plant to keep around for the future of our company. Kyle Payton

Response: Comment noted.

Other Topics

Since Units 1 and 2 were replaced by gas units, my electric bill has increased greatly to record amounts. Coal has been cheaper and lower cost, an important factor for myself and other low income residents of Kentucky. *Annie Combs; Linda Combs*

Response: As stated in the EA, retiring PAF would eliminate projected future maintenance and environmental compliance costs, and long-term savings would be realized by TVA. These savings would assist TVA in maintaining lower rates, to the benefit of TVA energy consumers.

The proposed action has been reviewed by appropriate Kentucky state agencies and does not conflict with state or local plans, goals, and objectives. *Lee Nally – Kentucky Department for Local Government; Yvonne Sherrick – Kentucky Heritage Council; Carlos Spicer – Department of Housing, Buildings and Construction, Division of Building Code Enforcement; Dan Stoelb – Kentucky Department of Fish and Wildlife Resources; Amy Frogue – Pennyrile ADD; Nick Hall -- KY Transportation Cabinet, District 2;*

Response: Comment noted.

The impact that Paradise has on the environment is a drop in the bucket compared to the impact from China. *Bill Kurtz; Sue Kutay*

Response: As explained elsewhere in this EA, the proposal to retire PAF is primarily driven by economic considerations.

The Paradise Plant is an icon, tourist attraction, and integral part of Muhlenberg County. Taking it away would be like taking the Statue of Liberty out of New York Harbor. *Clayton Adams*

Response: TVA understands the importance of the Paradise Plant to the county and surrounding area.

Paradise Unit 3 is the closest plant providing baseload power to Pennyrile Electric Cooperatives 48,000 members. With its retirement, the only nearby plant would be the Paradise NGCC plant. Any outage of the NGCC plant could result in voltage issues for the area. Closure of Unit 3 would also result in the loss of existing and future jobs in the region. *Alan Gates – Pennyrile Electric Cooperative*

Response: TVA conducts annual transmission grid reliability studies based on NERC Regulatory Standards to ensure TVA continues to maintain a high-level of reliability in providing electricity to its customers, including Pennyrile EC and the TVA Kentucky service area. These studies evaluate TVA reliability in multiple scenarios, including scenarios with PAF Unit 3 offline. Through these annual studies, the projects needed to maintain or enhance reliability have been identified and will be implemented to ensure a reliable transmission system.

Global warming is a political hoax meant to enshrine the power of the elites. *D. Bruce Penrod*

Response: Comment noted.

It matters a great deal if the persons making the final ruling are elected or not. It's not right for an unelected individual to be able to take away the livelihood of hundreds of fellow Americans. Let Congress have the final say. *Bruce Purdy; Richard Shoup; Wyatt Waxler*

Response: The final decision about the retirement of PAF will be made by the TVA Board of Directors. Board members are nominated by the President of the United States and confirmed by the U.S. Senate. The proceedings of TVA Board meetings are open to the public. The TVA Board is authorized by the TVA Act to make decisions related to power supply for the Valley region.

Kentuckians should have the right as a sovereign state of the union to make their own decisions upon what types of fuel we choose and at the very least an opportunity to vote openly about such matters instead of being subjected to unknown and unelected officials from outside the state and local communities over-reaching their authority to make significant and arbitrary decisions effecting so many in Kentucky. *Mahala Mallicoat*

Response: See the response to the preceding comment. Current Board members are residents of most of the states served by TVA, including Kentucky.

As a rate payer, due to my power coming from TVA I am very concerned about my electric rates. *Pamela Pendley; Jarred Williams; Linda Combs*

Response: As stated in the EA, retiring PAF would eliminate projected future maintenance and environmental compliance costs, and long-term savings would be realized by TVA. These savings would assist TVA in maintaining lower rates, to the benefit of TVA energy consumers.

TVA should consider re-engineering existing coal-fired power plants with equipment and processes that improve the plant's efficiency and reduce SO₂ and NO_x emissions. Various patented technologies are available for TVA to consider. *Patrick Maloy, Christopher McKinney, Keith Moore*

Response: Comment noted.

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B

Comments on the Draft EA
Received during the Public
Comment Period



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Clayton Douglas Adams
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

VIA U.S. MAIL & EMAIL

December 11, 2018

Tennessee Valley Authority Board Of Directors
Board Services
400 West Summit Hill Drive, WT 7
Knoxville, Tennessee 37902
board@tva.gov

Re: Proposed Closure of Unit 3, Paradise Fossil Plant, Drakesboro, Kentucky

Dear TVA Board Members:

By way of introduction, my name is Clayton D. Adams, and I am a young attorney who was born and raised in Muhlenberg County, Kentucky. I obtained a juris doctorate from the University of Mississippi School of Law in 2016 and received a Bachelor of Science in Economics from the University of Kentucky in 2013. In fact, I grew up in Nelson on US 62 East, approximately nine (9) miles from TVA's Paradise Fossil Plant in Drakesboro. I currently live in Greenville, Kentucky, the county seat of Muhlenberg County. I write to you today imploring you not to close Unit 3 of the Paradise Plant.

Aside from the time I spent attending law school, and a very brief stint in Clarksville, Tennessee, I have lived in Muhlenberg County all my life. When I graduated from law school, I knew it was the only place I wanted to live. Nothing was better than returning to Muhlenberg County, i.e. home. And let me tell you, home simply would not be the same without the Paradise Fossil Plant.

The Paradise Fossil Plant is the engine of Muhlenberg County's economic development. It directly and indirectly provides thousands of jobs and services to Muhlenberg County. Some local businesses, such as the Burger Shack (a local restaurant) in Drakesboro, rely almost solely on business from employees at the Plant. Muhlenberg County has an Enterprise Rent-A-Car because the Paradise Fossil Plant is there. Frankly, there is no way of knowing how many homes have been built for employees of the Paradise Plant through the years, providing construction jobs; nor is there any way of knowing the millions of dollars that are spent by locally by employees at the Paradise Fossil Plant. In fact, jobs at the Paradise Fossil Plant are some of the best paying and most coveted jobs in the County.

As someone who has had three family members, including my dad, and countless friends work there for many years, I know good and well just what the Paradise Fossil Plant means to


Muhlenberg County's economy. It is especially critical that the jobs the Paradise Plant provides continue, as Muhlenberg County's present unemployment rate still sits at 5.3%. If the Paradise Fossil Plant is closed, I imagine the direct and indirect economic repercussions would cause that rate to skyrocket. Further, the jobs eliminated would be some of the best jobs available, with good pay, steady work, health insurance, and a pension.

Over the years, I have had the privilege of learning the full scope of not only the Paradise Fossil Plant's immense economic impact on Muhlenberg County but also its cultural impact. Unit 3 at the Paradise Plant is iconic. It is a symbol of Muhlenberg County. You view it as you cross the Green River on the Western Kentucky Parkway. The cooling towers are a practical tourist attraction. When my fiancé first visited Muhlenberg County when we were dating, one of the first things I showed her was the Paradise Plant. The largest coal fired unit in the TVA system and one of the largest in the world lying in the middle of coal country. Everyone in Muhlenberg County knows about it, and everyone considers it an integral part of home. Taking the Paradise Fossil Plant Unit 3 away from Muhlenberg County would be like taking the Statute of Liberty out of New York Harbor.

While I understand the Board is evaluating the closure based on maintenance costs and environmental impact, I do not believe these factors mandate closing Unit 3. The big unit might need some repairs from time to time, but it produces **a million dollars of affordable power a day**. Further, the environmental impact is not as strenuous as some other coal fired plants, since scrubbers were installed in the early 2000's to decrease emissions. I know because my dad worked on the project.

I could go on and on about stories and reasons why this Board should not close the Paradise Fossil Plant. I will simply ask that, before you vote, imagine that you are a citizen of Muhlenberg County. Imagine one of your family members is about to lose their job. Imagine you are someone who cares about the County and does not wish to see such an iconic landmark closed. Imagine you were me. Thus, I urge you to reconsider your proposed plan to close the Paradise Fossil Plant and keep this historic piece of Muhlenberg County open.

Best,



Clayton D. Adams

Cc: Hon. Senator Mitch McConnell
Senator from Kentucky



Hon. Congressman James Comer
Kentucky 1st District



Hon. Senator Rand Paul
Senator from Kentucky



Hon. State Rep. Melinda Prunty
15th District Muhlenberg County



From: Barry
To: [Pilakowski, Ashley Anne](#)
Subject: Paradise unit 3
Date: Friday, December 7, 2018 3:03:41 PM

TVA External Message. Please use caution when opening.

Sent from [Mail](#) for Windows 10

To whom this may
concern.

I am a retired level 5 forman from paradise.TVA has always been a good place to work and I appreciate the opportunity to work there for 20 years. I have a son-in-law that still works on u-3. What bothers me is if they shut u-3 down, my son-in-law will lose his job along with a lot more people. That means he will move away from here to get another job and will take my only daughter and only grandson with him and means me and my wife will not get to see them very often like we would like to. There is no more good jobs around here and every one that loses their job will move out of here. Muhlenberg county and surrounding counties depend on paradise and u-3.

Thank you,

Barry Barnard

From: Board of Directors
To: [Pilakowski, Ashley Anne](#)
Cc: [Campbell, Laura J](#); [Tudor, Andrew J](#); [Hydas, James Hunter](#)
Subject: FW: Paradise Unit 3
Date: Monday, December 10, 2018 4:56:53 PM

-----Original Message-----

From: Jimmy Bivins [REDACTED]
Sent: Wednesday, December 05, 2018 7:45 PM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Unit 3

TVA External Message. Please use caution when opening.

I hope this is not like beating a dead horse but I do hope you take in consideration the economic impact that closing Unit 3 will have on this area. There are so many people here depending on the work this unit causes outside of just the TVA employees. There are all kinds of people such as cold miners, truck drivers, various vendors and fabrication companies who look to TVA for the work they do

I am Jimmy Bivins and a retiree from TVA since 1994. I pray you reconsider closing Unit 3 at Paradise

Sent from my iPhone

From: Board of Directors
To: [Pilakowski, Ashley Anne](#)
Cc: [Campbell, Laura J](#); [Tudor, Andrew Wade](#); [Hydas, James Hunter](#)
Subject: FW: Paradise Plant Unit 3 Possible Closure
Date: Wednesday, December 19, 2018 7:40:18 AM

From: Cary, Sarah [REDACTED]
Sent: Tuesday, December 18, 2018 12:29 PM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Plant Unit 3 Possible Closure

TVA External Message. Please use caution when opening.

Dear TVA,

My name is Sarah Cary and I am a 25 year veteran teacher in Muhlenberg County Kentucky. I am writing you in hopes of keeping Unit 3 running at the Paradise Plant. I have family ties to TVA and know how devastating the closure would be to the families of our community. In today's unstable financial climate, small rural communities, like our, have a hard time keeping good paying jobs. TVA has been the backbone of Muhlenberg County for many years and any loss would be a tremendous blow to our people. Please consider other options and keep Unit 3 open. We are depending on you for the future.

Thank you,

Sarah Cary
6th Grade English Teacher
Muhlenberg South Middle School

TVA Board of Directors:

My wife and I are very concerned after hearing TVA's announcement that they are considering retiring Paradise's Unit 3. If Unit 3 shuts down it will have negative impacts not only on my household but also on my friends, neighbors, and the local community.

When Units 1 & 2 shut down I was transferred to a plant 100 miles from my home but was still hopeful to return to Paradise one day. If the decision is made to close Unit 3 it would be most unlikely that I could return. I still have friends and neighbors that was fortunate enough to stay when I had to leave but would be forced to move possibly even further away than I had to move. Many of them with families that the transfer would cause them to miss important milestones in their children's lives. There are very few jobs even within driving distance comparable to the jobs we are all blessed with at TVA.

That leads me to my concern of the negative local impact. Other jobs would be lost in our community due to the need for coal being taken away. We have friends and family that their jobs are affected by coal or work in the coal mines themselves. The money that will be taken away from our local businesses and economy will be detrimental. Our school system depends on a large sum of money each year from TVA and will suffer a great loss if Unit 3 shuts down.

I ask you to take all of this and my fellow community members' concerns into consideration when making your decision. Thank you for your time.

Brandon & Leann Coin

From: [Linda Combs](#)
To: [Pilakowski, Ashley Anne](#)
Subject: Closure of unit 3 TVA Paradise plant
Date: Tuesday, December 18, 2018 8:34:48 AM

TVA External Message. Please use caution when opening.

To who it may concern,

I am very concerned Re: the closure of unit 3 for various reasons. I am a retiree living on a fixed income and have seen my electric bill rise since the plant has gone to the 2 gas units. My budget rate this year has gone from 202.00/ month to 236.00/ mo and I am now at 260.00 with a balance of 100.00 that I must also pay in January along with my monthly bill. Last January my electric bill was 594.00 never in my 47 years of having a household was my cost ever that much for one month.

Coal has always been the backbone of KY and I feel it has been cheaper and more efficient than gas as per my past utility bills. My question would be why would you chance playing the gas market when coal is here and readily available? Also the community in which I live depend on the coal market for jobs both in the mines and unit 3. I know of many retirees that have gone to subsidized housing due to the fact utilities are included and they do not have to choose warmth over food.

I as a retiree, and resident of Ky want unit 3 to remain in operation as a coal burning plant . Keep coal(our natural resource) as part of the energy plan and not in the hands of fluctuating gas prices.

Thank you for your time and please realize there are people out in the coal communities that depend on your decision.

Linda Combs

Sent from my iPad

From: Board of Directors
To: [Pilakowski, Ashley Anne](#)
Cc: [Campbell, Laura J](#); [Tudor, Andrew Wade](#); [Hydas, James Hunter](#)
Subject: FW: Closure of unit 3 TVA Paradise plant
Date: Wednesday, December 19, 2018 7:39:53 AM

From: Linda Combs [REDACTED]
Sent: Tuesday, December 18, 2018 8:43 AM
To: Board of Directors <bod@tva.gov>
Subject: Fwd: Closure of unit 3 TVA Paradise plant

TVA External Message. Please use caution when opening.

Sent from my iPad

Begin forwarded message:

From: Linda Combs [REDACTED]
Date: December 18, 2018 at 7:34:23 AM CST
To: aapilakowski@tva.gov
Subject: Closure of unit 3 TVA Paradise plant

To who it may concern,

I am very concerned Re: the closure of unit 3 for various reasons. I am a retiree living on a fixed income and have seen my electric bill rise since the plant has gone to the 2 gas units. My budget rate this year has gone from 202.00/ month to 236.00/ mo and I am now at 260.00 with a balance of 100.00 that I must also pay in January along with my monthly bill. Last January my electric bill was 594. 00 never in my 47 years of having a household was my cost ever that much for one month.

Coal has always been the backbone of KY and I feel it has been cheaper and more efficient than gas as per my past utility bills. My question would be why would you chance playing the gas market when coal is here and readily available? Also the community in which I live depend on the coal market for jobs both in the mines and unit 3. I know of many retirees that have gone to subsidized housing due to the fact utilities are included and they do not have to choose warmth over food.

I as a retiree, and resident of Ky want unit 3 to remain in operation as a coal burning plant . Keep coal(our natural resource) as part of the energy plan and not in the hands of fluctuating gas prices.

Thank you for your time and please realize there are people out in the coal communities that depend on your decision.

Linda Combs

From: [Rustin Davis](#)
To: [Pilakowski, Ashley Anne](#)
Subject: Paradise plant retirement (Advance Green Energy Inc) Coal Ash Cleanup
Date: Monday, November 26, 2018 9:59:04 PM

TVA External Message. Please use caution when opening.

You need to talk to Mike Barbee or Brad Dye at Advance Green Energy Inc. [REDACTED]
I know this company and these gentleman and their company has been tested their coal additive FUTT-14 by Universities as a great product for the future of coal. This is straight from Advance Green Energy's Website: <https://www.advancegreenenergy.us/products/futt-14/>

Coal gas as the path towards jobs and leadership in the clean fuel industry.

FUTT-14™ is our synthetic biodiesel fuel additive that increases the profitability of the gasification of coal, which in turn can open job opportunities for American workers who are dependent upon the coal industry.

Coal Gas is **the clean fuel of the future**. As the name suggests, this product is made from coal and is a **synthetic biodiesel fuel** that could very easily put many of the 193,000 coal miners, and people that depend on the coal industry, on a path back to work. Once the United States completes the building of all of its gasification plants that were planned years ago, **we could be the leaders in the clean fuel industry.**

Benefits from commercially ready FUTT-14™.

Our product FUTT-14™, used in the gasification of coal, **could replenish significant portions of liquid fossil fuels**. FUTT-14™ is ready to be used commercially worldwide. An added benefit of our breakthrough technology with FUTT-14™ is that it **significantly increases the profitability of gasification.**

How FUTT-14™ can mean more jobs for US coal miners.

According to Michael W. Wynne, the Secretary of the Air Force, **our military is the largest user of bio-fuel in the world**. By AGE offering products such as FUTT-14, AGE will be able to put most of our coal miners back to work to produce this much needed bio-fuel.

By building smaller versions of gasification plants and utilizing FUTT-14™, we can avoid moving coal and **transfer only the liquid bio-fuel** created from the plants. **This method is the safest today and is our prize** additive currently on the market for green technologies.

Thank You,

Howard Davis

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Comment to Potential Paradise Fossil Plant Retirement Environmental Assessment

Background

In November of 2018, the Tennessee Valley Authority released an environmental assessment (hereafter the “EA”) to assess the continued operation of Paradise Fossil Plant, Unit 3 (hereafter “Unit 3”). It appears that more than fifteen individuals participated in the preparation of the EA, some employed by TVA and others by “HDR”.

The EA comes three years after the announcement of the retirement of Units 1 and 2 at the Paradise Fossil Plant and one year after the termination of the operation of those units in April 2017. The closure of Units 1 and 2 occurred following the beginning of installation on a particulate collection system (commonly referred to as a “baghouse”) estimated to cost \$850 million dollars. Despite beginning installation, the Board decided to replace the Units with a combined cycle natural gas plant. This CC plant cost TVA approximately \$1 billion.

Units 1 and 2 had a combined capacity of more than 1400 MW. As set forth on page 1 of the EA, the Paradise Fossil Plant had the ability to supply power to 950,000 homes. The CC plant now in place has capacity of 1100 MW (a net loss of 300 MW in capacity). According to the EA, the units were replaced “in order to comply with.....2010 Mercury and Air Toxics Standards”. Page 1 of EA.

Given that the stated reason for the retirement of Units 1 and 2 was not that the units were not economical under the conditions and costs prior to MATS, the undersigned must assume that the reason was solely because of the capital cost of the baghouse project needed to collect mercury and other particulate matter. Thus, TVA expended more than a billion dollars (assumed by adding the cost of the CC plant to the cost of de-commissioning units 1 and 2).

TVA’s website indicates that in 2015, the year of the approval of the CC plant, it sold \$1,000,000,000 of bonds bearing interest at the rate of 4.25%. These bonds are not callable until maturity in 2065. <http://www.snl.com/IRW/CustomPage/4063363/Index?keyGenPage=1073746881>. With an added capital requirement of more than \$150 million (the difference in cost between new plant capital cost versus compliance costs for continued operation of 1 and 2) and a cost of debt at a fixed rate, TVA’s total lifetime interest burden on the added cost is \$318,901,083.14. With the additional interest burden of \$300 million and additional capital burden of \$150,000,000, TVA managed to spend approximately \$450,000,000 more than necessary to comply with the MATS requirements at PAF not including the costs of unit retirement. I encourage the reader to create an amortization schedule to independently calculate this sum.

TVA also created its 2015 IRP near the time of its decision to retire Units 1 and 2. The IRP studied various energy challenges and conditions relevant to its power generating operations

and explored strategies for coping with these issues. Further discussion will cite the contents of the IRP but for purposes of introduction it is sufficient to note that TVA did not at that time recommend closure of Unit 3. Since issuance of the IRP, TVA has expended millions to update and refurbish Unit 3 to create better performance. As estimated by TVA employees, because specific data will not be released by TVA, the costs to upgrade boiler SSH and turbine control systems completed in May 2018 was more than \$100 million.

Despite the significant expenditures, TVA management began consideration of Unit 3 retirement in 2018. Pursuant to the National Environmental Policy Act of 1969 federal agencies are required to submit a detailed statement containing information relating to:

- a. The environmental impact of the proposed action
- b. Any adverse environmental effects which cannot be avoided if the proposal is implemented
- c. Alternatives to the proposed action
- d. The relationship between short term uses of the environment with long term productivity
- e. Any irreversible commitments of resources which would be involved in the proposed action.

The following analysis provides an interdisciplinary critique of the EA decision making. This approach corresponds with 42 USC Sec. 4332 which directs that agencies utilize a systematic and interdisciplinary approach to planning and decision-making.

Purpose of EA

According to page 2 of the EA, TVA has recently experienced flat to declining load....natural gas prices have remained relatively low prompting TVA to conduct analysis of various generating assets. Additionally, on the same page, it is written that Unit 3 falls within a category of assets that has high projected future maintenance and compliance costs, a high forced outage rate, and poor generation portfolio fit.

Further, the EA makes the following factual statements about Unit 3:

1. Its condition requires large investments, including a turbine rotor
2. It has high forced outage rates – placing it in the bottom quartile of the US coal fleet
3. It has inflexible output abilities.

Then the report reveals that the purpose of the EA is to evaluate retirement of Unit 3 considering “load outlook, economic benefits and costs, performance, environmental and social impacts....[and] capacity”. EA page 3. It is upon this set of criteria that the mystery writer of the EA concludes that retirement of Unit 3 could facilitate TVA’s mission to provide reliable power at the lowest system cost.

Because of the stated general criteria for consideration (economic and environmental), this comment will focus first on profitability, second capacity concerns and then on the environmental impacts.

Profitability

a. EA Data

To begin, the EA's criteria for the consideration of the proposed action relates heavily to profitability as the plain language of the report makes clear. The EA's emphasis on economic considerations is warranted given that the TVA is ultimately a business that must operate in a manner that protects taxpayers from incurring expenses to subsidize operation.

For this reason, as I read the EA's stated concern for economic consequences in its chapter one I expected that the report would include analysis of several items. First, I expected the EA writers to express the revenue produced by Unit 3 over at least the last five years and then to project future revenue for at least an additional five years (the interval of five years corresponds to the interval of the IRP's produced by TVA). There is not a single citation or statement of past or expected revenue for Unit 3 in the EA or its supporting documents.

While I scanned the EA for past and projected revenues for the unit, I anticipated reading about the expected costs of future capital investments needed for the unit to continue operating. Similarly, I expected to read estimates for the turbine replacement and other costs to reach catastrophic levels given the allegations on page 2 of the EA. Instead of the expected estimated costs being set forth, there was not a single citation or statement of past or future costs.

Unit 3 is a coal fired unit and I expected that there would be projections set forth in the EA for the forecasted growth or decline in coal prices. I found none.

It is unfathomable that the Board of Directors could accept for consideration financial analysis that does not provide any information relating to costs or revenues. To even submit a report claiming to make conclusion based upon economic viability of an asset without including projected costs, revenues, net profits, or similar data is, frankly, embarrassing.

A member of any board that considers a proposal without projected cost savings or projected additional revenue, or some similar measure, is in breach of his/her fiduciary duty to the organization. Can anyone imagine the board of Apple approving the sale of a division of the company without first being provided minimum facts and projections on the effect on future net earnings? Hopefully, the answer is no. Thus, the Board of Directors for TVA should continue meeting the operating needs of Unit 3, including replacing the rotor turbine until a real financial analysis can be performed. I would also recommend that the analysis be completed by an entity with established competence in the field of finance – as the EA was prepared primarily by three individuals with stated experience and education that does not include finance.

b. 2017 Profitability

The undersigned has obtained some rudimentary data from Ashley Pilakowski relating to profitability. I want to publicly thank her for her work in responding to my requests.

Attached hereto is Exhibit A – a document provided to me by TVA after requesting information relating to revenue and costs for Unit 3. The document contains a short note to me from TVA explaining its response to my request. The note is revealing.

To my surprise, in the note TVA admitted that “[it] does not maintain profit and loss statements for each site”. To the Board members reading this, this should be totally unacceptable. There should not be a single unit in your system that is not measured for profitability. Certainly, McDonald’s knows whether individual restaurants are profitable or not. Its shareholders would be appalled if this information were not regularly obtained and compiled into reports for the regional management and board of directors to consider.

The note from TVA in Exhibit A provides that corporate overhead is not included in the information provided. However, neither the note nor the EA proposes any cut to corporate expenditures in the event Unit 3 is retired. In the event that such cuts are proposed, I request that the EA include this information so that stakeholders can consider this and provide feedback. For the sake of my analysis of Exhibit A, I assume no corporate overhead costs will be cut due to the proposed action and therefore the overhead is a “fixed” cost that has no bearing on the effect of retirement on the economic health of TVA.

According to Exhibit A, for fiscal year 2017, Unit 3 generated 3,272 GWh of energy. This production required \$85 million for coal, \$39 million for operation and maintenance costs, \$56 million for capital expenditures, and \$38 million for environmental compliance. TVA sold electricity at its wholesale rate of 6.96 cents per kWh.

With those known inputs, we can estimate gross profit. Revenue is calculated by first converting gigawatts to kilowatts and then multiplying the energy generated by the rate. This calculation results in generation revenue of \$227,800,800. By deducting the costs referenced above, we see \$9,800,800 is the profit from Unit 3. The Paradise Plant also sells coal after-products to companies to use in the production of gypsum products. These sales were not provided to the undersigned and so the revenues from these sales are not included but would enlarge the gross profit.

In fiscal year 2018, in response to issues with forced outages, Unit 3 produced less energy and a profit was not realized for FY 2018.

c. Future Profitability

This is an appropriate point to pause and consider the EA’s contents relating to unit reliability. As set forth above, the EA itself does not contain citation to any financial data but

does make unsupported statements of fact. According to Ms. Pilakowski, a preparer of the EA and stated contact person for the EA, the EA did not include information relating to outages for 2018. See Exhibit B. In this email, Ms. Pilakowski wrote regarding my request for outage information that “The response provided was for the information you requested relevant to the cited benchmarking data (2015 – 2017) contained in the Draft EA”. [emphasis added]

Plainly the 2018 upgrades and performance were not included in the EA submitted to the Board. To me, a layperson, it would seem that evaluating an asset’s profitability should be done considering the asset’s current ability to generate income rather than prior to upgrades. The capital expenditures for upgrades were either done in vain at the request of management and they should be accountable for such useless spending or the capex provided significant operating benefits and should be considered in determining whether future costs can be absorbed by the increased generation capability. Thus, the EA, to the extent it makes recommendations dependent on revenue and costs data, is misleading.

In any event, according to information provided Ms. Pilakowski, the EFOR (a measure of forced outages, *i.e.* unplanned outages against total unit availability) was 16.7%. In 2015, forced outage hours (FOH) were 386, then 816 and 1353 for 2016 and 2017 respectively. Exhibit C. The 2017 forced outages cost the unit 1,375,560 megawatts of production according to the same document (note to reader: review the MWHFO category).

However, since May 7, 2018 and after the upgrades, the EFOR has dropped to 3.3% putting Unit 3 in the top decile as calculated by the Generating Data Availability Systems (GDAS). To put the lower outage rate in perspective, it is roughly half the forced outage rate of 2015 in which Unit 3 missed out on 393,054 megawatts of production compared with 1,375,560 megawatt hours lost in 2017. With current FOH needs being half of 2015, we can estimate that only 150,000 megawatt hours will be lost due to unplanned outage hours. That is more than a million megawatt hours differential in lost production. In terms of revenue, that is approximately \$70,000,000 in additional revenue if rates are similar to FY 17 and 18. Attached hereto as Exhibit D are TVA documents evidencing the lower forced outage rates.

Information was also provided for expected capital and environmental costs for FY’s 2019 through 2023 via Exhibit A. According to TVA, approximately \$107 million per year will be needed for capital costs and environmental compliance each year. This entirely consistent with the costs reported during FY’s 17 and 18. Thus, it does not appear from TVA’s data that capital costs will be greater than during the last two years when costs from significant capital costs are included.

Though it is nearly impossible to predict profit for future years without knowing run rates, it is safe to say that the increased reliability (and therefore increased production capability) is a factor that the Board of Directors should consider because of its potential to provide dramatically increased revenue.

Before leaving this section on profitability, several items should be at least mentioned. TVA has millions and millions of dollars' worth of coal reserves at PAF. TVA has spent millions and millions (and is continuing to spend millions) on the gypsum de-watering project. TVA is spending millions on landfill to house a three decades supply of coal byproducts. Closing Unit 3 would be just throwing those millions in the trash. If TVA's management knew of the possibility of this closure, it should have begun the process of evaluating the long-term future of Unit 3 before investing (*i.e.* burning) millions into upgrades.

d. Additional Comments on TVA Provided Data

We know from the email provided by Ms. Pilakowski, as well as the source information of the EA, that the EA submitted to the Board and other federal agencies was fundamentally flawed for at least two basic reasons. First, the EA did not provide the pertinent cost and income information for Unit 3 to the Board for proper decision-making and instead the writers took it upon themselves to evaluate the information and draw conclusions without "showing their work" as the elementary school phrase goes. Second, the EA's authors based conclusions and recommendations on the condition of the Unit prior to the following: a. total revamp of super heater section of the boiler, b. installation of new cyclones throughout the boiler, and c. installation of GE ex2000 controls and Mark 6 modular controls. Essentially, they used outdated and irrelevant data in guiding the Board in making a billion dollar decision.

The EA authors, who report virtually no environmental contamination by Unit 3, take their job in writing an environmental report in compliance with NEPA as an opportunity to make a judgment call on the Unit's economic viability. The NEPA was written to make sure that federal agencies explain major environmental decisions – not to evaluate capital structures and profitability.

In the movie *Casino* an employee of the casino reports to Robert de Niro that three jackpots were hit within a matter of minutes – a scenario with odds of greater than one in a billion. De Niro immediately fires him. Why? Because the employee was either too incompetent to catch the scam by whoever rigged the machine to hit multiple jackpots simultaneously or the employee was in on the scheme. Either way, he was out. <https://www.youtube.com/watch?v=JcZHSGyos6g>

If the EA's failure to cite any economic data and its use of sources that describe the Unit's condition prior to multi-million dollar upgrades does not convince the Board that the EA's authors fall into at least one of the categories identified by Casino's de Niro character, then perhaps the findings of the Office of Inspector General will better illustrate that TVA's financial controls are exceedingly inadequate.

On September 30, 2018, the Office of the Inspector General released its semi-annual independent review of the Tennessee Value Authority. The report covered the six month period prior to the date of the report. On the first substantive page of the report, the OIG wrote:

“In this semiannual period, our audit, evaluation, and investigative activities identified almost **\$64 million** in funds TVA could put to better use, questioned costs, recoveries and savings, and shared opportunities for TVA to improve its programs and operations. Below are highlights of our work this period.”

<https://oig.tva.gov/reports/semi65.pdf> at page 4.

Later, at page 27 of the same OIG report, this independent federal office wrote that:

“TVA spent \$2.076 billion on capital expenditures in FY 2017 and anticipates capital expenditures of \$1.974, \$1.885, and \$1.706 billion, respectively, in FYs 2018, 2019, and 2020. Due to the capital-intensive nature of the electric utility industry, we audited TVA’s capital projects post-project economic assessment process to determine if TVA adequately monitors the actual return on investment of capital projects compared to those submitted during the budgeting and project review processes. The scope of the audit was TVA’s capital projects post-project economic assessment process for FYs 2015 through 2017. We limited our review to projects that were greater than \$10 million. During our audit period, TVA completed or put in service 22 projects totaling \$597.9 million that were considered candidates for post-project benefits assessments. **We found TVA is not adequately monitoring actual return on investment of capital projects. Specifically, TVA Standard Programs and Processes (SPP) requiring the assessments do not provide adequate guidance. We also found the required post-project benefits assessments were generally not being performed as only one assessment was performed in FYs 2015 through 2017 out of 22 projects completed. In addition, we found the estimated benefits in the project justification for the one assessment performed were not valid.** Accordingly, the post-project assessment’s basis for comparison was not valid. TVA management agreed with our recommendations and provided planned corrective actions to implement our recommendations.”

Id. at page 27 [emphasis added].

In the other OIG report available online, released in the spring of this year, the OIG reported similar findings. Jill Matthews, then acting Inspector General stated that her office examination of TVA operations revealed:

“Five preaward contract examinations of cost proposals submitted by companies to provide civil projects and coal combustion residual program management services identified almost **\$40 million** in potential savings opportunities for TVA.”

<https://oig.tva.gov/reports/semi64.pdf> at page 5 [emphasis added].

Let’s take a moment to consider the Inspector General’s findings. Over the last year, the Officer of Inspector General has discovered more than \$100 million in cost savings that were

missed by TVA in cost proposals alone. In other words, the cost savings identified by the OIG and cited above refer to contract examinations with outside companies rather than cost-savings that could have been achieved in internal operations. Last year, TVA's net income was \$1.1 billion. <http://www.snl.com/Cache/395786289.pdf> at page 49. Therefore, the bad contracts alone account for almost 10% of TVA's earnings.

With respect to major capital projects, the OIG found that TVA is not adequately monitoring the actual return on investment. TVA only performed one assessment of return on investment for its major projects during the FY 2015 to FY 2017 period of twenty-two completed – less than 5%. Also, the one assessment on return on invested capital contained estimated benefits that “were not valid”.

This section is not intended to attack the EA contributors for the sake of attack. But, it is intended to instill skepticism about the numbers and evaluations created and used by TVA. The Board should immediately review institutional norms relating to finance and accounting as this is part of its duty of care and duty of due diligence. The Board should also treat with skepticism the EA's findings and conclusions relating to the nature and cost of future capital needs of Unit 3.

Load Demand

According to the EA, TVA is experiencing flat or declining load demand. EA at page 2. The implication is that we simply do not need large energy producers such as Unit 3. The reader naturally assumes that TVA has all the generation it needs. TVA's annual report discloses otherwise. Yet last year, according to TVA's most recent SEC filing, TVA purchased 13% of the energy it provided. <http://www.snl.com/Cache/395786289.pdf> at page 13. A significant portion of these purchases were spot market purchases which is an indication that generation could not meet peak demand. See <http://www.snl.com/Cache/395786289.pdf> at page 17.

I have no formal financial education or training but it seems to be common sense that energy sellers are selling the energy to TVA at a profit (if not, they would stop production and stop selling it altogether or sell to another buyer at a greater profit). Thus, the energy producers are making a profit off TVA's inability to meet demand. TVA should be in the business of generating power at one price and selling it for a somewhat higher price rather than buying the power at a premium and in desperation on the spot market, then selling it.

On page 18 of the EA, the report set forth:

“As part of its recent analysis of its generating assets (see Section 1.1), TVA modeled the future operation of its generating assets with and without the retirement of PAF Unit 3. This analysis is based on TVA's current power supply plan. The results of this analysis show that a majority of the generation currently provided by PAF Unit 3 would, following the retirement of PAF, be replaced by increased generation from NGCC plants.

Most of the remainder would be replaced by increased generation at other coal plants, and a small amount by renewable sources.”

It is clear, therefore, that even the writers of the EA recognize that TVA, a company already not meeting demand and resorting to the power generated by others on the spot market, will need to use other assets to make up for its energy generation. (Further, the Board should consider why the EA does not propose that TVA simply purchase more power from outside sources if such purchases are profitable).

While the undersigned appreciates the admission of the EA regarding TVA’s insufficient system capacity, the admission creates a new set of questions. First, if other assets are more profitable to generate energy, why are those assets not being maximized already? If X unit in Tennessee is capable of producing a great deal more energy at a profit, then why is TVA buying energy from other sources? Why is TVA not generating more energy from X unit and selling it to expand its profits? I suspect the reason is there is no miracle X unit or it would already be utilized at its maximum generating capacity.

Next, if other assets are more profitable than Unit 3, would those numbers not be something that the Board and the public should be presented (for verification purposes) in making this decision? But then the undersigned is reminded that TVA’s internal controls do not believe that tracking profitability of each asset is worthwhile and these profit statements are not available for the Board or the public to guide in making systemically important decisions.

The writers of the EA assume a continued flat or declining load demand. The U.S. Energy Information Administration projects that worldwide energy consumption will increase by 28% over the next approximately 20 years. <https://www.eia.gov/todayinenergy/detail.php?id=32912> The increase in energy demand makes sense due to the development of economies across the world such as those in China, southeast Asia, Africa, and the emerging Central and South American economies. But, it is also likely a consequence of the booming American economy ranked by the World Economic Forum as the most competitive economy in the world. <https://www.weforum.org/agenda/2018/10/most-competitive-economies-global-competitiveness-report-2018/>

Growth rates of US GDP have consistently been greater than 3% and sometimes better than 4% during this most recent period of economic recovery. Tax cuts and tax code re-design have encouraged not only growth but also corporate capital expenditure to replace property, plant and equipment. Additionally, US manufacturing is at its highest level in fourteen years. <https://www.foxbusiness.com/economy/us-manufacturing-at-highest-level-in-more-than-14-years>

These domestic and foreign economic conditions are drivers of not just economic growth but energy consumption demand. Economic activity requires energy and the macro trend for world economies is growth. TVA’s current fleet is already incapable of meeting demand and

without sufficient changes will be even more dependent on competitors for its energy as the world and Tennessee Valley economies grow and demand power. Why close a producing asset when demand cannot be with the assets already in place?

The point made in this section to the Board is that the EA acknowledges that TVA's generating capacity is not sufficient to meet demand with current assets. Other assets will either need to be built or increased generation at current assets must occur. We do not know the cost of these additional units or the costs of additional production at other units, including whether capital improvements must be made to the other units. The EA report does not provide this information nor do any of its supporting sources. Without an evaluation of the cost of generation from these other sources it is impossible to evaluate the costs to the system due to these capacity issues.

Environmental Concerns

a. Methodology

In the summary to Chapter 3 of the EA, the scope of the analysis is stated to be a description of the consequences for continuing Unit 3 operation and a description of the consequences for retiring Unit 3. That is logical because there are only two options.

However, as set forth above and in the EA, the consequences to shutting down Unit 3 are more complex than simply turning off the unit and sending customer's across the nation energy by the push of a button. The EA acknowledges that the loss of capacity from retirement would require additional generation of electricity from natural gas and coal units. Thus, a comprehensive analysis cannot be conducted without knowing the assets expected to provide the additional generation.

Page 18 of the EA indicates that most of the replacement generation would come from natural gas plants but also that some would come from coal fired plants. If the natural gas plants can produce more electricity for both a cheaper price (as is implied in Chapter 2 of the EA) and with fewer pollutants, then why is TVA even using Unit 3 at this time?

According to PAF employees, TVA originally planned to run Unit 3 for approximately 30% of this FY. These original plans have morphed into an expected 60% run rate or more for this year. Though some of the reasons are unclear, it is apparent that the other units are unable to increase generation necessary to meet demand.

Aside from the practicality of the proposed increased generation from other units, the Board should weigh the pollution consequences of increasing pollution at other coal fired units. If Unit 3 is a relatively low producer of emissions when compared to the coal units that would soon be putting out more days of production then it makes no environmental sense to retire Unit 3. That would result in a net increase in emission output. Without the information about the

other plants involved in a system wide generation change, it is impossible to make an informed decision.

Again, the EA is deficient in its scope of analysis. The Board should immediately require that a new study be performed which includes all the information and consequences of retirement. Further, the Board should view with skepticism the projected replacement of Unit 3 generation with other sources of power, including natural gas. If management could more profitably and more cleanly produce all the energy the organization needed with natural gas units then it would. It has not and in fact appears desperate for Unit 3 to produce more energy this winter as the next scheduled outage is not until March 13.

The scope of the analysis is only a part of the failed methodology of the EA. On page 15 of the EA, specifically at section 3.1.2, the report states, "the assessment of air quality and climate impacts in this document is primarily *qualitative*, given the PAF Unit 3 emissions contribute a small *portion* of criteria pollutants and GHG emissions at regional and global scales". [emphasis added]

Qualitative analysis is the use of non-measurable data to evaluate and reach conclusions. That word choice by the EA correctly reflects a fundamental truth of the EA. Note that monitors emissions of Unit 3 are located in Hopkinsville, Kentucky and Bowling Green, Kentucky. Hopkinsville is thirty one miles away and Bowling Green is certainly no closer.

Within the region are other power plants, such as a coal fired plant in Centertown, Kentucky, multiple coal units in Sebree, Kentucky, and in Owensboro, Kentucky. There are numerous industrial plants, such as Logan Aluminum, Constellium, Emerson Electric, Metalsa, and others in the area that may contribute to the contaminants in the air. There are also many thousands of cars, trucks, and heavy equipment running in the area.

There is an old scientific concept. When a scientific test is performed, variables have to be isolated. There is no way to truly determine what percentage of the pollutants measured in Bowling Green (two counties away) and Hopkinsville (nearly two counties away) is related to Unit 3 and what emissions are related to other industrial activities. It would make far more sense to measure emissions in Drakesboro, Kentucky.

Even the EA all but admits that the emission testing cited in the report is not testing of Unit 3. On page 15, the report acknowledges that Unit 3 emissions contribute a "small portion of criteria pollutants....at regional and global levels". It is the source of a portion of criteria pollutants and emissions. We do not know what that portion is and without that information it is not possible to conduct a quantitative analysis. Thus, the EA's reasoning is qualitative in nature.

There is science and there is opinion. Qualitative analysis is, in reality, an opinion that cannot be supported by accepted scientific testing disguised as science. I humbly submit that the Board should review the emissions statistics contained within the charts on pages 17 and 18 as an

attempt to represent what cannot be represented. It reflects certain pollution levels in the Bowling Green area but it does not reflect the emissions of Unit 3 because the unit only produces a *portion* of regional pollutants as admitted by the EA experts.

b. The Good News about Unit 3 Emissions

The federal government has established National Ambient Air Quality Standards to make sure that our air is breathable and safe. These standards require certain levels of seven contaminants to be within certain boundaries. Page 14 of the EA details the onerous requirements of these regulations in terms of the saturations levels and measuring requirements for the said contaminants.

Since 1998 the Environmental Protection Agency has designated Muhlenberg County as an area of "maintenance/attainment". EA page 14. This is the highest level of compliance available under federal regulations. 42 U.S. Code § 7409(b). The Board should recognize that these standards are designed by the federal government to protect the welfare of the public from any adverse effects of pollution and to do so with a margin of safety. 42 U.S. Code § 7409(b)(2). Moreover, the Administrator of the EPA is required to develop these standards after appointing an independent scientific review committee composed of seven members including at least one member of the National Academy of Sciences, one physician, and one person representing State air pollution control agencies and determining the appropriate requirements based on numerous factors including public health and economic effects.

Table 3-2 in the EA indicates that the particulate matter level in the Paradise plant region was less than the permitted amount under the NAAQS. Ozone levels are also well-below the permitted levels in the region.

To put this in perspective, many areas of California (considered by many to be the most environmentally concerned of all states), including Fresno County, Orange County, San Bernardino County, and Los Angeles County do not meet the NAAQS. The relevant area near Unit 3 meets all the standards. <https://www3.epa.gov/airquality/greenbook/knc.html>

In summation, the EA does not actually measure the pollutants that come from TVA. It measures the pollutants in the air, regardless of the source. Even with the inclusion of other sources, it appears that air quality in the region meets all the standards of the National Ambient Air Quality Standards. These standards are monitored and updated by the EPA every five years, according to the above cited statute, and are designed to provide safety to citizens in the air with a margin of safety.

Therefore, Paradise Fossil Plant meets standards set forth by experts, doctors, and federal regulators for keeping people safe. The Board should avoid the natural impulse to presume that Unit 3 is a danger to the citizens of Muhlenberg and surrounding counties and instead rely on the EPA to determine what levels are safe and what levels are dangerous.

In order to prevent belaboring this analysis, the EA's analysis of the remaining environmental issues will be included within this section on emissions. Table 2-2 summarizes the alternatives now before the Board and the consequences of each. With respect to the option of continued operation, the EA writers conclude that impacts from air quality will be "minor" and that there will be no impact to surface water, groundwater, no effect on threatened and endangered species, no impact to visual resources, and no impact to environmental noise.

Plainly, the EA authors recognize that Unit 3 is not a threat to the region's environmental resources. The EA spends page after page arguing every conceivable negative possible outcome from continued operations but the end result is not a warning to the Board that Unit 3 operations are unsafe. It is instead a recognition of relatively negligible impacts on human and animal life. These neutral findings shed light on what is the most important facet of the decision before the Board. It is the financial aspect of this plant, not the environmental impact, that the EA finds as justifying closure. Again, for the reasons stated above, the EA scientists are not in a position to perform this analysis and, to the extent that they have, have done a poor job.

Socioeconomic Impact

The EA performs some form of an analysis on the socioeconomic impact of the alternatives in Section 3.10. Page 41 reflects that 131 people are employed by TVA due to Unit 3 operation and another 135 people are employed as coal miners as a result of TVA coal purchases from Unit 3 operation. The EA, however, sadly fails to report many other jobs that relate to Unit 3 operation in the affected counties.

During outages, there are sometimes 200 contractors working at Paradise Fossil Plant. These contractors span the range of carpenters, electricians, general laborers, engineers, and many other trades. These contractors are often natives of the affected areas. Those that are not residents of the area live in local hotels and homes. They eat at local restaurants and purchase living necessities at Muhlenberg County stores.

Truck drivers from Ray Jones and Clay Jones trucking, among many other companies, haul in \$55 million of coal to the Plant each year. There are literally hundreds of people that rely on income from the trucking business to support their families.

There is a local factory (Reed Mineral Harsco) that produces gypsum products from coal byproducts purchased from TVA. Employment by this industrial company provides income many more families.

Of course, these truck drivers and industrial plant workers buy insurance, build homes, buy food, buy clothing, donate to local churches, and pay local taxes. The total economic output of Unit 3 to the local economy cannot be understated. There will be literally thousands of people that will face either unemployment or dramatic changes to income.

Of the approximately 10,000 Muhlenberg County residents that are employed, it would likely be fair to say that no less than 10% are directly linked to Unit 3. If you consider the secondary effects, such as those in the retail and construction sectors, the impact snowballs.

At page 46, the EA writers begin the discussion of consequences of shutting down the Unit by spending the entire first paragraph focusing on the impact on minorities. The EA then reaches the most absurd conclusion that “minor positive indirect effects to minority and low-income populations may occur due to beneficial changes to air quality” from closure of Unit 3. The EA writers fail to consider that black Americans are disproportionately unemployed – having a rate of unemployment that is more than double white Americans. <https://www.epi.org/publication/unemployment-of-black-and-hispanic-workers-remains-high-relative-to-white-workers-in-16-states-and-the-district-of-columbia-the-african-american-unemployment-rate-is-at-least-twice-the-rate-of-white/> For this reason, deterioration of economic conditions tend to disproportionately negatively affect minorities.

The statement that minority and low-income individuals will benefit from the loss of a major employer, in an already economically distressed area, is a statement that “these people do not work anyway so the loss of industrial work is irrelevant”. The reality of the situation is minority and low-income individuals will have even fewer opportunities to move up the economic ladder with the loss of the most important producer of wealth in Muhlenberg County.

With respect to the 131 TVA employees, 200 contractors, dozens of truck drivers, 135 coal miners, and uncounted vendors that will lose the income they depend on, the EA concludes that these individuals “may become temporarily unemployed”. The absurdity continues later on page 46 as the report explains that “given the prominence of several other fields in the PAF vicinity, including educational services, health care, and social assistance, manufacturing and retail trades, current PAF employees may potentially find alternative employment in these other industries.”

These statements falsely describe the economic reality of the affected counties. The unemployment rate is 9.4 on average – far higher than the national average of less than 4%. EA page 43 and <https://data.bls.gov/timeseries/LNS14000000>. Clearly, the prominence of these other industries is not sufficient to provide ready access to jobs for the people of the area. Of the jobs available in Muhlenberg County, the average income is \$19,934 – more than \$4000 less than the state average.

Further, these “prominent” industries do not on their own create economic value. These industries rely on the creation of value by other industries such as agriculture, manufacturing, mining, and similar activities. To put it another way – if there were 10,000 Wal-Marts or hospitals built in Muhlenberg there would not be a single bit of economic improvement after the initial construction spending concluded. Why not? Because neither Wal-Marts nor hospitals produce wealth but instead are secondary to other producers.

These dependent industries are the result of economic production and not the creators. On the other hand, Unit 3 is a producer of value. It produces electricity and in large volumes. This wealth is passed, in part, to Unit 3 employees. This flow of wealth is what enables the healthcare, retail, social assistance, and educational industries to exist. These secondary industries do not just appear – they follow the centers of wealth production.

While the EA writers may not understand or discuss this fundamental economic concept, the area will become a poor display of the principle at work. When Unit 3 leaves, the hotels will no longer have contractors to pay for rooms and will leave. The truck drivers will no longer be needed to haul coal to the Unit. The medical facilities will lose patients. The retail and hospitality industries will be empty, then they will go out of business.

The EA's authors are sorely mistaken in assuming that these hundreds of Unit 3 workers (direct and indirect) will simply walk into another industry. Many will be forced to retire. Many will default on their mortgages and others will no longer be able to pay for the children's college education.

\$200 million (or more) in annual revenue being removed from Muhlenberg County translates into millions in lost economic value each year. The bottom line is that there will be millions and millions in loss of wealth creation each year in Muhlenberg County and other affected counties.

Further, to repeat the points mentioned repeatedly above, the EA study fails to provide any projections as to the loss of total wealth to Muhlenberg County – whether measured in unemployment, per capita income, total area domestic product (similar to GDP). It is unimaginable that the EA writers legitimately believe that the economic impact to the area will be “minor” even considering the lack of economic education and experience they collectively have. The Board should reject the EA's position and hire an independent third party with appropriate financial and economic qualifications to provide guidance to the Board as detailed analysis of economic impact is required under the NEPA.

Conclusion

The EA provided to the Board is an opinion paper. Its opinion that the Fossil Plant should be shuttered is not based on environmental concerns, as the “Purpose and Need” for the study is solely the result of alleged economic difficulties presented by continued operation. EA Section 1.1 and 1.2. The report is clear, despite its best efforts, that the affected areas meet all the federal metrics relating to environmental protection and that the environmental impact of the Unit is best described as “minor”.

Thus, the EA is primarily an economic argument based on alleged future needs of capital costs. However, this primary argument contains zero information to the Board on expected future revenues, zero estimates of future profits or losses, zero information relating to current and

future reliability of the Unit, and zero information relating to economics of relying on either purchased power or increased generation at other facilities.

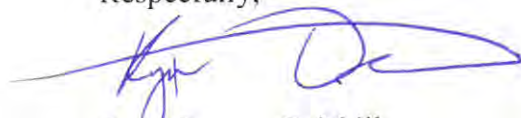
Further, the EA uses outdated information as a basis for its description and characterization of Unit 3 outage rates as a means to reach its conclusion that the Unit does not meet the portfolio needs of TVA.

The EA fails to project actual lost economic value to the affected areas, whether it be in the form of projected loss of domestic product, loss of employment, or otherwise. It is non-quantitative analysis. The EA fails to include in its analysis the loss of supporting industries such as the trucking and contracting industries.

In sum, the EA is an attempt by non-businesspeople to reach an economic conclusion without the necessary data. This Board has a fiduciary duty to the organization to make informed decisions in the best interests of the company. The Board also has a statutory duty to make decisions in accordance with NEPA and part of that duty is to consider the economic impacts on the affected communities. This EA does not enable such conclusions.

For the reasons cited above, the undersigned respectfully requests that the Board purchase the rotor turbine, which management has delayed purchasing in order to engineer the urgency of this decision, and continue operations of the Unit pending a more appropriate analysis.

Respectfully,

A handwritten signature in blue ink, appearing to read 'Ryan Bennett Driskill', is written over a horizontal line.

Ryan Bennett Driskill

EXHIBIT A

Generation and Financial Information Requested on Paradise Fossil Unit 3 December 2018

Included below is detail on generation and spend for Paradise Fossil Unit 3. TVA budgets and tracks spend at the plant level to ensure common plant spend is fully captured. Please note this information does not include any corporate overhead. Regarding revenue for the plant, TVA does not maintain profit and loss statements for each site. TVA's budgets are based on the system as a whole with total revenue representing the cost to generate power, maintain reliability, and deliver on the broader mission of TVA. For reference, TVA's System Effective Wholesale Rate is included.

In FY17, Paradise Fossil Units 1 and 2 operated for a partial year. To approximate Unit 3 generation and expenses for FY17, proration was applied. Individual unit generation is metered, so common station service that is a small portion of total plant generation was allocated to Unit 3 based on its portion of total unit metered generation. Fuel expense and operating and maintenance expenses were allocated based on percent of total plant generation. As base and environmental capital spend is investment in future operations, 100% of this spend was allocated to Unit 3. FY18 generation and financials represent Unit 3 only, as Units 1 & 2 were retired.

The bottom ash conversion project of about \$40 million and the wastewater treatment project of about \$110 million are included in FY19-23 forecasted environmental compliance spend. These projects are needed to support compliance with the Coal Combustion Residual (CCR) and potential Effluent Limitation Guidelines (ELG).

All financial detail provided is included in TVA's most recent annual filing with the SEC on form 10-K for the fiscal year ended September 30, 2018. This source is available on TVA's website at www.tva.gov/investors. While this level of detail is not specifically outlined in TVA's most recent 10-K, it is included in the comprehensive financial statements and supporting notes and disclosures.

Generation and Financial Information	FY17	FY18	FY19-23	FY19-23 Comments
Paradise Unit 3 Generation (GWh)	3,272	2,751		
Plant Financials (\$ millions)				
Fuel Expense	85	66		
Operating & Maintenance Expense	39	50		
Capital Spend	56	25		216 Boiler, turbine, generator, condenser, induction fan, and balance of plant projects to address material condition
Environmental Compliance Spend	38	70		212 Completion of ash conversion/remediation work and wastewater treatment plant construction
TVA System Effective Wholesale Rate (cents/kWh)	6.96	6.92		
Proration of Spend Information	FY17			
Paradise Plant Generation (GWh)	4,524			
Paradise Unit 3 Percent of Plant Generation	72%			
Paradise Plant Fuel Expense	118			
Paradise Plant O&M Expense	53			

EXHIBIT B

RE: Information Requested

Pilakowski, Ashley Anne <aapilakowski@tva.gov>

Fri 12/7/2018, 3:57 PM

To: Ryan Driskill [REDACTED]

Mr. Driskill,

The response provided was for the information you requested relevant to the cited benchmarking data (2015 – 2017) contained in the Draft EA. Please note that calendar year 2018 is not yet over.

Thank you,

Ashley Pilakowski

NEPA Specialist

NEPA Program & Valley Projects

Tennessee Valley Authority

400 W. Summit Hill Drive

Knoxville, TN 37902

[REDACTED]
aapilakowski@tva.gov



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From: Ryan Driskill [REDACTED]

Sent: Friday, December 07, 2018 4:35 PM

To: Pilakowski, Ashley Anne <aapilakowski@tva.gov>

Subject: Re: Information Requested

TVA External Message. Please use caution when opening.

Ms. Pilakowski,

With respect to the turbine cost, please disregard that request. Though your contact person said the information is proprietary it was bundled with other information and so that request is unnecessary.

However, still need information with respect to 2018 on the outages.

Thanks,

Ryan Bennett Driskill

From: Pilakowski, Ashley Anne <aapilakowski@tva.gov>

Sent: Friday, December 7, 2018 3:10 PM

To: Ryan Driskill

Subject: RE: Information Requested

Mr. Driskill,

Please find responses to your requests in the attached document.

Included in the response are the following:

- Paradise Unit 3 generation and financial information for FY17 and FY18
- Paradise Unit 3 Equivalent Forced Outage Rate (EFOR) performance summary, general information about Generating Availability Data Systems (GADS), and an export of GADS data for PAF3 forced outage and derate events
- The GKS Navigant benchmarking study and business sensitive plant engineering estimates are considered proprietary and confidential and are not able to be shared.

We look forward to your comments on the Draft Proposed Paradise Retirement Environmental Assessment.

Thank you,

Ashley Pilakowski


NEPA Specialist

NEPA Program & Valley Projects

Tennessee Valley Authority

400 W. Summit Hill Drive

Knoxville, TN 37902



aapilakowski@tva.gov



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From: Pilakowski, Ashley Anne

Sent: Friday, December 07, 2018 9:30 AM

To: 'Ryan Driskill' 

Subject: RE: Information Requested

Mr. Driskill,

Thank you for your email. I have been away from my desk in multiple meetings this past week and have not received any voicemails from you. We are working on your requests and hope to have something to you later today.

Regards,

Ashley Pilakowski

NEPA Specialist

NEPA Program & Valley Projects

Tennessee Valley Authority

400 W. Summit Hill Drive

Knoxville, TN 37902

aapilakowski@tva.gov



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From: Ryan Driskill [REDACTED]

Sent: Thursday, December 06, 2018 7:42 PM

To: Pilakowski, Ashley Anne <aapilakowski@tva.gov>

Subject: Information Requested

TVA External Message. Please use caution when opening.

Ms. Pilakowski:

I have called your office several times and emailed several times. You have not answered the phone since last week - though I have called each day with the possible exception of December 5, 2018. More importantly, and for whatever reason, you have not provided any citations to any of the items set forth in the EA relating to the stability, outages, costs, or revenue of Unit 3. The EA makes statements of fact relating to those items and so I can only assume that this information and data is readily available. So, please produce it. Your prior email provides no web links or other attachments which are studies or reports providing this data. I have asked you for a link to the benchmark study you referenced (which seems to serve as a measuring stick for outage rates rather than provide the data for the outage rate of Unit 3) but you have failed to timely respond to this simple request.

I plan to comment in response to the EA and this information is necessary for an appropriate response (just as the citation of reliable sources was necessary for the production of the Environmental Assessment - but not included). The response is due by the 19th of December.

Given the time frame for a response, I need the information as soon as possible. I need sources (such as government reports, studies, or other reliable data compilations) that provide the outage rates for the unit during the last few years (three preferably), revenue rate for the unit for the last three years, and cost information for investments necessary for future operations of PAF (and which was referenced in the EA). If the EA is going to draw conclusions based on certain assumed facts, I must know the basis/source of these assumed facts in order for an assessment and rebuttal.

If I do not have that information, I will be forced to provide a rebuttal to the EA without that information. I will be attaching these emails to show the public that TVA has failed to provide information responsive to my requests and prevented a member of the public from having the information required to participate in the process.

Further, I will assume that your failure to provide the necessary sources of information is because those creating the EA did not in fact have the information necessary to substantiate the factual allegations relating to costs for operating PAF and I will make that point clear in my public comment.

I look forward to a timely response to this inquiry.

Thank you,

Ryan Bennett Driskill

EXHIBIT C

Summary of Paradise Unit 3 EFOR Performance Data for 2015-2017

GADS Data Export - December 2018

Unit	Date	FOH	EFORW	MWHFO	FD	EFOR	Year
PAF 3	01/01/2015	386	5,653,723	393,054	20,778	7.32	2015
PAF 3	01/01/2016	816	7,170,342	830,262	211,930	14.53	2016
PAF 3	01/01/2017	1353	4,332,793	1,375,560	14,858	32.09	2017

Generating Availability Data Systems (GADS)

The electric utility industry initiated GADS (Generating Availability Data Systems) in 1982 to expand data collection activities that it began in 1963. Today, NERC's GADS maintains operating histories on more than 7,700 generating units in the North America.

Purpose

- Through GADS, NERC collects information about the performance of electric generating equipment
- GADS is a mandatory industry program for conventional generating units that are 20 MW and larger
- GADS is recognized as a valuable source of reliability information for total unit and major equipment groups and is widely used by industry analyst

Forced Outage and Derate Event Reporting

An **OUTAGE** exists whenever a unit is not synchronized to the grid system and not in a reserve shutdown state.

Forced Outage Event Types

- Startup Failure (SF)
- Unplanned (Forced) Outage - Immediate (U1)
- Unplanned (Forced) Outage - Delayed (U2)
- Unplanned (Forced) Outage - Postponed (U3)

An **DERATE** exists whenever a unit is limited to a power level that is less than the unit's net maximum capacity.

Forced Derate Event Types

- Unplanned (Forced) Derating - Immediate (D1)
- Unplanned (Forced) Derating - Delayed (D2)
- Unplanned (Forced) Derating - Postponed (D3)

Link to information about the Generating Availability Data System (GADS)

<https://www.nerc.com/pa/RAPA/gads/Pages/default.aspx>

Paradise Unit 3 Forced Outage and Derate Events for 2015-2017
GADS Data Export - December 2018 (2 pages)

Unit	Type	EXT	Cause Code	Event Times Start	Event Times End	Hours	MWHL	Cause Code Description	MW Impact	Event Description	Power Replacement Cost	Year
PAF 3	U1	T2	1030	1/9/2015 13:55	1/11/2015 18:00	52	52,969	BOILER SCREEN, WING WALL, OR SLAG SCREEN LEAKS (WATER TUBES ONLY)	1,017	Boiler Tube Leak.	\$552,709	2015
PAF 3	D1		8760	2/15/2015 5:50	2/15/2015 15:00	9	367	CEMS OPACITY MONITOR PROBLEMS	40	Opacity issues.	\$2,913	2015
PAF 3	D1	49	8760	2/15/2015 5:50	2/15/2015 15:00	9	119	CEMS OPACITY MONITOR PROBLEMS	13	Opacity issues.	\$947	2015
PAF 3	D1	49	8760	2/19/2015 3:00	2/19/2015 6:30	4	560	CEMS OPACITY MONITOR PROBLEMS	160	Opacity issues. Troubleshooting in progress.	\$12,167	2015
PAF 3	D1	W0	9270	2/22/2015 2:30	2/22/2015 15:30	13	2,379	WET COAL (OMC)	183	U3 IS DROPPING LOAD DUE TO RUN OF WET COAL. LOAD 3 FEEDERS.	\$19,581	2015
PAF 3	D1	34	110	2/23/2015 16:00	2/23/2015 20:49	5	737	OTHER COAL FUEL SUPPLY PROBLEMS UP THROUGH BUNKERS	153	Coal supply interruption.	\$17,682	2015
PAF 3	U1	T2	4609	5/6/2015 21:54	5/15/2015 17:07	211	214,807	OTHER EXCITER PROBLEMS	1,017	Remove unit from service and trouble shoot reduction gear issues.	\$2,414,574	2015
PAF 3	U1	T1	3412	5/25/2015 16:26	5/26/2015 13:33	21	21,476	FEEDWATER PUMP DRIVE - STEAM TURBINE	1,017	Unit trip on BFP turbines.	\$90,095	2015
PAF 3	U1	T1	1050	6/8/2015 20:56	6/13/2015 3:00	102	103,802	SECOND SUPERHEATER LEAKS	1,017	SSH OUTLET BOILER TUBE LEAK.	\$850,608	2015
PAF 3	D1		9271	6/16/2015 20:12	6/17/2015 8:00	12	3,304	WET COAL (NOT OMC)	280	Lost feeders due to wet coal	\$26,668	2015
PAF 3	D1	54	3415	8/13/2015 14:00	8/13/2015 15:55	2	958	FEEDWATER PUMP/DRIVE LUBE OIL SYSTEM	500	38 BFPT front standard oil leak.	\$20,064	2015
PAF 3	D1	93	1475	8/19/2015 11:00	8/19/2015 23:00	12	3,060	INDUCED DRAFT FAN CONTROLS	255	F ID fan hydraulic pump replacement.	\$24,286	2015
PAF 3	D1	70	3412	8/31/2015 16:03	8/31/2015 20:30	4	2,158	FEEDWATER PUMP DRIVE - STEAM TURBINE	485	"B" BFPT Tripped - One BFP Operation.	\$35,303	2015
PAF 3	D1	34	415	9/29/2015 19:00	9/29/2015 21:50	3	255	CYCLONE FEEDERS	90	U3 LIMITED BY FWF WITH 3 COAL FEEDERS OUT OF SERVICE.	\$1,294	2015
PAF 3	D1	54	3110	10/23/2015 5:00	10/23/2015 20:00	15	4,080	CONDENSER TUBE LEAKS	272	REPAIR U3 EAST COND TUBE LEAK.	\$10,630	2015
PAF 3	D1	82	1401	12/5/2015 9:15	12/5/2015 17:22	8	2,800	FORCED DRAFT FAN DAMPERS	345	Lost an FD fan.	(\$671)	2015
PAF 3	D1	67	1400	1/6/2016 20:00	1/7/2016 2:20	6	3,433	FORCED DRAFT FANS	542	FD Fan C bearing rubbing.	\$11,827	2016
PAF 3	D1	82	1475	1/7/2016 2:37	1/7/2016 4:30	2	1,171	INDUCED DRAFT FAN CONTROLS	622	ID Fan.	\$4,590	2016
PAF 3	D1	83	4620	1/7/2016 8:30	1/7/2016 9:00	0	204	GENERATOR AIR COOLING SYSTEM	407	Lost Generator Leads Housing Fans.	\$2,009	2016
PAF 3	U1	T1	4620	1/7/2016 9:58	1/8/2016 10:49	25	25,272	GENERATOR AIR COOLING SYSTEM	1,017	Lost Generator Leads Cooling Fans.	\$69,108	2016
PAF 3	D1	49	3631	1/10/2016 5:00	1/10/2016 12:10	7	1,627	400-700-VOLT CIRCUIT BREAKERS	227	480V Absorber Board 1B faulted out, resulting in a loss in reduction capacity.	\$6,579	2016
PAF 3	D1	82	110	1/21/2016 8:30	1/21/2016 9:30	1	356	OTHER COAL FUEL SUPPLY PROBLEMS UP THROUGH BUNKERS	356	BC-26 TRIPPED OFFLINE.	\$1,787	2016
PAF 3	U1	T1	9930	2/1/2016 9:03	2/1/2016 17:02	8	8,119	OPERATING PROCEDURE ERROR	1,017	Unit Trip (500KV TRANSFER TRIP PUSHED INADVERTENTLY at MONTGOMERY STATION).	\$36,050	2016
PAF 3	D1	82	1410	2/5/2016 3:00	2/5/2016 9:30	6	2,451	FORCED DRAFT FAN MOTORS	377	FD FAN (3C FDT TRIP).	\$33,184	2016
PAF 3	D1	82	415	2/12/2016 15:00	2/12/2016 19:25	4	1,003	CYCLONE FEEDERS	227	Lost feeder Board .	\$4,767	2016
PAF 3	D1	51	110	2/14/2016 5:15	2/14/2016 6:00	1	245	OTHER COAL FUEL SUPPLY PROBLEMS UP THROUGH BUNKERS	327	Coal delivery problem .	\$1,484	2016
PAF 3	D1	82	415	2/14/2016 17:30	2/15/2016 6:00	12	5,963	CYCLONE FEEDERS	477	Coal feeder issues .	\$28,913	2016
PAF 3	D1	51	110	2/15/2016 6:07	2/16/2016 10:00	28	10,233	OTHER COAL FUEL SUPPLY PROBLEMS UP THROUGH BUNKERS	367	Coal conservation.	\$66,781	2016
PAF 3	D1	W0	9270	2/17/2016 1:30	2/17/2016 7:00	6	1,084	WET COAL (OMC)	197	U3 WET COAL / FEEDER ISSUES.	\$3,490	2016
PAF 3	D1	W0	9270	4/28/2016 4:30	4/29/2016 0:54	20	5,100	WET COAL (OMC)	250	wet coal issues on U3.	\$27,460	2016
PAF 3	D1	54	3412	5/27/2016 9:00	5/27/2016 21:50	13	7,123	FEEDWATER PUMP DRIVE - STEAM TURBINE	555	A BEPT rupture diaphragm repair.	\$49,149	2016

Paradise Unit 3 Forced Outage and Derate Events for 2015-2017
GADS Data Export - December 2018 (2 pages)

PAF 3	U1	T1	4520	6/5/2016 16:14	6/14/2016 9:13	209	212,536	GENERATOR STATOR WINDINGS, BUSHINGS, AND TERMINALS	1,017	UNIT TRIP (Generator Bushing Failure)	\$1,448,288	2016
PAF 3	U1	T2	1050	6/16/2016 21:08	6/24/2016 21:10	192	195,298	SECOND SUPERHEATER LEAKS	1,017	BTL	\$2,517,469	2016
PAF 3	D1	82	1400	6/28/2016 6:30	6/28/2016 10:40	4	958	FORCED DRAFT FANS	230	FD Fan.	\$4,273	2016
PAF 3	D1	82	1400	6/28/2016 18:00	6/28/2016 22:53	5	2,354	FORCED DRAFT FANS	482	3A FDF O/S.	\$30,571	2016
PAF 3	D1	V0	1455	7/4/2016 1:00	7/12/2016 4:20	195	100,011	INDUCED DRAFT FANS	512	Removed B FDF from service due to high vibration.	\$962,309	2016
PAF 3	U1	T1	3643	7/13/2016 10:01	7/14/2016 0:44	15	14,967	INVERTERS	1,017	unit trip due to loss of power supply.	\$324,302	2016
PAF 3	D1	34	110	7/17/2016 6:30	7/17/2016 20:23	14	4,887	OTHER COAL FUEL SUPPLY PROBLEMS UP THROUGH BUNKERS	352	RECLAIM BELT ISSUE.	\$77,526	2016
PAF 3	D1	82	415	7/28/2016 8:00	7/28/2016 21:29	13	2,656	CYCLONE FEEDERS	197	FEEDER ISSUES.	\$34,143	2016
PAF 3	D1	W0	9270	7/29/2016 6:30	7/29/2016 19:00	12	3,275	WET COAL (OMC)	262	U3 DERATE DUE TO WET COAL/FINES.	\$38,632	2016
PAF 3	D1	82	415	7/31/2016 9:00	8/1/2016 18:00	33	4,356	CYCLONE FEEDERS	132	Limited by in service feeders.	\$81,608	2016
PAF 3	D1	82	415	8/1/2016 18:00	8/2/2016 7:00	13	1,196	CYCLONE FEEDERS	92	Feeders O/S.	\$11,847	2016
PAF 3	D1	E0	8560	8/3/2016 9:00	8/5/2016 16:00	55	12,760	ELECTROSTATIC PRECIPITATOR PROBLEMS	232	Opacity issues.	\$197,634	2016
PAF 3	D1	E0	8560	8/4/2016 9:30	8/8/2016 10:20	97	13,073	ELECTROSTATIC PRECIPITATOR PROBLEMS	135	Opacity issues.	\$150,661	2016
PAF 3	D1	83	8010	8/9/2016 8:00	8/9/2016 9:00	1	332	WET SCRUBBER CRUSHERS/MILLS	332	Coal Slurry Conservation.	\$4,548	2016
PAF 3	D1	83	30	9/10/2016 10:00	9/10/2016 14:00	4	508	COAL CONVEYORS AND FEEDERS	127	unit cannot come to full load.	\$10,118	2016
PAF 3	D1	82	1480	11/1/2016 0:05	11/4/2016 8:00	80	24,295	OTHER INDUCED DRAFT FAN PROBLEMS	304	3F ID fan will not start.	\$294,432	2016
PAF 3	D1	82	3412	12/3/2016 14:37	12/3/2016 17:18	3	1,280	FEEDWATER PUMP DRIVE - STEAM TURBINE	477	U3 B BPT TRIPPED AND WON'T RESET.	\$16,675	2016
PAF 3	U1	T1	4750	12/16/2016 11:11	12/31/2016 19:00	368	374,070	OTHER GENERATOR CONTROLS AND METERING PROBLEMS	1,017	Field Ground relay.	\$3,955,812	2016
PAF 3	U1	T1	900	1/3/2017 20:30	1/8/2017 8:05	108	109,412	SLAG-TAP (CYCLONE FURNACE)	1,017	slag tap issue.	\$1,807,851	2017
PAF 3	U1	T1	1599	1/11/2017 3:09	1/11/2017 23:13	20	20,408	OTHER MISCELLANEOUS BOILER AIR AND GAS SYSTEM PROBLEMS	1,017	Unit Trip - Furnace Pressure.	\$146,652	2017
PAF 3	U1	T2	1040	1/13/2017 2:13	1/14/2017 22:30	44	45,036	FIRST SUPERHEATER LEAKS	1,017	U3 BOILER TUBE LEAK REPAIRS.	\$313,830	2017
PAF 3	D1	82	415	1/26/2017 8:00	1/26/2017 11:00	3	288	CYCLONE FEEDERS	96	3 Coal Feeders Out of Service.	\$437	2017
PAF 3	D1	82	30	1/28/2017 8:11	1/29/2017 8:00	24	5,359	COAL CONVEYORS AND FEEDERS	225	Fire in the coal belt.	\$1,676	2017
PAF 3	U1	T2	1010	2/15/2017 13:57	2/17/2017 12:00	46	46,833	CYCLONE FURNACE LEAKS (IN CYCLONE AREA ONLY)	1,017	BTL	\$202,345	2017
PAF 3	U1	91	105	4/12/2017 6:00	5/16/2017 17:15	827	841,313	BUNKER STRUCTURES	1,017	Bunker silo repairs.	\$8,816,724	2017
PAF 3	U1	T2	9271	6/5/2017 19:17	6/12/2017 8:38	157	160,025	WET COAL (NOT OMC)	1,017	Loss of feeders due to wet coal.	\$1,147,959	2017
PAF 3	U2	12	8160	6/29/2017 20:31	7/6/2017 2:30	150	152,533	WET SCRUBBER MIST ELIMINATORS/DEMISTERS AND WASHDOWN	1,017	UNIT TO BE REMOVED FROM SERVICE TO CLEAN MIST ELIMINATORS.	\$957,214	2017
PAF 3	D1		415	8/5/2017 17:30	8/5/2017 22:00	4	320	CYCLONE FEEDERS	71	3 FEEDERS O/S LIMITING FEEDWATER FLOW.	\$2,200	2017
PAF 3	D1	82	3632	8/12/2017 17:30	8/12/2017 21:35	4	1,107	400-700-VOLT CONDUCTORS AND BUSES	271	Loss feed to coal handling.	\$6,635	2017
PAF 3	D1	F0	9630	8/20/2017 7:20	8/23/2017 12:25	77	7,785	OPACITY STACK EMISSIONS - FOSSIL STEAM UNITS	101	Opacity issues.	\$78,891	2017

Response on Other Requested Information

Navigator Benchmarking Study

The information in the GKS Navigator Benchmarking Study on plant performance is proprietary and confidential and unable to be shared with a third party. TVA received specific permission from GKS Navigator to publicly disclose the statement regarding EFOR quartiles calculated in that study.

Plant Engineering Estimates

Plant engineering estimates for future project work are business sensitive and not able to be shared with a third party.

EXHIBIT D

Calendar Year-to-Date: November 2018

Unit	Date	FOH	EFORW	MWHFO	FD	EFOR
PAF 3	01/01/2018	1,097	5,724,727	1,115,666	48,172	20.33

Monthly Data 2018

Unit	Date	FOH	EFORW	MWHFO	FD	EFOR
PAF 3	01/01/2018	515	540,197	523,687	-	96.94
PAF 3	02/01/2018	350	530,433	355,781	-	67.07
PAF 3	03/01/2018	0	-	-	-	0
PAF 3	04/01/2018	128	285,387	130,329	-	45.67
PAF 3	05/01/2018	0	602,556	-	-	0
PAF 3	06/01/2018	0	732,240	-	-	0
PAF 3	07/01/2018	0	756,648	-	21,235	2.81
PAF 3	08/01/2018	0	756,648	-	22,098	2.92
PAF 3	09/01/2018	12	682,407	12,390	266	1.85
PAF 3	10/01/2018	92	104,954	93,479	-	89.07
PAF 3	11/01/2018	0	733,257	-	4,572	0.62

Unit	Type	EXT	Cause Code	Event Times Start	Event Times End	Hours	MWHL	Cause Code Description	MW Impact	Event Description	PR Cost	Year
PAF 3	SF	H0	4030	1/9/2018 20:50	1/30/2018 7:07	490	498,618	HP TURBINE ROTOR SHAFT	1,017	HP Turbine Rotor locked.	\$12,106,122	2018
PAF 3	U1	T1	1799	1/30/2018 23:21	2/15/2018 13:50	374	380,850	OTHER BOILER CONTROL AND INSTRUMENTATION PROBLEMS	1,017	BACKPRESSURE DUE TO CONTROLS ISSUE	\$584,843	2018
PAF 3	U1	T1	9920	4/12/2018 22:51	4/18/2018 7:00	128	130,329	CONTRACTOR ERROR	1,017	Logic Error in Trip Controls due to Vendor Error.	\$893,590	2018
PAF 3	D1		1480	7/12/2018 8:30	7/17/2018 2:40	114	21,235	OTHER INDUCED DRAFT FAN PROBLEMS	186	G IDF BRG FAILURE.	\$169,623	2018
PAF 3	D1	82	1480	8/1/2018 12:38	8/2/2018 22:50	34	19,494	OTHER INDUCED DRAFT FAN PROBLEMS	570	PAF Unit 3 - 150 MW derate due to the loss of G IDF	\$107,827	2018
PAF 3	D1		30	8/29/2018 17:39	8/29/2018 22:30	5	472	COAL CONVEYORS AND FEEDERS	87	PAF 3 derated for loss of BC-12 and BC-11	\$2,084	2018
PAF 3	D1		30	8/29/2018 17:39	8/29/2018 22:30	5	2,183	COAL CONVEYORS AND FEEDERS	450	PAF 3 derated for loss of BC-12 and BC-11	\$10,779	2018
PAF 3	D1		3669	9/20/2018 6:12	9/20/2018 7:12	1	266	OTHER 4000-7000-VOLT PROBLEMS	266	Lost 6900 feeder board	\$184	2018
PAF 3	U1	T1	4309	9/28/2018 10:49	9/28/2018 23:00	12	12,390	OTHER TURBINE INSTRUMENT AND CONTROL PROBLEMS	1,017	Tripped during turbine valve testing.	\$25,141	2018
PAF 3	U1	T2	4279	10/27/2018 23:11	10/31/2018 19:06	92	93,479	TURBINE MISCELLANEOUS TURBINE PIPING	1,017	Inspect/Repair B MSSV Below Seat Drain Piping	\$714,331	2018
PAF 3	D1	82	1400	11/1/2018 17:45	11/1/2018 20:40	3	1,330	FORCED DRAFT FANS	456	Lost C FD fan.	\$14,973	2018
PAF 3	D1		30	11/9/2018 3:33	11/9/2018 6:00	2	671	COAL CONVEYORS AND FEEDERS	274	PAF 3 FD to 700 MW for BC-27 feeder breaker coil burned out.	\$1,845	2018
PAF 3	D1	82	1480	11/27/2018 9:19	11/27/2018 20:30	11	2,181	OTHER INDUCED DRAFT FAN PROBLEMS	195	PAF U3 ID Fan Trip.	\$62,152	2018
PAF 3	D1		1480	11/28/2018 14:26	11/28/2018 16:26	2	390	OTHER INDUCED DRAFT FAN PROBLEMS	195	PAF 3 FD due to ID fan trip	\$9,383	2018

DEC 14 2018

Dear Mr. Smith,

I am a Unit Operator at Paradise Fossil Plant in Drakesboro, Kentucky. I started my career with TVA in 2011 as a student, and became an assistant unit operator (AUO). I spent 6 years as an AUO at Paradise, and during that time, I achieved my operator accreditation. When the decision was made to shut down Paradise Units 1 & 2, my career path and thoughts of being able to retire from TVA someday were wiped away. I ended up being transferred from Paradise during the "surplus to fill" process that was initiated when the 2 units at Paradise ceased operation (April 2017). I was sent to Allen Fossil Plant, which was also slated to be shutdown, to be a control room operator there until the plant ceased to operate. I lived in a hotel away from my wife and children for 12 months as I operated the Allen Fossil Plant until it was taken offline for the last time. At that point, I was being transferred to Kingston Fossil Plant, but received an 11th hour reprieve when I was chosen to come back to Paradise as an operator, a position to which I had applied. I returned home in May of 2018, and was hoping to be home for good. Shortly after my return, we found out that there was reluctance to fund the new turbine rotor project for Paradise, and that shutting the plant down could be on the horizon. I stand in disbelief when I look at the massive number and cost of upgrades that have been done to this plant in the last couple of years, to the tune of hundreds of millions of dollars, and TVA wants to shut us down. In the last 2 years, we have had brand new natural gas auxiliary boilers built and installed, new GE turbine controls installed on the main turbines, a new secondary super-heater installed in the boiler, and are currently nearing completion of construction on a gypsum de-watering facility to be compliant with environmental regulations (a project that appears on paper to have not been started yet based on the environmental assessment just recently issued by TVA). Additionally, this unit had cyclones replaced in 2012, has existing SCR (selective catalyst reduction system), electrostatic precipitators AND wet flue gas desulfurization scrubbers. Finally, the dry fly-ash handling facility is currently under construction and is scheduled to be commissioned in the summer of 2019. These projects have set us up to run far into the future, and remain compliant with environmental regulations, as well as be reliable to the TVA system. Forgive the crude analogy, but a decision to not replace the rotors on this unit is tantamount to rebuilding an engine and transmission in a vehicle, repainting it, and then deciding to take it to the scrap yard because the tires are bald. We recently had a top 2 record run on this unit—this is a testament to the work ethic of the Paradise team, as well as to the massive benefit that the new Mark VI turbine controls provide to our reliability at this plant. My reason for writing this letter is to provide questions for those in decision-making roles to ponder and seek answers to in order to make the best decision possible.

First, I would like to know how shutting down Paradise would be fulfilling TVA's mission of economic development. Part of that mission of economic development is to provide good-paying jobs to the people of the community in which TVA serves. The loss of Paradise Units 1 & 2 cost many people their jobs, the community has suffered as payments in lieu of taxes have decreased, and the local school system has suffered greatly from this revenue that they had come to rely on for so many years. I'm certain the folks from the Muhlenberg County School Board would love to talk about how many school teachers ended up losing their jobs as a direct

result of TVA's actions when PAF 1 & 2 were shutdown. From what I can see, TVA payments in lieu of taxes dropped by half from 2012 to 2014. How many more teachers will lose their jobs if TVA shuts Paradise? The previous cutback resulted in 51 layoffs and failure to replace 20 teachers who had retired (source: Messenger-Inquirer news article 06/23/2016 by Keith Lawrence "Muhlenberg schools plan cuts, tax increases").

Secondly, I would like to know how shutting down a coal plant in the middle of coal country is saving on fuel cost. Paradise is closer to coal than any other TVA plant in the valley, and it also has the flexibility to receive coal via truck, barge or rail if needed. This is important because Chip Pardee noted in his November 6, 2014 Board of Directors meeting remarks that having flexibility of delivery by water and by rail was a deciding factor in TVA choosing to keep the Shawnee plant in operation over Paradise units 1&2 and Allen Fossil. (reference board meeting Nov. 6, 2014 video beginning at 52:30 mark: <https://tva.mediaplatform.com/#!/video/603/TVA+Board+of+Directors+Meeting+-+November+2014>) During our current run, the corporate fuels folks didn't expect us to run as reliably or for as long as we did, so we almost ran completely out of coal. One of the Vice Presidents, recognizing we were on a really good and reliable run, said to "get Paradise coal, no matter what it takes." The problem with this is that TVA then contracted out-of-state truck drivers, housed them in hotels and essentially paid approximately 3 times our normal contract price for coal. It is not our fault that corporate let us run out of fuel. I can see these fuel costs being orchestrating into "Paradise costs too much to run" when in reality, it was corporate fuels that didn't accurately figure how much coal we needed to keep on-site to stay running until our Fall outage started.

Third, I question the recent assertion that this plant is unreliable and inefficient. The new turbine controls have greatly improved reliability resulting in a top 2 record run for this unit before we came offline for the Fall outage. It is worth pointing out that having fuel on-site is critical in terms of natural disaster planning and load forecasting. As a short-term example, I noticed several weeks ago that on the consolidated outage portal, Gallatin Combustion Turbine site had multiple units out of service due to road construction requiring the pipeline to be relocated. What would happen if there was a severe natural disaster, and TVA has all of its eggs in the gas turbine basket? What happens when the pipeline supplier cannot supply the gas? At a coal plant, we have a few weeks' worth of fuel sitting on the ground, ready and available.

Fourth, I question TVA's claim that there is a desire for a balanced portfolio of generating assets. A truly balanced portfolio IS a great idea, however shutting any more coal units down is simply exacerbating an already heavily weighted portfolio in the wrong direction. According to the most recent 10-k filing with the SEC, in 2018 FY, TVA's generating assets were as follows: 39% nuclear, 20% natural gas, 19% coal, 9% hydro and 13% purchased power. (reference page 13 of TVA 10-k for FY ended Sept. 30, 2018). As you can see, we are already approaching purchasing the same amount of power as our coal fleet is making, and idling 2 additional plants (as Johnson is proposing) would only further off-balance the portfolio. What happens when the Henry hub gas price spikes for some unforeseen reason? How are we reaching our mission of being the lowest-cost provider if we stagger our generating portfolio too heavily into the gas

market? The potential for volatility in the Henry Hub natural gas price per million Btu is real, and a small increase in gas prices can have a large impact in the cost per megawatt of power production. Long-term coal contracts can help to abate the financial risk of this, but only if coal remains a viable **AND** substantial portion of our generation portfolio. TVA has already shuttered more than half of the 59 coal-fired units it once operated (Chattanooga Times Free Press, Aug 27, 2018 "Trouble in Paradise: TVA studies whether to close more coal plants"). How is this promoting a balanced portfolio for grid reliability and stability? **I would ask that the Board request TVA show the pricing spectrum and cost per megawatt for natural gas combined cycle plants at each given price point for natural gas, and also explain the break-even point so that a true picture of the power cost can be seen when compared to coal.** For example, on September 10 of this year, the Henry Hub natural gas spot price was \$2.90 per million Btu. By December 4, it had risen to \$4.40 per million Btu, a fuel cost increase of 51.7%. These numbers have real implications on the cost per megawatt, and these increases must be passed on to customers for TVA to remain viable. With a truly balanced portfolio, TVA has the ability to throttle back natural gas plants and utilize coal plants when more efficient and cost-effective. If they continue to shutter coal plants, that price buffering ability and resiliency is lost forever.

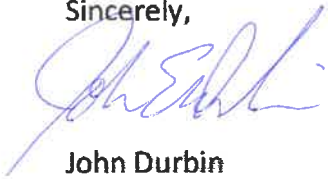
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down? November 28th of this year marked a date with the 2nd highest peak in TVA history for a November. ("Cold temperatures cause TVA's second highest peak power demand in November" <http://www.wrcbtv.com/story/39556729/cold-temperatures-cause-tvas-second-highest-peak-power-demand-in-november>) Where is the power of the future going to come from? **I would encourage the board to request TVA provide DETAILED information regarding the number of times in 2018 alone that the TVA bulk electric system has been under a conservative operation alert, and scrutinize this information carefully in the decision-making process that is soon to follow.**

I think that shutting down any additional generation in the TVA system could be detrimental to our mission and to our 99.999% reliability. I am not just saying this because it is the plant at which I am currently employed—I have already demonstrated my willingness to travel with TVA to where the work has been. I say this as a Unit Operator who sees the day-to-day operation of our power system and the inherent weaknesses it has. We do not need to make this mistake, and at this point it is completely preventable. TVA has spent over one billion dollars on environmental controls at Paradise, and these controls have ensured the viability of this plant well into the future. At the closure announcement of Paradise Units 1 & 2, Chip Pardee stated that Paradise 3 was part of TVA's long-range generating portfolio. Let's stop this war against coal generation, and support the asset that TVA has invested so heavily in so that it can serve the people of the Valley far into the future.

Thank you for your time.

Sincerely,



John Durbin

PAF Unit Operator

From: Board of Directors
To: [Pilakowski, Ashley Anne](#)
Cc: [Campbell, Laura J](#); [Tudor, Andrew J](#); [Hydas, James Hunter](#)
Subject: FW: Paradise Fossil Plant
Date: Monday, December 10, 2018 4:56:39 PM

From: Durbin, John Everett [REDACTED]
Sent: Wednesday, December 05, 2018 7:38 PM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Fossil Plant

Dear TVA Board of Directors,

I am a Unit Operator at Paradise Fossil Plant in Drakesboro, Kentucky. I started my career with TVA in 2011 as a student, and became an assistant unit operator (AUO). I spent 6 years as an AUO at Paradise, and during that time, I achieved my operator accreditation. When the decision was made to shut down Paradise Units 1 & 2, my career path and thoughts of being able to retire from TVA someday were wiped away. I ended up being transferred from Paradise during the "surplus to fill" process that was initiated when the 2 units at Paradise ceased operation (April 2017). I was sent to Allen Fossil Plant, which was also slated to be shutdown, to be a control room operator there until the plant ceased to operate. I lived in a hotel away from my wife and children for 12 months as I operated the Allen Fossil Plant until it was taken offline for the last time. At that point, I was being transferred to Kingston Fossil Plant, but received an 11th hour reprieve when I was chosen to come back to Paradise as an operator, a position to which I had applied. I returned home in May of 2018, and was hoping to be home for good. Shortly after my return, we found out that there was reluctance to fund the new turbine rotor project for Paradise, and that shutting the plant down could be on the horizon. I stand in disbelief when I look at the massive number and cost of upgrades that have been done to this plant in the last couple of years, to the tune of hundreds of millions of dollars, and TVA wants to shut us down. In the last 2 years, we have had brand new natural gas auxiliary boilers built and installed, new GE turbine controls installed on the main turbines, a new secondary super-heater installed in the boiler, and are currently nearing completion of construction on an ash de-watering facility to be compliant with environmental regulations (a project that appears on paper to have not been started yet based on the environmental assessment just recently issued by TVA). Additionally, this unit had cyclones replaced in 2012, has existing SCR (selective catalyst reduction system), electrostatic precipitators AND wet flue gas desulfurization scrubbers. These projects have set us up to run far into the future, and remain compliant with environmental regulations, as well as be reliable to the TVA system. Forgive the crude analogy, but a decision to not replace the rotors on this unit is tantamount to rebuilding an engine and transmission in a vehicle, repainting it, and then deciding to take it to the scrap yard because the tires are bald. We recently had a

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wound up in the same predicament as January where there wasn't enough power to meet demand and reserve power. We started shutting lights off at the plant to make as much power available on the grid as possible. What does TVA think is going to happen in the future if Paradise 3 and Bull Run are shut down? November 28th of this year marked a date with the 2nd highest peak in TVA history for a November. ("Cold temperatures cause TVA's second highest peak power demand in November" <http://www.wrcbtv.com/story/39556729/cold-temperatures-cause-tvas-second-highest-peak-power-demand-in-november>) Where is the power of the future going to come from? **I would encourage the board to request TVA provide DETAILED information regarding the number of times in 2018 alone that the TVA bulk electric system has been under a conservative operation alert, and scrutinize this information carefully in the decision-making process that is soon to follow.**

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Thank you for your time.

Sincerely,

John Durbin
PAF Unit Operator

EA Concerns / Summary

Reliability:

Over the last 13 Years TVA has invested approximately 715 million in capital improvements with the intention of meeting or exceeding environmental regulations and improving Unit reliability. Those capital investments include:

ABS Absorber/ Scrubber - (2005) \$360,000,000.00

Auxiliary boilers - (2016) - 66,000,000.00

Secondary Super heater Replacement (2017) - \$50,000,000.00

BFPT & FDFT Controls upgrade (2011) - \$6,000,000.00

Main Turbine Controls upgrade - (2017) - \$12,000,000.00

EX2100E Generator Excitation upgrade - \$2,000,000.00

Cyclone & Lower furnace Floor and Walls replacement (2011)- \$100,000,000.00

Gypsum De-watering System (2018-19) - \$50,000,000.00

Fly Ash De-watering System (2018-19) - \$50,000,000.00

CCR Land Fill Project (2018-19) - \$10,124,000.00

Haul Road for Dry Ash to Land Fill - \$1,973,000.00

Jacobs Creek closure (2017 Phase 1) - \$7,100,000.00

Jacobs Creek closure (Phase 2) Out for Bid (2019)

Peabody Pond Closure - Out for Bid (2019)

The SSH was original equipment that significantly contributed to decreased reliability with frequent tube leaks. The (23) Cyclones, lower furnace floor and water walls were original assets that were replaced in 2011. In the 20 years prior to replacement, the Cyclones were a significant contributor to high EFOR/low reliability due to material condition (end of life) and tube leaks. The single module FGD / Scrubber was built and commissioned to meet SO₂ regulatory requirements and efficiently removes >98% of SO₂ produced in the combustion process. Plant performance has improved along with Employee morale with the recent combination of capital investments and TVA is currently in a position to realize a return on those investments.

Load Flexibility:

Turbine/Generator Controls upgrade: This capital improvement provided a means to safely operate at lower loads with MW output variations from 400-1000MW. This project allowed for an additional 300MW load reduction during lower system demand periods. This flexibility could support a reduction of Fleet Shut-down and Start-Up costs during low system demands.

Fuel Flexibility:

We have on site 5 million Tons of Coal Fines from the previous Coal Wash Plant facility that we successfully blended at a 10% rate prior to RPM solutions supporting the Coal Yard Reduction Plan. This area is referred to as Daniels Run and has the potential to provide 150 million in fuel cost savings over the course of 15 years of operation at a 10% blend. Continued harvesting of the Fines material could defer closure costs of the Daniels Run area estimated to be \$30-40 Million pending approved method. Use of the Fines material could also reduce closure costs pending approved method of closure. There is currently 360,000T of Coal fines stored in the Coal Yard Footprint. At the 10% blend rate Paradise would need to Operate at full load for 375 days in order to consume this fuel and avoid potential high disposal costs. The Project goal is to reduce the Coal Yard footprint with the end result of improving efficiency, reducing runoff/ Pond management costs and overall reducing environmental risks. The fines are near the equivalent of PRB with respect to quality/BTU. We have successfully blended

lower cost fuels in the past such as PRB and are capable of receiving fuel by means of Truck, Rail and/or Barge.

Ongoing Projects:

As depicted in Table 2-1 Paradise has several environmental projects underway that must be completed prior to June of 2019. These capital projects as shown in the table are required regardless of alternative A or B. These include the Gypsum De-Watering Facility(completion 5/2019), The Fly Ash De-Watering Facility (completion 05/2019)and Landfill project (Completion 04/2019)that is designed to house 15+ years of CCR material. In the Spring of 2019 the Process Water basin construction is expected to start.

Future Operational needs / Environmental Projects:

Paradise employees understand there are additional Environmental projects that must be completed in order to continue operation.

LP Turbine A & B Rotor replacement - \$35,000,000.00

Bottom Ash de-Watering System -in operation by 2023

Waste Water Treatment - Project on hold

Jacobs Creek closure (Phase 2) Out for Bid (2019)

Peabody Pond Closure - Out for Bid (2019)

Chemical Pond Closure - in planning

Daniels Run area closure (Coal Wash Refuse area) -in Planning

Economic Impacts:

Paradise Unit 3 provides approximately 132,370 Tons of Bottom Ash annually (EA pg.33) to Harsco. Harsco is located approximately 3 miles from Paradise Fossil Plant and is an industrial site that processes Paradise's Boiler Slag which is used in the manufacturing of roofing shingles, sand paper and other abrasive products. This type Boiler Slag is unique to Cyclone fired boilers. Harsco has 21 employees and pays TVA \$10.00/Ton for Boiler Slag resulting in an annual TVA revenue of approximately \$1.32 million. Economically the immediate area and surrounding Counties would as well be affected in the event of closure. Opportunities in this largely rural area are limited.

Closing Statement:

The EA purpose was to provide Senior Leadership with sufficient and accurate information to help TVA make the right decisions with respect to TVA's future Generating portfolio and projected system demands. These notes are intended to help support any future decision. Paradise employees understand that we would not operate past January 31st of 2020 if the decision is made to not replace the LP Turbine Rotors.

From: [Ann Ercelawn](#)
To: [Pilakowski, Ashley Anne](#)
Subject: Paradise Fossil Plant and Bull Run Plant
Date: Saturday, December 8, 2018 3:17:25 PM

TVA External Message. Please use caution when opening.

Both of these plants should be closed. We the people want clean non polluting energy sources such as wind and solar. We benefit by cleaner air and protection of the earth. Rising carbon emissions from fossil fuels are endangering all of us.

Ann Ercelawn



Paradise Unit 3 LP Turbine B Failure RCA Summary

Cycle Chemistry Regimen Analysis and Corrective
Action

Burt FitzHugh

11/1/2017

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EXECUTIVE SUMMARY

Over the past 13 years, the problem of reducing the Operating cost of the Powdex system has undergone the same solution on two separate occasions, first from 2004 to 2007, and most recently from 2014 to present. In both instances, fundamental flaws in the design of the Powdex system were not sufficiently considered, and basic fundamental ion exchange science was completely misunderstood. The result in both instances has been accelerated BTF and LPT failures. Due to the low ion exchange capacity and poor fluid dynamics of the Powdex system, the capability of successfully mitigating Condenser Tube leaks and Air inleakage is not possible. Further, the deliberate operation of the system above $0.075\mu\text{S}/\text{cm}$ has proven detrimental to the Boiler circuits and LP-B Turbine sections 5, 6, 7, 8, and now section 9, as well. Thus the problem is two-fold: Deionizer type/design, and Human Performance, which can be categorized as mechanism/electrochemical, and human error/unlearned.

This report addresses both aspects of the problem, and offers solutions to prevent future occurrences, and ensure future continued operation of PAF3 apart from inadequate cycle chemistry.

Because the focus of most cycle chemistry regimens in the Power Utility industry is Boiler Tube protection, the vulnerability of the LP Turbine steel is often neglected, resulting in irreversible, catastrophic damage to Turbine blades. Fundamental understanding of Ion exchange science has diminished over the past three decades in TVA, and as a result, PAF3 LP-B Turbine has suffered such damage twice in a ten-year period. While exceedances in Cation Conductivity of the polisher effluent may not be detrimental to boiler circuit integrity (depending upon the magnitude and duration of exceedance), turbine steel is unprotected from electrochemical attack, and is therefore dependent upon continuous proper performance of the Condensate Polisher.

KEY TERMS

Ammonium Cycle

Boiler Feedwater

Condensate Polishing

Deionizer

Exhaustion

Fluid Dynamics

Ion Exchange

Ion Exchange Reaction Reversibility

Ion Exchange Reactions

Ion Exchange Resin

Ionic Leakage

Salt Line / Wilson Line

Selectivity

Sodium break through

Strong Acid Cation Ammonium Form

Strong Acid Cation Hydrogen Form

Strong Base Anion Hydroxide Form

HISTORY OF ASSET DAMAGE

The Root Cause of the 2007 LP-B Turbine pitting was reported by the author to TVA Corporate and PAF Site management on May 5th, 2007:

PAF3 was put in jeopardy beginning in June 2004 via a plan to increase run length of the Powdex Demineralizer Units, the intent being monetary savings on powdered resin expense. Boiler feedwater cycle chemistry operating parameters were re-evaluated, and an improvement team consisting of [REDACTED], [REDACTED], and SysEngrCWT was formed. Numerous mechanical components (including filter elements and valves) were replaced on the Powdex System. These actions failed to yield the desired results of increasing the run lengths of each Powdex unit. By November of 2004, the water chemistry operating parameters were altered, and as of February 2005, parameters were officially changed by SysEngrCWT.

The changes made were factually unsuitable for Oxygenated Treatment cycle chemistry, and are more favorable to All Volatile Treatment. However, serious errors were made, rendering the cycle chemistry regimen destructive to the steam generator and LP Turbine. In light of the known hematite formation throughout the feedwater cycle and steam generator steel, as well as its presence on the LP Turbine blades contemplate the following industry warnings:

SECTIONS 2-20 AND 2-21 OF THE EPRI OT CYCLE CHEMISTRY GUIDE:

“Deep-bed polisher operations should be conducted with the cation resin in hydrogen form. Ammonia form operations is not justified except under unusual circumstances. Polisher production runs will be very long because of the lower ammonia concentrations used with OT. Thus, extending deep-bed polisher runs by operation beyond ammonia break is not suggested.

Powdered resin polishers should also use hydrogen form cation resin with the polisher operations. Former successful station operations with regard to the use of fiber may be

continued with OT. If former operations with ammonia form cation resin have proved that the system can maintain condensate purity at levels $<0.15\mu\text{S}/\text{cm}$ (preferably $<0.1\mu\text{S}/\text{cm}$), then continued operation with ammonia form resin or operation of hydrogen form cation resin beyond ammonia break may be expected to provide successful operational results. The hydrogen form cation resin usage suggestion is based upon the expectations of improved water quality capability.

Polisher performance of either deep-bed or powdered resin condensate polisher systems is expected to improve with the use of oxygenated treatment, because of both the lower ammonia levels and lower crud levels.”

The EPRI AMMONIUM FORM GUIDE (P.26) 1.3.3 further states, “All power stations employing OT use, or are strongly advised by EPRI to use, full flow H-OH condensate polishing. EPRI also advises these stations to maintain low cation conductivity levels with a normal operation level of $0.15\mu\text{S}/\text{cm}$ @ 25°C and a target of less than $0.1\mu\text{S}/\text{cm}$ being preferred. Without full flow, H-OH form, condensate polishing it is often difficult, to achieve these levels. With condensate polishing, the $0.1\mu\text{S}/\text{cm}$ cation conductivity target is easily met and levels of around $0.06\mu\text{S}/\text{cm}$ can be achieved without difficulty by the proper use of appropriately designed plant. “

Section 1.4.1 (p.28) of the same report states, “Filter demineralisers employ a thin coating of powdered mixed anion and cation septa contained in a service vessel. The system acts as a very effective filter for particulate impurities, with a crud removal efficiency of over 95%, but has a low ion exchange capacity. When used in a system conditioned with ammonia or other volatile amine, the cation resin in the ion exchange resin coating is rapidly converted to the ammonium or amine form. For the remainder of the time the vessel is in service the resins then operate in the ammonium (or amine form). Although this does not noticeably affect its filtration properties, the quality of the polished water is adversely affected. “

SECTION 1.7 (P31) OF THE EPRI AMMONIUM FORM GUIDE expounds more on these adverse affects:

“Unfortunately, there are disadvantages. As the ammonia added as a conditioning agent is no longer removed, the water phase throughout the polisher bed(s) remains at a high pH level, generally that of the influent condensate. It is this high pH (high OH ion concentration) together with the presence of ammonium ions, which controls the behaviour of ammonium form beds. It leads to:

A significant decrease in the quality of the polished water, even under no in-leakage conditions, relative to that that would be produced if the same resins were operated in the conventional H-OH form. (Nevertheless, given an appropriate level of regeneration, ammonium form beds can and do yield polished water perfectly suitable for use on fossil power plants).

A tendency to “throw” even higher levels of impurities in some circumstances.

Lower capacities for removing impurities.

The subsequent leakage, under some conditions and after a few days, of impurities removed from condensate.

This behaviour is unlike that shown by beds operated in the H-OH form and, in the past, has caused difficulties to those operators not well versed in the characteristics of ammonium form beds. Ammonium form beds have become viewed by some as unstable. Stations suffering from

frequent condenser leaks or experiencing frequent start ups should not consider adopting this mode of operation nor should those stations unable to regenerate resins to the much higher quality required for successful ammonium form operation. “

Further research into the ammonia cycle clearly demonstrates that the EPRI recommendation of the exclusive use of Hydrogen Form Cation Resin is founded upon scientific fact. The ammonium cycle operation is undeniably revealed as unsuited for OT.

DOW LIQUID SEPARATIONS DOWEX ION EXCHANGE RESINS GUIDE TO CONDENSATE POLISHING MAY 2003 (page 10) states concerning the ammonia cycle and AVT, **“While increased run length and reduced regeneration costs are very attractive, there is a risk. Namely, the driving force for the uptake of contaminant ions is significantly reduced by virtue of hundredfold increases in the competing ion concentrations. For instance, in the ammonia cycle, the competing ion, NH_4^+ , is at a solution concentration near 10-5 equivalents per liter. In contrast, the competing ion, H^+ , in the hydrogen cycle is at a solution concentration of only 10-7 equivalents per liter. Consequently, sodium leakage will be much greater (as much as 100X) with ammonia cycle operation.”**

In spite of this information being readily available, and having been known to TVA personnel as Paradise attempted to transition to OT Cycle Chemistry in the 1990s, the Improvement Team documents exhibit **contrary** actions:

CURRENT WATER QUALITY PARAMETERS (JULY 2004)

SINCE THE SPRING 2004 OUTAGE, THE HOTWELL CATION CONDUCTIVITY HAS BEEN DOWN TO 0.13 MICROMHOS (0.12 TARGET, 0.15 LIMIT) AND THE HOTWELL DO RANGES FROM 35 TO 60 PPB (10 PPB TARGET, 20 PPB LIMIT). DEIONIZER (POWDEX) OUTLET CATION CONDUCTIVITY IS 0.07 (0.075 TARGET, 0.10 LIMIT) AND ECONOMIZER INLET CATION CONDUCTIVITY IS 0.08 (0.10 LIMIT). IF THE DEIONIZER OUTLET DOES NOT GO ABOVE 0.075 MICROMHOS AND LOAD REMAINS STEADY, THESE CATION CONDUCTIVITY LEVELS CAN BE MAINTAINED AND WOULD PROBABLY IMPROVE.

HOTWELL DEGASSED CATION CONDUCTIVITY CHECKED ON 7/14/04 AND WAS 0.061 MICROMHOS. CATION CONDUCTIVITY WAS 0.17 MICROMHOS, THEREFORE DISSOLVED GASSES ARE AFFECTING WATER QUALITY INDICATORS ON THE UNIT.

UNIT 3 POWDEX PROCOATS--AUGUST 17, 2005

STARTUP

EACH PRECOAT WILL BE 10 GREEN AND 2 RED. THE TSA WILL ADJUST THE RATIO IF NECESSARY AS DICTATED BY SPECIFIC CONDUCTIVITY.

OFF STARTUP--NORMAL OPERATING MODE

THE STANDARD PRECOAT RATIO TARGET IS 8 GREEN AND 4 RED. HOWEVER, THE TOTAL NUMBER OF RED BAGS USED IN ANY 24 HOUR PERIOD SHOULD NOT EXCESS 8 BAGS.

AFTER 8 BAGS OF RED RESIN (2 PRECOATS) ARE CONSUMED IN THIS 24 HOURS PERIOD, SUBSEQUENT PRECOATS SHALL BE DONE WITH 12 GREEN BAGS.

TRANSITION TO ALL RED RESIN:

THE AMMONIUM CARBONATE IS REMOVED MORE EASILY WITH HYDROGEN FORM RED RESIN. WHEN RED RESIN REMOVES AN IMPURITY, IT RELEASES AN ACID THAT MUST BE NEUTRALIZED WITH OUR AMMONIA FEED. WHEN THE RESIN EXHAUSTS, THE AMMONIA FEED MUST BE REDUCED. AT CURRENT DILUTE LEVELS (6" AMMONIA IN 30" FILL), THE AMMONIA PUMP SWINGS FROM 15% TO 35% WHEN A

Powdex Meeting Notes - 2/10/05

Monday, February 14, 2005 2:00:43 PM

Below are suggestions by SysEngrCWT:

1. Call David Ong and Richard Steward and get their feedback on why the Powdex runs are so short. ■■■ said he would contact them. SysEngrCWT said that he could not add anything to the mechanical work (i.e., element replacement, valve replacement, pump repairs) that are already planned.
2. SysEngrCWT recommended continuous monitoring of sodium after the hotwell and after the Powdexes. This will help the monitoring of condenser tube leaks. ■■■ will request pricing on the Swan sodium analyzer that SysEngrCWT recommended and discuss this further with Steve West.
3. SysEngrCWT suggested that the ratio of green (NH₃ form) resin should be increased. He said that the red (H form) resin becomes spent too quickly. Before the Unit 3 startup, resin ratios will be finalized by the Powdex team and passed on.
4. SysEngrCWT said that all the specific conductivity meters should read 3 decimal places in order to better trend possible condenser tube leaks. Tim will contact Bull Run about the meters they use.
5. High DO should continue to be addressed by searching for air inleakage. SysEngrCWT recommends deoxygenating the makeup water. Besides helping lower DO during normal operation, it has reduced startup times at Bull Run by 2 to 4 hours because of the reduced time required for pegging the DA. ■■■ and ■■■ are reviewing a proposal submitted by Ecolochem for deoxygenation of makeup water.
6. Operating feedwater at a pH of 8.5 to 8.6 is acceptable. This corresponds to a specific conductivity of 0.85.
7. During the next Unit 3 startup, monitor the suspended iron (from the millipores) closely.
8. After Unit 3 is up and steady, send off water samples to the central lab and have them analyzed for iron and nickel. ■■■ and the lab TSAs will arrange this.

ION EXCHANGE SCIENCE AND MISCONCEPTIONS

The statement “**When red resin removes an impurity, it releases an acid that must be neutralized with our ammonia feed**” is a clear demonstration that the members of the Improvement Team *were not familiar* with the science of ion exchange, and hence ignorant of the purpose and operation ion exchange systems in general. Basic ion exchange science was taught to Paradise personnel in January, 1985 by Betz Dearborn, Inc. , this information unfortunately was not retained in TVA .

The theoretical low conductivity value for a Strong Acid Cation / Strong Base Anion Mixed Bed Demineralizer is 0.056μS/cm (note that some sources cite 0.054μS/cm as theoretical low, but no source cites values lower), or 18.1megohm. To achieve theoretical low values, the SAC resin must be in the hydrogen form, and the SBA resin must be in the hydroxide form. The selectivity coefficients for ions in

solution drives this process. Selectivity coefficients are measurements of a resin's affinity for a particular ion. Regardless of %crosslinking of DiVinylBenzene resin, the selectivity coefficient for H^+ form resin is 1.00. Sodium (Na^+) has a selectivity coefficient which is always lower than ammonium (NH_4^+). The percentage of crosslinking influences both sodium and ammonium, yet as the % increases, so does the resin's preference for the ammonium ion. SAC resin regenerated in the ammonium form will exchange ions for the sodium ion. Ammonium form resin will readily remove magnesium, silver, nickel, and so forth. Yet, in spite of its selectivity for many ions, it has a lesser selectivity for sodium. Therefore, it is expected that "The Powdex system cannot consistently maintain an outlet cation conductivity of <0.075 micromhos..." because the ammonium form resin had been used prevalently in the system during that time period. The ammonium form resin cannot achieve lower conductivity levels than $0.065\mu S/cm$ regardless of Powdex System condition, as ammonia is concentrated in the effluent.

SODIUM BREAK THROUGH.

The DI outlet Cation Conductivity limit for Paradise Unit 3 is $0.075\mu S/cm$, the point at which the sodium break occurs. In the condensate cycle, the SAC resin exchanges sodium for ammonia at this point. The resin has become saturated with sodium, and because of the higher selectivity coefficient of the ammonium ion, the sodium ion is exchanged for the ammonium ion. This is the reason that the deep bed demineralizers on PAF1 and PAF2 are not allowed to operate above $0.075\mu S/cm$. Once the sodium has been released back into solution, the hydroxide cycle is affected.

In the regeneration process of the SBA (Strong Base Anion) resin, hydroxide form, ultrapure water is heated to around $115^\circ F$ and a regenerant (sodium hydroxide) is introduced into solution. Sodium hydroxide is formed when the SAC resin reached sodium break, and the free sodium ions combine with the free hydroxide ions which have been exchanged by the SBA resin for anions such as silica and chloride. Within the resin layer of a Powdex filter (or within a deep bed), once the sodium break has been reached, silica and chloride leakage will greatly increase due to the fact that regeneration conditions for the SBA resin have been met.

The chloride leakage which pitted the LP Turbine a direct result of the decision to operate the Powdex units past the point of sodium break, that is, $>0.075\mu S/cm$. Even without a chloride analyzer to measure the magnitude of chloride leakage, the fact that leakage would occur was predictable. By considering the chemical functions of the ion exchange process, (selectivity coefficients, regeneration conditions, saturation points, sodium breaks), and acting according to this knowledge, equipment damage resulting from chloride contamination could have been avoided.

SysEngrCWT's assessment that "the ratio of green (NH_3 form) resin should be increased. He said that the red (H form) resin becomes spent too quickly." is asinine. H^+ Form resin becomes "spent" quicker than NH_3 Form resin because it is selective to more ionic species, and thus **produces a cleaner cycle**. As described

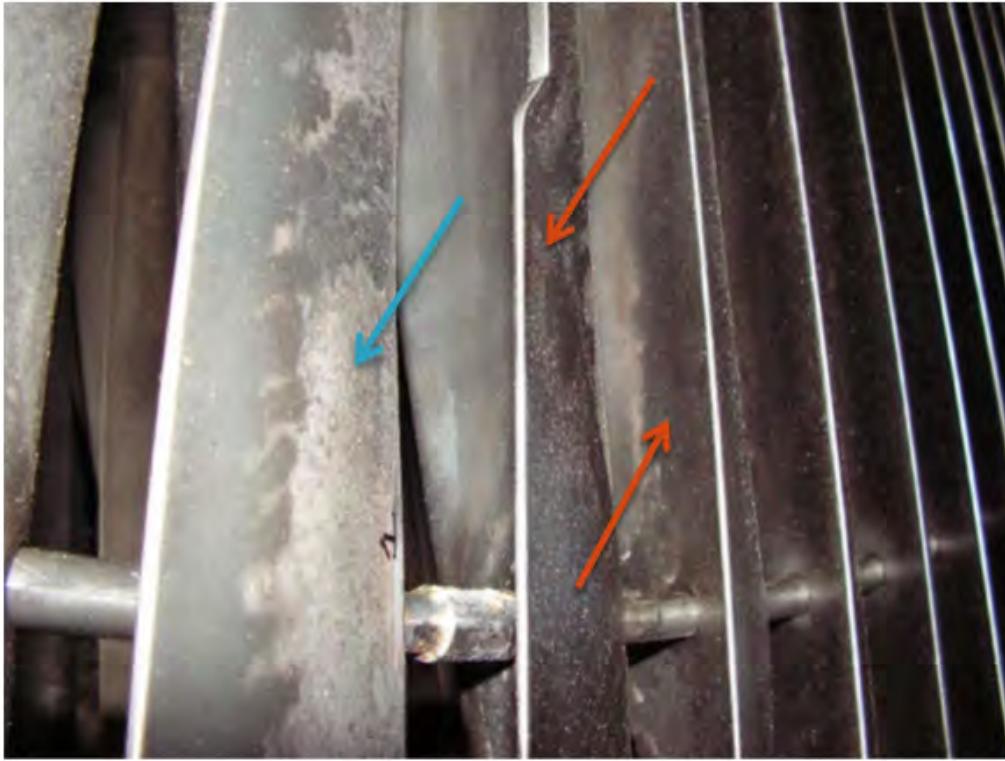
above, NH₃ Form resin not only produces an impure cycle, it also breaks on sodium *rapidly*, resulting in chloride leakage. The mixture of the two forms of SAC resin results in ionic leakage increases of 100 fold.

OT chemistry requires stability which the Improvement Team's actions prevented. in the condensate and boiler feed cycle of PAF3. Stability in Specific Conductivity and pH are necessary for OT to function. Chemical instability results in the loss of the protective ferric oxide hydrate layer coating the boiler tubes with OT. Once this protective layer is lost, a corrosive layer of hematite forms. Pitting of boiler system piping, heater tubes, and boiler tubes, will occur. Millipore filter samples taken from the Economizer Inlet of PAF3 from 2004 exhibited the presence of hematite in the majority of samples: additionally, water samples, hematite coating of laboratory facilities and instruments, and in photographs of the DA and Re-Heater Inlet header clearly demonstrate a process failure in the boiler water chemistry, which is the use of an exhaustible source of pH and Specific conductivity control: ammonium form ion exchange resin. Once the ferric oxide hydrate was stripped from the protective oxide layer, conditions were met for the formation of hematite, which is corrosive. Photographs taken during the 2007 PAF3 outage proved hematite present throughout the boiler cycle. The LP "B" turbine rotor blades exhibited hematite contamination upon visual inspection.

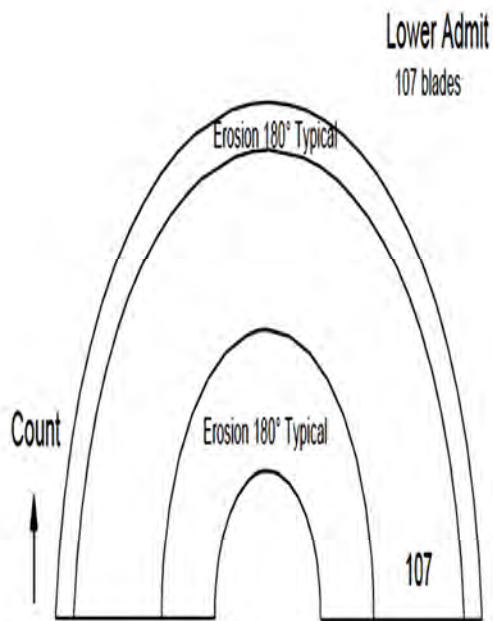
PAF3 LP Turbine Failure of 2007

The NONDESTRUCTIVE EXAMINATION REPORT, JOB No: 4097-5, MARCH 31--JUNE 1, 2007 revealed numerous damaged components within the LP Turbine. There are three areas of damage which are consistent with cycle chemistry failure: pitting, erosion, and protective film peeling. Entrance and discharge areas of erosion and pitting are particularly indicative of chloride damage. That the protective film peeling ranged from minor to excessive also indicates corrosive environmental conditions.

The pitting damage to the LP Turbine in 2007 is clearly the result of the erroneous cycle chemistry regimen prescribed by the Powdex Improvement Team. Observe diagrammatic and photographic evidence testifying to chloride damage and hematite ingression of the LP Turbine blades:



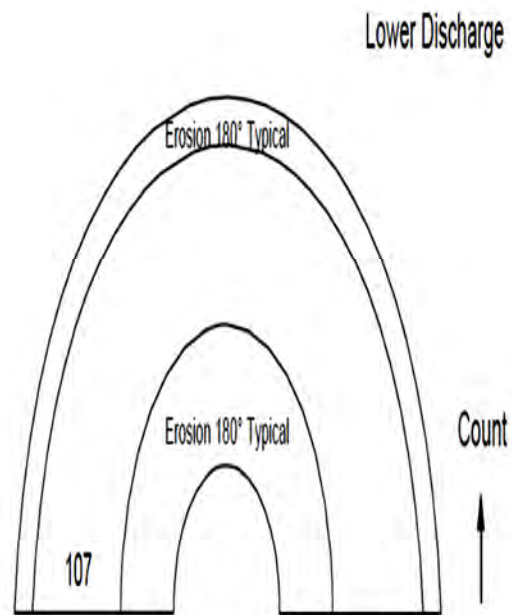
Arrows indicate pitting resulting from chloride ingress. Note the absence of the protective coating, which was depleted by chlorides.



COMMENTS:

- Erosion typical all blade edges.
- No damage noted.

Repaired:

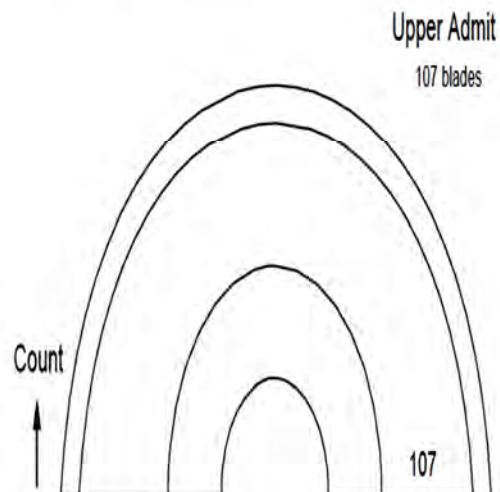


COMMENTS:

- Erosion and impact damage typical on all blade ends.
- Porosity on blade ends (inboard / outboard) welds blade No. 1, 16, 17, 25, 27, 29, 57-61, 63-65, 68, 94, 96-98, 101, 102.
- Blade tip No. 34 broken at impact area.

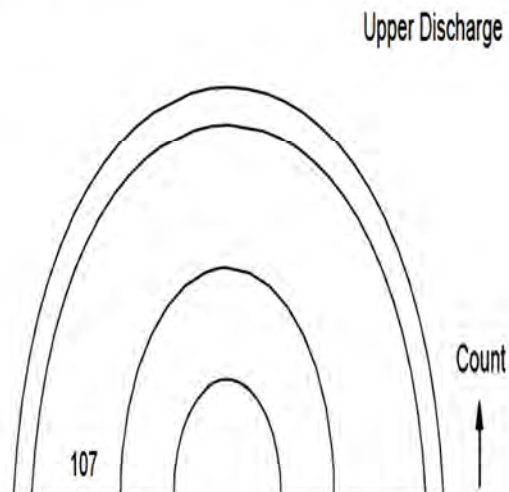
Repaired:

Erosion “typical all blade edges”; “Porosity on blade ends”. Consistent with chloride ingress.



COMMENTS:

- Very little erosion present.
- No damage noted.

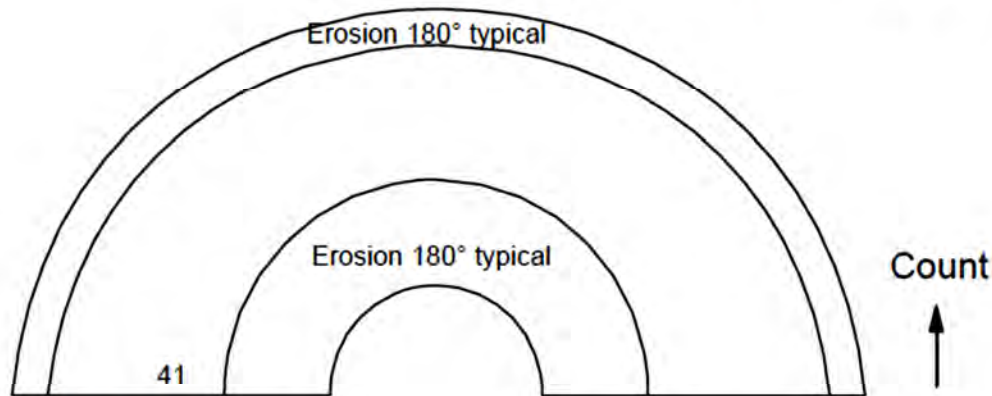


COMMENTS:

- Minor impact damage to all blades.
- Erosion to all blade edges typical.
- Minor impact damage to outer ring groove - 180° typical.

“Erosion to all blade edges typical” consistent with chloride ingress. Note that the discharge of the sections exhibit erosion and pitting; this is where the Wilson Line is approached, and thus where contaminants will reach highest concentrations.

Upper Discharge

**COMMENTS:**

- Crack in outboard end of blades: 2-4, 7, 9-11, & 14-29.
- Crack at inboard end of blades: 32, 33, 35, 36, 40, & 41.
- Erosion at outboard end of blades: 3, 7-10, 30, & 41.
- Erosion at inboard end of blades: 2, 9, 13, 18, 23, & 25.
- Minor impact damage to blades: 12, 17, 24, 36, 37, 39 & 40.
- Pitting on blades 15 & 30.

Pitting is consistent with Chloride ingress. The cracks in the outboard end of blades 14-29 are consistent with pitting in blades 15 through 30, which resulted from chloride ingress.



The red arrow shows pitting caused by chloride ingress; the orange arrow shows hematite from the steam generator. Both are the result of improper operation of the Powdex system.

Regardless of the source of MPR's information, the undeniable fact is that the Powdex Improvement Team instituted a seriously flawed cycle chemistry regimen which inevitably and directly caused irreversible catastrophic damage to the PAF3 LP Turbine.

Failure Analysis of a Cracked Low-Pressure Turbine Blade, J. Ciulik, Radian Corporation, identified "*Chloride contamination of the steam reportedly occurred a few months prior to the inspection*" of "*A cracked, martensitic stainless steel, low-pressure turbine blade from a 623 MW turbine generator was found to exhibit fatigue*". Note that the time frame was "***a few months prior to the inspection***" of the LP Turbine.

TOTAL COST OF LP TURBINE FAILURE

Repairs: \$11million

Power Replacement Cost: \$26million

Lost Revenue due to Downtime: \$30million

Total: \$67million

CYCLE CHEMISTRY JULY 2007 THROUGH OCTOBER 2014

Following the catastrophic damage incurred in the LP Turbine, Paradise plant management disbanded the Powdex Improvement Team, and elected to adhere to the recommendations of the author of the May 5th 2007 Cycle Chemistry Failure Analysis. This regimen prescribed Ultrapure Water (UPW) as the foundation, with conditioning agents added for proper oxide formation on the ID of the steam generator tubes. The conditioning agents are ammonia and oxygen. **UPW is recognized as the protecting agent for the LP Turbine.** The DI product limits are set as follows:

Cation Conductivity:	0.056μS/cm to 0.075μS/cm
Specific Conductivity:	0.50μS/cm to 0.90μS/cm
pH	8.0 to 8.5 (Target 8.3)
Sodium:	<0.1ppb
Silica:	<3ppb
Iron:	<3ppb
Oxygen at Economizer Inlet:	70 to 90ppb
Chlorides:	<0.5ppb (note that this measurement is impossible with ICP technology, and requires an electrophoretic instrument).

The practice of mixing different forms of SAC resin ceased immediately. The Powdex units from July 2007 startup forward is **exclusively** H-OH form. This regimen has served Paradise and TVA as well as the Powdex system design permits for over 7 years. Whereas a mere 2 1/2 years of the Powdex Improvement Team's cycle chemistry program caused devastating damage to the steam generator and LP Turbine, the current prescription provided protection for the generating assets until the erroneous practices employed again in 2014. It must be noted that excursions resulting from Condenser Tube Leaks and Air Inleakage **cannot be remedied** by the Powdex system due to its combination of low ion exchange capacity and poor fluid dynamics. The regimen prescribed was therefore the best practice, as it provided the best possible Cycle Chemistry that the Powdex system can provide, recognizing that the design of the Powdex system limits the ability to mimic the performance of a Deep Bed polishing system.

2014 TO 2017 CYCLE CHEMISTRY REGIMEN

In October, 2014, the cycle chemistry was changed back to the ammonia cycle by SysEngrCWT, (ret). The mixture of opposing forms of Cation exchange resins was re-instituted, a well.

The resin mixtures were as follows:

October through December 2014:	83% Ammonium Form, 17% Hydrogen-Hydroxide Form
January through December 2015:	83% Hydrogen-Hydroxide Form, 17% Ammonium Form
January 2016 through December 2016:	83% Ammonium Form, 17% Hydrogen-Hydroxide Form

The author of this report objected to this action formally.

Subject: PAF3 LP Turbine contamination

Date: Friday, October 31, 2014 8:22:48 AM

Attachments: image001.png

Importance: High



PAF3 is taking a hit on the LP Turbine. Operating in the ammonia cycle and beyond the sodium break (0.075µS/cm) is detrimental to the LP Turbine, as well as the Steam Generator. This is precisely what caused the Turbine Failure of '07, which cost TVA \$70million in repairs, lost generation, and PRC. There should be absolutely NO Ammonia Form resin on this site – ever; I am aware of the practice of mixing the two forms of resin (ammonia and H-OH) having returned – which increased the ionic contaminant leakage by 100x.

<http://chapdotnet:8035/frmNarrativeLogs.aspx>

Please see to it that the ammonia form resin is discarded, and permanently prohibited from this site. Also, Operations must strictly adhere to operating limits on each Powdex (0.075µS/cm maximum Cation Conductivity).

I recognize that the supply of H-OH form resin has been depleted – again; contingency plans were to be in place to prevent such occurrences. Regardless, the ammonia form resin should not have been here, and any current stock should be discarded or destroyed.

Thank you,

Burt FitzHugh

Technical Services Analyst

Tennessee Valley Authority

Paradise Fossil Plant

[REDACTED]

[REDACTED]

PER SOS: MAINTAIN POWDEX LIMIT TO .085 UNTIL THE ARRIVAL OF THE RESIN AND THEN GO BACK TO THE .075 LIMIT.	30-OCT-2014	29-OCT-2014 12:21	[REDACTED]	Unit Operator
Rolled Forward				

Removed #5 powder from service to precoat with 2 green and 10 red per SOS due to very limited supply of green resin on hand, more green resin should be here by the end of the week.	16-DEC-2014	15-DEC-2014 20:41	[REDACTED]	Unit Operator
--	-------------	-------------------	------------	---------------

PER EMAIL FROM [REDACTED]

Here are general guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity becomes elevated.

1. If EI Cation Conductivity increases above 0.12 for 2 hours - isolate O2 (oxygenated treatment) injection.
2. If EI Cation Conductivity remains above 0.12 for 2 hours after O2 is isolated - shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve.
3. If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above contact Wayne Piper.

Call W. Piper if you have additional questions or concerns not addressed for further clarification.

[Rolled Forward]

Removed #5 powdex from service to precoat with 2 green and 10 red per SOS due to very limited supply of green resin on hand, more green resin should be here by the end of the week.

As is evident from the Unit Operator Log entries, the practice which pitted the LP Turbine in 2007 returned; **A second catastrophic failure has occurred;** it is evident that since October 2014, this practice has been in full effect.

With the Cation Conductivity limit increased beyond sodium break, $0.075\mu\text{S}/\text{cm}$, BFW contains contaminants untraceable by conductivity/resistivity measurement. Numerous facets of the present regimen defy scientific law, scientific method, and experience. As is documented, the mixture of SAC resins increase ionic leakage (contaminants) by 100 fold. Thus, the new "limit" is based upon the false assumption that the Powdex effluent is Ultrapure Water. The Powdex units were emitting approximately 3.5ppb chlorides into the condensate system at any given time.

CYCLE CHEMISTRY PARAMETERS FOR DI EFFLUENT REQUIRED FOR A SUPER CRITICAL OTSG ON OT CYCLE CHEMISTRY:

Cation Conductivity	$<0.075\mu\text{S}/\text{cm}$ at 25°C
Chloride	$< 0.5\text{ppb}$
Sulfate	$<0.5\text{ppb}$
Sodium	$<0.1\text{ppb}$
Silica	$<5\text{ppb}$

Graver Ecodex, according to Graver literature, can produce

Cation Conductivity	$<0.08\mu\text{S}/\text{cm}$
Chloride	$<1\text{ppb}$
Sodium	$<0.5\text{ppb}$
Silica	$<5\text{ppb}$

0.075 μ S/cm is the point at which the H-OH form resin converts to NH₄OH form. As the Cation Conductivity increases to 0.085 μ S/cm sodium, sulfate, chloride and silica leakage will significantly intensify. For UPW at 25°C and pH7, at 0.058 μ S/cm, cycle chloride leakage concentration is 1.6ppt, while at 0.075 μ S/cm, cycle chloride concentration is approximately 3ppb, and at 0.085 μ S/cm the cycle chloride concentration is approximately 5ppb, according to Dow / Rohm Haas. The ionic leakage in the ammonium cycle increases significantly over that of the hydrogen-hydroxide cycle. Therefore, the limits established for the Critical Process Indicators (CPIs) are founded upon sound scientific **fact**, and must be rigidly adhered to.

Concisely, as the H⁺ form SAC resin converts to the NH₄⁺ form, the SAC which has converted from the H⁺ form to the Na⁺ form will release the Na⁺ ion into solution as it converts to the NH₄⁺ form. The selectivity (equilibrium) coefficients for Na⁺ and NH₄⁺ demonstrate that the SAC resin has an affinity for the ammonium ion over the sodium ion. **Hence, the ammonium cycle *should never be permitted* in condensate polishing for OTSG.**

Note that since October 2014, SysEngrCWT has changed the acceptable Cation Conductivity limits of the Powdex effluent to 0.085 μ S/cm (5ppb Chloride), and presently 0.078 μ S/cm (3.6ppb Chloride). The limit for Chloride in OTSGs is 0.5ppb, corresponding to 0.063 μ S/cm (total deionizer effluent). Considering the manner in which PAF1 and PAF2 were operated, the first alarm arrives at 0.060 μ S/cm, at which time the Deep Bed performance is monitored closely. At 0.065 μ S/cm, preparations are made to exchange the bed, and between 0.070 μ S/cm and 0.075 μ S/cm, the bed is exchanged. Only one bed (33.33% of the total ion exchange system) is permitted to operate in exhausting conditions; PAF3 has been permitted to operate with all vessels in exhaustion according to UPW standards per SysEngrCWT's prescribed regimen.

In CATION CONDUCTIVITY MONITORING: A REALITY CHECK, 05/15/2008, David G. Daniels, M&M Engineering Associates Inc. notes:

"MOST TURBINE MANUFACTURERS CALL FOR THE CHLORIDE LEVEL IN THE STEAM TO BE BELOW 2 PPB UNDER NORMAL CONDITIONS. THE STEAM'S CHLORIDE CONCENTRATION WOULD HAVE TO RISE TO NEARLY 20 PPB BEFORE THE RESULTANT CATION CONDUCTIVITY WOULD EXCEED THE GENERALLY ACCEPTED NORMAL CATION CONDUCTIVITY LIMIT OF 0.2 μ S/CM. STEAM ENTERING A TURBINE WITH A 20-PPB CHLORIDE CONCENTRATION WOULD BE CONSIDERED GROSSLY CONTAMINATED".

To achieve and maintain UPW quality in the PAF3 system cycle, strict parameters must be acknowledged and adhered to. The parameters previously cited are derived from decades of scientific research and observation, operator experience, and failure analysis.

The premise of the failed cycle chemistry regimen is detailed in the following document place here in its entirety:

Paradise Station Unit 3

Demineralization Process Optimization (PAF3-CAP-8)

Problem Definition

Condensate is pumped from the condenser hotwell through the demineralization process to the feedwater heaters. The demineralization process is a Graver Powdex system. It is an original system and installed during initial construction. The system is intended to remove dissolved and suspended solids from the condensate before the condensate enters the feedwater heaters. As shown in Figure CAP-8-1, the system consists of five (5) steel tanks with retention elements that are normally coated with disposable powdered ion exchange resins. During normal operation, four (4) tanks are in service and one (1) tank is maintained as a spare.



Figure CAP-8-1. Paradise Station – Demineralization Process
Graver Powdex Tanks

The process to coat the retention elements within the tank starts with bags of ion exchange resin poured into a Powdex slurry tank. The precoat slurry is transferred by precoat pumps to a distribution header and into each demineralizer tank. A complete precoat process for the system requires 12 bags of resin.

- 1 -



Figure CAP-8-2. Paradise Station – Demineralization Precoat Process Ion Exchange Resin and Slurry Tank

This process requires a person to manually dump each bag of resin into the slurry tank (see Figure CAP-8-2). During a normal start-up of Unit 3, the tanks are precoat approximately 20 times to achieve the proper level of condensate demineralization. Therefore, approximately 240 bags of resin are manually dumped into the slurry tank during a normal start-up. This is a very time intensive process and start-up of the unit cannot proceed until the condensate reaches an acceptable water quality.

Evaluation

The current demineralization system is cumbersome. The start-up process is long, operator-intensive, and costly. There are more efficient processes available that could reduce start-up time and consumable costs while still protecting the steam cycle.

One demineralization process that is commonly used in industry is deep bed polishing. Deep bed polishing uses cation and/or anion resin beads to remove contaminants from the condensate.

Resin regeneration is often an automated process using a regeneration vessel. Paradise personnel have investigated this option and found the capital investment to be too high for their current budget. A life cycle cost analysis does not appear to have been performed that factors in start-up time savings.

Paradise is beginning to test a filming amine process on Unit 2. The plant hopes that if the test goes well, this technology could be used to protect the steam cycle on Unit 3 and remove the need to rely on condensate polishers. Filming amine treatment is an attractive option to the plant because it is less labor intensive than the existing Powdex system. A well defined test plan for Unit 2 is necessary to maximize the usefulness and applicability of the test to Unit 3. The test plan should consider the following:

- Monitoring locations – There should be a high level of instrumentation and sampling on the Unit 2 steam cycle during the test. The objective is to gather as much information about the test as possible. One key constituent to monitor in addition to the standard water quality parameters is iron to track the amount of corrosion occurring in the steam cycle before, during and after transition to the new treatment program. Monitoring locations for

- 2 -

iron should consider the potential sources such as the condenser, feedwater heaters, and the boiler.

- Test duration – The test should be long enough to predict how the system would behave for the next 20 years. This should encompass multiple start-ups and shutdowns that provides sufficient sampling to trend the data.
- Differences between Unit 2 and Unit 3 systems – Differences between Unit 2 and Unit 3 should be recognized and evaluated for influence on amine effectiveness. Example differences include current treatment program, system design, sub-critical vs. super-critical operation, number of start-ups and shutdowns, and unit turndown. Acknowledging these differences upfront will permit the test program to be modified to best understand their impact on the test results.

If the Unit 2 filming amine test run has positive results, Paradise could consider implementing this treatment program on Unit 3. Prior to making the decision to implement this process on Unit 3, a full review of the Unit 2

filming amine test program should be performed to ensure the treatment is compatible with Unit 3. In addition to reviewing the Unit 2 test program, the following issues should be evaluated:

- The impact of filming amines on the Powdex demineralization, Ammonia injection, and Oxygen injection processes.
- The transition of the Unit 3 steam cycle treatment from OT to filming amines.
- The process to remove iron and corrosion products from the condensate.
- The ability to maintain film integrity, which is jeopardized by oxygen and solids in the water.
- Long term protection of the steam cycle, including additional treatment systems required to operate with filming amines.

If the filming amine evaluation and Unit 2 program review raise no concerns about implementing this treatment on Unit 3, then the plant should implement the filming amine treatment for Unit 3.

If a filming amine program is not a feasible solution to the Unit 3 cycle chemistry challenges, then the plant should consider replacing the Powdex System with deep bed polishers, if economically feasible. This will reduce the following concerns:

- The annual cost of chemicals (precoat resin),
- Unit 3 start-up time,
- The risk of human error, and

- The manual burden on plant personnel.

- 3 -

If neither filming amines nor deep bed polishers are a feasible solution, the plant can continue to operate the Powdex system. It is expected that this system could operate for the next 20 years as long as preventative maintenance activities are performed as recommended by the vendor.

The premise of the above document is greatly flawed, as the Powdex system is **proven** incapable of producing and maintaining proper condensate for OTSG on OT Cycle Chemistry regimen by industry data and guidelines, as well as Plant data and experience. Complicating matters is that the Powdex has been operated in a manner prescribed such that pitting of the LP-B Turbine was **accelerated**. A few examples of the erroneous regimen is illustrated in the instructions given to Operations personnel, and the resultant behaviour of the Powdex system.

10/29/2014 12:21	PER SOS: MAINTAIN POWDEX LIMIT TO .085 UNTIL THE ARRIVAL OF THE RESIN AND THEN GO BACK TO THE .078 LIMIT. [REDACTED] Unit Operator]
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12/09/2014 15:40	PER SOS [REDACTED] POWDEX LIMIT STILL .078. PRECOAT WITH 10 GREEN FOLLOWED BY 2 RED IF ECONOMIZER INLET CAT REACHES .100 CONTINUOUSLY FOR OVER 6 HOURS NOTIFY SOS IF ECONOMIZER INLET CAT REACHES .120 NOTIFY SOS [REDACTED] Unit Operator]
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12/09/2014 17:47	<p>PER EMAIL FROM [REDACTED]</p> <p>Here are general guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity becomes elevated.</p> <ol style="list-style-type: none">1. If EI Cation Conductivity increases above 0.12 for 2 hours - isolate O2 (oxygenated treatment) injection.2. If EI Cation Conductivity remains above 0.12 for 2 hours after O2 is isolated - shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve.3. If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above contact Wayne Piper. <p>Call [REDACTED] if you have additional questions or concerns not addressed for further clarification. [REDACTED] Unit Operator]</p>
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PER SOS [REDACTED] POWDEX LIMIT STILL .078. PRECOAT WITH 10 GREEN FOLLOWED BY 2 RED IF ECONOMIZER INLET CAT REACHES .100 CONTINUOUSLY FOR OVER 6 HOURS NOTIFY SOS IF ECONOMIZER INLET CAT REACHES .120 NOTIFY SOS ***[Rolled Forward]***	25-DEC-2014	09-DEC-2014 15:40	[REDACTED]	Unit Operator
PER EMAIL FROM W. PIPER Here are general guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity becomes elevated. 1. If EI Cation Conductivity increases above 0.12 for 2 hours - isolate O2 (oxygenated treatment) injection. 2. If EI Cation Conductivity remains above 0.12 for 2 hours after O2 is isolated - shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve. 3. If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above contact Wayne Piper. Call W. Piper if you have additional questions or concerns not addressed for further clarification. ***[Rolled Forward]***	25-DEC-2014	09-DEC-2014 17:47	[REDACTED]	Unit Operator

Unit 3 Log		Thursday, January 1, 2015	Day Shift
Entry Time	Entry	Type	
	POWDEX: PRECOAT AT .078 WITH 10 GREEN FOLLOWED BY 2 RED IF EI CAT CONDUCTIVITY INCREASES ABOVE .12 FOR 2 HOURS, ISOLATED O2 INJECTION. IF EI CAT CONDUCTIVITY REMAINS ABOVE .12 FOR 2 HOURS, SHUT DOWN ANODAMINE PUMP AND ISOLATE TOTE VALVE IF EI CAT CONDUCTIVITY REMAINS ABOVE .12 CONTACT W. PIPER SCWP'S 2 AND 3 SAFE STOPPED, RCW ISOLATED AND		

06/07/2015 08:45

EMAIL FROM [REDACTED]

I adjusted the anodamine feed rate up from 30 ml/min to 40 ml/min. April and Jeremy are here on day shift for U1 startup so they are going to keep an eye on it today. Our anodamine instrumentation in U3 lab is now in service although I don't believe all of the values [REDACTED] are going to try to get the flows regulated and [REDACTED] will be in on evening shift to determine if calibration is necessary.

The O2 remains isolated and we will reevaluate that tomorrow.

Ammonia Feed - we will probably have to back down on the ammonia pumps to a lower feed rate as we increase the anodamine feed. Unit Operator has been notified [REDACTED], Unit Operator]

06/05/2015 13:00	<p>PER EMAIL FROM [REDACTED]</p> <p>PAF Unit 3 POWDEX RESIN MANAGEMENT:</p> <p>1.Startup Resin Requirements All RED</p> <p>2.Stable Water Chemistry/Anodamine Feed Resin Requirements 10 bags of GREEN Capped with 2 bags of RED</p> <p>While feeding anodamine we will be using 10 bags of Green capped with 2 bags of Red for all Powdexes. It takes about an hour and 10 minutes to perform a proper precoat following the procedure. Please follow the procedure to ensure a good precoat.</p> <p>General Guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity becomes elevated:</p> <p>1.If EI Cation Conductivity increases above 0.12 for 2 hours - isolate O2 (oxygenated treatment) injection. Notify Wayne Piper.</p> <p>2.If EI Cation Conductivity remains above 0.12 for 2 hours after O2 is isolated - shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve.</p> <p>3.If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above contact Wayne Piper.</p> <p>NOTE: Should PAF U3 come off for any reason the anodamine should be isolated and precoat using all RED resin will be required for startup.([REDACTED] Unit Operator)</p>
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02/12/2015 01:43	<p>TALKED TO SOS ABOUT ECON CATION CONDUCTIVITY HAS BEEN OVER THE .12 MARK FOR ALMOST 2 HRS GOES UP A LITTLE THEN BACK DOWN TO .122</p> <p>AT 2 HRS WILL ISOLATED O2 INJECTION AND MONITOR TO SEE IF COMES DOWN ANY FOR NEXT 2 HRA THEN NOTIFY SOS WHO WILL CONTACT [REDACTED]</p> <p>2/11/15 AT 2301 WAS .120; AT 2322 WENT BACK TO.117</p> <p>2/11/15 AT 2358 WAS AT .120 AGAIN AND NEVER WENT DOWN</p> <p>[REDACTED] Unit Operator]</p>
02/12/2015 02:05	<p>O2 INJECTION ISOALTED- WILL MONITOR FOR 2 HRS TO SEE IF ECON CONDUCTIVITY CHANGES</p> <p>[REDACTED], Unit Operator]</p>
02/12/2015 04:08	<p>PER WAYNE PIPERS EMAIL IF ECON COND STAYS ABOVE .120 FOR 2 HRS AFTER ISOLATING O2 INJECTION TO REMOVE ANODAMINE FROM SERVICE BUT WE HAVE BEEN STAYING AT .120 SINCE WE ISOALTED O2 2 HRS AGO</p> <p>DUSCUSSED WITH SOS- AGREED SINCE NOT ABOVE NOT TO REMOVE SYSTEM; WAYNE HAD BEEN ADJUSTING ANODAMINE WHEN UNIT WAS A T LOWER LOADS AND MAY ALSO HAVE NEED TO BE RE ADJUSTED. SOS TO EMAIL WAYNE TP LOOK AT TODAY</p> <p>[REDACTED] Unit Operator]</p>
02/12/2015 14:51	<p>PER [REDACTED] DO NOT LINE O2 INJECTION BACK UP PERIOD.[REDACTED] MISC]</p>

Per [REDACTED] since we are out of green resin continue to precoat with 12 red and control the PH with the ammonia pump by monitoring the economizer specific.	18-DEC-2014	16-DEC-2014 15:42	[REDACTED]	Unit Operator
[Rolled Forward]				
Removed #5 powder from service to precoat with 2 green and 10 red per SOS due to very limited supply of green resin on hand, more green resin should be here by the end of the week.	16-DEC-2014	15-DEC-2014 20:41	[REDACTED]	Unit Operator
Per water chemistry experts, they are conducting testing with the anodamine flow to increase the economizer cation conductivity, not to be alarmed and quick to adjust if it increases per the [REDACTED] guidelines, give it some time to see how it reacts before making adjustments. [This Entry Copied From Unit 3 Log - Midnight Shift - 01/04/2015 by F [REDACTED] Unit Operator]	06-JAN-2015	03-JAN-2015 19:36	[REDACTED]	Unit Operator
[Rolled Forward]				

Acknowledged dashboard request to increase load to D-MAX 1000MWS.	25-DEC-2014	25-DEC-2014 06:28	[REDACTED]	Unit Operator
Increased bus voltage to bring the generator out of alarm on 2 phases.	25-DEC-2014	25-DEC-2014 06:39	[REDACTED]	Unit Operator
BUS VOLTAGE IS 522 KV AT 35 MVAR. COMPLETED PERIODIC WALKDOWN SHEET.	25-DEC-2014	25-DEC-2014 07:00	[REDACTED]	Unit Operator
Removed #5 powdex from service to precoat with 10 green 2 red.	25-DEC-2014	25-DEC-2014 07:58	[REDACTED]	Unit Operator
BUS VOLTAGE IS 521 KV AT 47 MVAR. COMPLETED PERIODIC WALKDOWN SHEET.	25-DEC-2014	25-DEC-2014 08:00	[REDACTED]	Unit Operator
Acknowledged dashboard request to decrease load to min 800MWS.	25-DEC-2014	25-DEC-2014 08:25	[REDACTED]	Unit Operator
BUS VOLTAGE IS 524 KV AT 17 MVAR. COMPLETED PERIODIC WALKDOWN SHEET.	25-DEC-2014	25-DEC-2014 09:00	[REDACTED]	Unit Operator
Decreased bus voltage slightly as we were at the top of our voltage schedule, now at 524KV and 6MVAR.	25-DEC-2014	25-DEC-2014 09:20	[REDACTED]	Unit Operator
Acknowledged dashboard request to decrease load to E MIN 700MWS.	25-DEC-2014	25-DEC-2014 09:38	[REDACTED]	Unit Operator
Per SOS drop to 750MWS and hold until system has us drop again to 700, trying to	25-DEC-2014	25-DEC-2014 09:41	[REDACTED]	Unit Operator

#2 POWDEX VESSEL STILL HOLDING AT .078. NEVER HAS RINSED DOWN. WAITING FOR CATION CONDUCTIVITY TO INCREASE ABOVE .078 PRIOR TO PRECOATING AGAIN. WILL WRITE SR TO HAVE THE VESSEL BENCH CHECKED AND THE TITRATION ROOM EQUIPMENT CHECKED. [This Entry Copied From Unit 3 Log - Day Shift - 12/27/2014 by [REDACTED], Unit Operator] [This Entry Copied From Unit 3 Condenser Room AUO Log - Day Shift - 12/27/2014 by [REDACTED], MISC]	28-DEC-2014	27-DEC-2014 10:46	[REDACTED]	Unit Operator
[Rolled Forward] E Section #1 Hopper Valve is only opening 2"-3" without assistance. Found wire in hopper and pulled out, hopper is still not opening as it should - will attempt to grease before generating SR.				
SR 971324-REPAIR U3 PRECIPITATOR HOPPER E1 DIAPHRAGM OPERATED VALVE. [This Entry Copied From Unit 3 Control Room AUO 3-2 - Day shift - 12/27/2014 by [REDACTED], MISC] [This Entry Copied From Unit 3 Control Room AUO 3-2 - Midnight Shift - 12/28/2014 by [REDACTED], U3 Cont Rm AUO 3-2]	28-DEC-2014	27-DEC-2014 13:45	[REDACTED]	U3 Cont Rm AUO 3-2
[Rolled Forward] SR 971302 BENCHCHECK AND VERIFY CONDUCTIVITY READING ON #2 POWDEX VESSEL [This Entry Copied From Unit 3 Condenser Room AUO Log - Day Shift - 12/27/2014 by [REDACTED], MISC]	28-DEC-2014	27-DEC-2014 14:28	[REDACTED]	MISC
[Rolled Forward]				

July 1, 2015

TVA Paradise Fossil Plant - Anodamine Treatment

PAF Unit 3 POWDEX RESIN MANAGEMENT:

1. Startup Resin Requirements

All RED

2. Normal Operation w/NO Anodamine Feed

All RED

3. Stable Water Chemistry w/Anodamine Feed

10 bags of GREEN

2 bags of RED on top

While feeding anodamine we will be using 10 bags of Green with 2 bags of Red on top for all Powdaxes. It takes about an hour and 10 minutes to perform a proper precoat as outlined in the procedure. Please follow the procedure to ensure good precoats.

General Guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity becomes elevated

1. If EI Cation Conductivity increases above 0.12 for 2 hours – AUO to isolate O2 (oxygenated treatment) injection. Notify Wayne Piper via email.
2. If EI Cation Conductivity remains above 0.12 for 2 hours **after** O2 is isolated – AUO to shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve. Notify Wayne Piper via email.
3. If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above notify Wayne Piper (270) 977-5141, cell.

NOTE: Should PAF U3 come off-line for any reason, the anodamine feed should be isolated and precoats using all RED resin will be required for startup. The exception for switching to all red resin would be a hot restart or quick turnaround.

Operational Guidance

1. Only Engineering is authorized to place the anodamine pump in service.
2. The 10 Green with 2 Red on top resin precoat formula is to be maintained throughout normal operation while feeding anodamine. When it becomes necessary to discontinue anodamine feed due to water chemistry exceedances, the 10/2 precoat should be maintained for short periods of time (at night during load drops, over the weekend at low load conditions, etc.).
3. When anodamine feed is discontinued for longer prescribed periods of time, red only should be used for powdex precoat.
4. It is important to maintain pH at the Economizer Inlet at or near the 8.8 target. Economizer Inlet Specific Conductivity is used by the unit operator to regulate pH and as the Economizer Inlet Specific Conductivity increases, powdex resin precoat is required more frequently. Maintaining the EI Specific around 0.6 to 0.65 at near full load conditions results in a EI pH of approximately 8.6 while at the same time not significantly impacting the time between required precoat.

We may make minor operational exceptions along the way based on an evaluation of the overall water chemistry and unit conditions.

Contact me any time with questions.


[REDACTED]

TVA Paradise Fossil Plant

13246 State Route 176

Drakesboro, KY 42337

PAF-1A-DRK

 **Office (270) 476-** [REDACTED]

 **Cell (** [REDACTED]

[REDACTED]

November 10, 2015

TVA Paradise Fossil Plant - Unit 3

Anodamine Treatment and Powdex Resin Management

PAF Unit 3 POWDEX RESIN MANAGEMENT:

Startup Resin Requirements

All RED - until a cation conductivity of 0.10 or less is achieved at the DIO and EI. At that point switch to:

10 bags of GREEN

2 bags of RED on top

Normal Operation with or without Anodamine Feed

10 bags of GREEN

2 bags of RED on top

Known Condenser Tube Leak

All RED

It takes about an hour and 10 minutes to perform a proper precoat as outlined in the precoat procedure. Please follow the procedure to ensure good precoat.

General Guidelines for feeding Anodamine into PAF U3 should Econ Inlet Cation Conductivity become elevated

If EI Cation Conductivity increases above 0.12 for 2 hours – AUO to isolate O2 (oxygenated treatment) injection. Notify [REDACTED].

If EI Cation Conductivity remains above 0.12 for 2 hours after O2 is isolated – AUO to shut Anodamine pump (beside U3 Powdex station) off and isolate tote valve. Notify [REDACTED].

If EI Cation Conductivity remains above 0.12 after actions 1 and 2 above notify [REDACTED] [REDACTED], cell.

NOTE: Should PAF U3 come off-line for any reason, the anodamine feed rate should be reduced from 2.7 (60 ml/min) to 1.5 (28 ml/min) while water is circulated for boiler cool down. This feed rate should also be maintained any time the unit is off-line but water is moving through the boiler (hydros, condenser flooding, etc.). All precoat while the unit is off-line should be made using all red resin. The exception for switching to all red resin would be a hot restart or quick turnaround.

Operational Guidance

It is important to maintain pH at the Economizer Inlet at or near the 8.8 target. Economizer Inlet Specific Conductivity is used by the unit operator to regulate pH and as the Economizer Inlet Specific Conductivity increases, powdex resin precoat are required more frequently. Maintaining the EI Specific around 0.6 to 0.65 at near full load conditions results in a EI pH of approximately 8.6 while at the same time not significantly impacting the time between required precoat.

We may make minor operational exceptions along the way based on an evaluation of the overall water chemistry and unit conditions.

Contact me any time with questions.

[REDACTED]

TVA Paradise Fossil Plant

13246 State Route 176

Drakesboro, KY 42337

PAF-1A-DRK

☎Office [REDACTED] ☎Cell [REDACTED]

☎[REDACTED]@tva.gov

The Graver Powdex system is **not** suitable for OT cycle chemistry in OTSG, as the criteria used by **Graver** in determining applications for the system demonstrates. Graver Water Systems, Inc. publication “**Half A Century of Condensate Polishing**” by Eli Salem and Terrance LaTerra, confirms that the Powdex system is not capable of meeting and sustaining UPW water quality. Emphasised in their literature is the Powdexes’ filtration and crud removal ability, not ion exchange capability. While useful following chemical cleaning, it is of scarce value during normal operation with properly implemented OT cycle chemistry, iron transport being considerably reduced in OT chemistry application. Paramount is deionization capability, which the Powdex system lacks. For Supercritical plants employing OT cycle chemistry, **Graver** reports :

1:1 SAC / SBA	Ecodex
<0.09µmho/cm	<0.08µmho/cm
<0.5ppb sodium	<0.5ppb sodium
<5ppb silica	<5ppb silica
< 1ppb chloride	<1ppb chloride

50 day operating run	< 0.1ppb iron
	60 day operating run

Note the observation from 27 December 2014 10:46:



The presence of ammonia in the effluent of the condensate polisher, chlorides, and sulfates, contribute to the inability to obtain 0.056µS/cm. **It is electro-chemically impossible to achieve UPW with ammonia in the polisher effluent.**

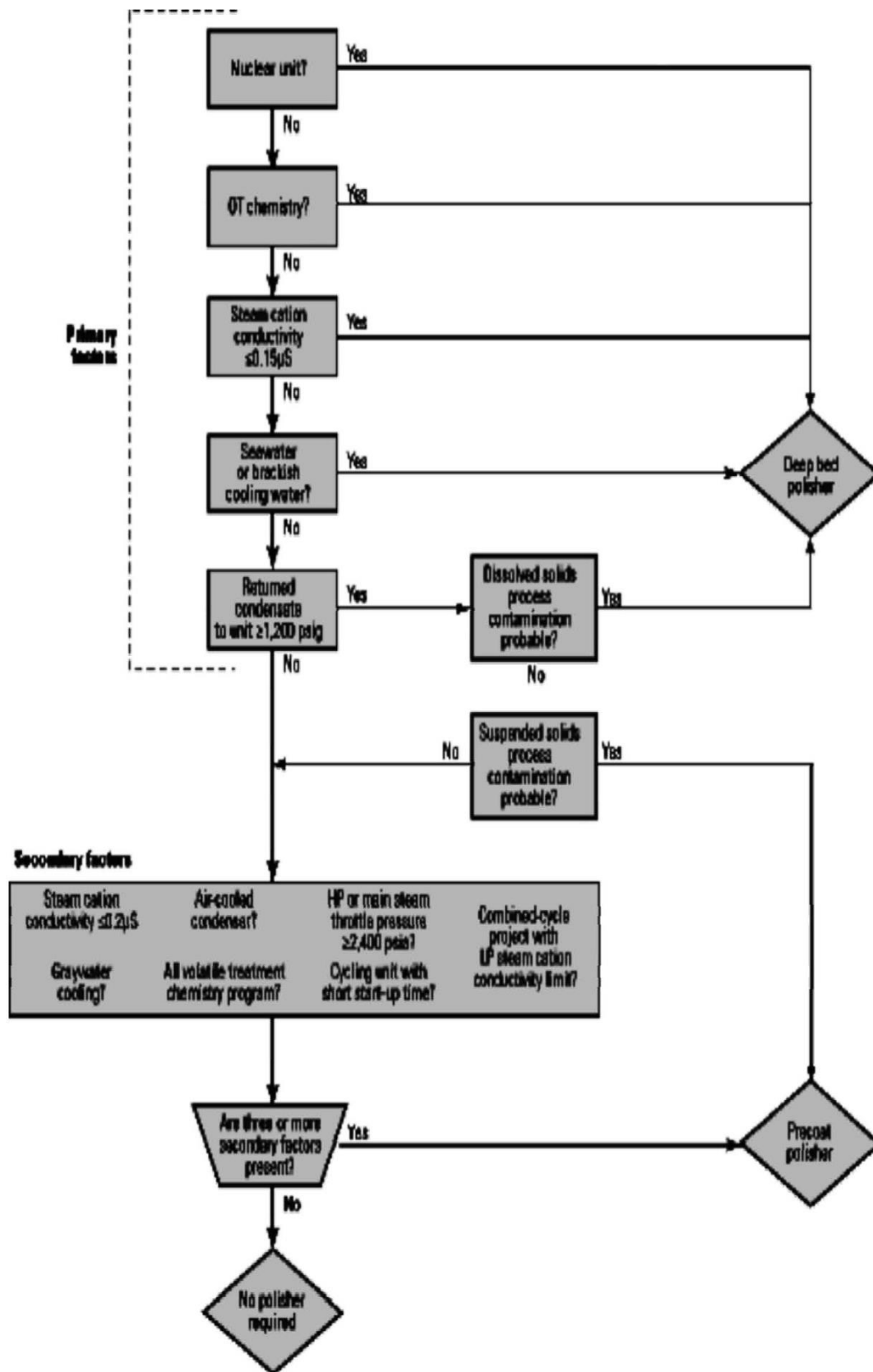
In each case described by Graver, one or more parameters exceeds OTSG cycle chemistry requirements. The process selection conditions that favor precoat filter demineralizers, according to the publication, “**Condensate Polishing For Nuclear And Super Critical Power Plants For The 21st Century**”, by Al Taveres, Graver Technologies, LLC, Glasgow, Delaware, and Robert A. Applegate, Graver Water Systems, LLC, Cranford, New Jersey, are:

- Need for frequent start ups and restarts (precoat filters provide superior crud removal and offer the most cost efficient means for controlling corrosion transport)
- Need for rapid start up
- Need to minimize pressure drop requirements for condensate polishing
- Low TDS cooling water
- Operating policy of orderly shutdown and repair in the event of a condenser leak
- High temperature condensate as typically seen in air cooled condenser plants
- Need to minimize costs including equipment, installation, and operating costs.
- Titanium condensers, with welded tube sheets.
- Limited operator availability and training (regeneration of deep beds is a complex regeneration sequence and involves the use of strong acid and base)
- Desire to avoid handling and neutralizing large quantities of acid and base

- Limited space availability. The footprint of a precoat demineralizer can be as much as 50% of a deep bed installation.

The Graver criterion demonstrates that the Powdex System is inept to the application requirements of Paradise Unit 3. A typical precoat requires 1.5 hours, and the PAF3 system requires 4 units to be in service during start up conditions, rapid start ups are not achievable, in comparison to deep bed deionizers which are rinsed to specifications in the same amount of time required for 1 precoat. Frequent start ups result in additional precoat over normal operating conditions, as the limited capacity renders the powdered resin filters exhausted rapidly. Powdered resin deionizers/filters require that the station remove equipment from service immediately in the event of a condenser tube leak. PAF condensate temperature is not as high as with air-cooled condensers, thus the purported temperature advantage is of no moment. Powdex systems offer higher operating (and maintenance) costs at PAF than do deep-bed polishers. The system requires a greater number of valves, requires pumps, and filter elements which are to be replaced per every 100 precoat applications. PAF has no Titanium condensers. PAF does not regenerate resin on site. PAF has adequate space for deep-bed polishers on the 380 elevation of PAF3. Thus, by Graver's criteria, a Powdex System is not designed for the system cycle requirements of Paradise Unit 3.

The Condensate Polisher selection tree provided by Bechtel Power Corporation confirms that the Powdex system is inappropriate for the application requirements of Paradise Unit 3, and that a Deep-Bed system is required to meet the cycle chemistry demands of this Unit.



Consider this conclusion again: *“If neither filming amines nor deep bed polishers are a feasible solution, the plant can continue to operate the Powdex system. It is expected that this system could operate for the next 20 years as long as preventative maintenance activities are performed as recommended by the vendor.”* As exhibited, neither possesses the ability to protect the LP Turbine. **Anodamine is not purposed to protect the LP Turbine.**

Further, the system cannot operate for 20 years without damage to the LP Turbine unless the unit is removed from service during excursions resulting from Condenser Tube Leaks, air inleakage, etc, and that each vessel is precoated before reaching 0.075µS/cm regardless of cost. Typical operation in H-OH form will produce 0.056µS/cm effluent, which is sustainable for a mere few days before the 0.075µS/cm exhaustion point is reached. Preventative Maintenance measures have failed to alleviate the design insufficiencies of the Powdex system.

2017 LPB DAMAGE

DAMAGE REPORTED FROM THE NDE CHECKLIST

8 G/E Admission Side L/H - FOD and Pitting areas

9 T/E Discharge Side L/H - Light pitting and FOD on blades

9 G/E Admission Side L/H - Light FOD Blades 23--29, 33---40 & 8

*7 G/E Admission Side L/H -Light pitting and FOD blades

*7 T/E Discharge Side L/H - Light pitting and FOD blades

*6 G/E Admission Side L/H - Light pitting and FOD blades

6 T/E Discharge Side L/H - Light pitting and FOD blades

*5 G/E Admission Side L/H - Light pitting and FOD blades

5 T/E Discharge Side L/H - Light pitting and FOD blades

*Indicates pitted areas identical to 2007 NDE report

The damage is two-fold: FOD is the result of operation of the Powdex system beyond sodium breakthrough ($0.075\mu\text{S}/\text{cm}$) resulting in excessive production of hematite on the BFW piping and boiler tube IDs. Pitting is the result of operation of the Powdex system beyond sodium breakthrough ($0.075\mu\text{S}/\text{cm}$) resulting in excessive Chlorides in the Condensate and BFW streams.

OT CYCLE CHEMISTRY MECHANISM

Inner layer Magnetite formation: $3\text{Fe}^{2+} + 1/2\text{O}_2 + 3\text{H}_2\text{O} = \text{Fe}_3\text{O}_4 + 6\text{H}^+$

Cover layer formation:

Hematite $2\text{Fe}_3\text{O}_4 + \text{H}_2\text{O} = 3\text{Fe}_2\text{O}_3 + 2\text{H}^+ + 2\text{e}^-$

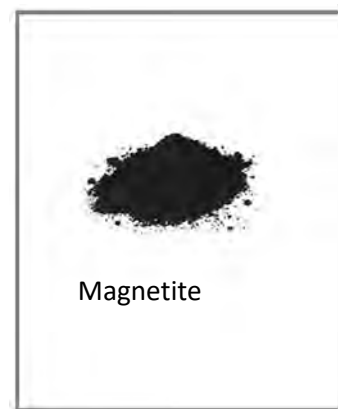
and Ferric Oxide Hydrate $\text{Fe}_3\text{O}_4 + 2\text{H}_2\text{O} = 3\text{FeOOH} + \text{H}^+ + 2\text{e}^-$

Magnetite is the innermost layer. Fe^{2+} ions passivate to the surface of the metal. Combining with water and injected oxygen, magnetite is formed. Magnetite will continue to transport; combining with water, two magnetite molecules form hematite. Hematite is corrosive to metals, however is not in contact with metal surface, as magnetite prevents this occurrence. Magnetite at the surface combines with two water molecules to form three ferric oxide hydrate molecules.

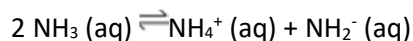
Simplistically viewing the cycle, ultrapure water is conditioned with ammonia and oxygen in controlled concentrations with predetermined ranges. Magnetite formation as described in the Schikorr equation



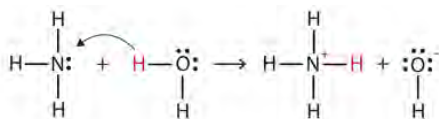
demonstrates the transport of iron from the surface metal, and the formation of an oxide. Note that the addition of ammonia provides OH^- ions to solution, just as with AVT cycle chemistry. Magnetite will continue to transport indefinitely under these conditions until chemical (acid) cleaning is necessary, should the cycle operate according to AVT parameters. However, with OT cycle chemistry specifications, the lower pH equates to lower OH^- concentrations, and consequently reduced magnetite formation. Yet, magnetite will continue to form, as will hematite.



Ammonia self-dissociates, as does water



Therefore, it readily dissolves in water



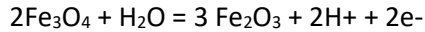
Note the dissociation of the OH^- ion. For every three Fe^+ ions, two OH^- ions bond to form three $\text{Fe}(\text{OH})_2$, which equates to $\text{Fe}_3\text{O}_4 + \text{H}_2 + 2\text{H}_2\text{O}$. The H_2 will bond with O^- to form water. Fe_3O_4 will react with two molecules of H_2O to form three ferric oxide hydrate molecules (FeOOH), giving off one H^+ ion and two electrons. These will quickly bond with other ions. Additionally, hematite is formed when magnetite combines with water $2\text{Fe}_3\text{O}_4 + \text{H}_2\text{O} = 3 \text{Fe}_2\text{O}_3$ giving off two H^+ ions and two electrons.

The result of these reactions is a multi-layer passivation of iron, forming a protective oxide coating on the surface of the boiler tubes. **The ferric oxide hydrate fills the pores of the magnetite layer, inhibiting further iron transport, which in turn provides a two-fold protection from hematite and from excessive magnetite growth.** When operated properly, chemical cleaning of boiler tube IDs can be avoided for decades.

Dissolved salts will react with the process of iron transport in such a manner as to prohibit its normal function. The multi-layer oxide coating formed under OT cycle chemistry will not occur. Further, upsets in feedwater chemistry will adversely affect the oxide coating once formed. It is therefore **paramount** that cycle chemistry parameters for Condensate and Feedwater circuits be correctly established and diligently maintained. This includes but is not limited to the proper selection, use, and maintenance of analytical methods and devices.

EXCESSIVE HEMATITE FORMATION AND TRANSPORT

Hematite formation on the boiler tube steel is according to the following equation:



hematite is also formed when magnetite combines with water:

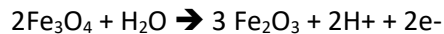


Dissolved salts reaction with iron transport process:

Chlorides released from exhausted Powdex vessels ($>0.075\mu\text{S}/\text{cm} = >3\text{ppb Cl}^-$) dissolve Magnetite, producing ferrous (Fe^{2+}) and ferric (Fe^{3+}) chlorides



These acids attack the boiler tube steel, resulting in pitting. The bare steel combines with water and oxygen forming Hematite



The continuous growth of the hematite layer dissolves in water, and is deposited through out the boiler and Turbines. This is why all BFW components in PAF3 are coated with hematite.

Hematite particles entering the Turbines erodes the turbine blade steel, as exhibited in both the 2007 and 2017 LPB failures.

TURBINE PITTING

Contaminant solubility decreases as steam expands through the turbine., and condense onto surfaces at solution concentrations greater than the contaminant concentration in the Economizer Inlet steam.

Where the liquid film forms at 1% moisture, the chloride concentration can be 100x higher than that measured in the BFW. Chloride induced pitting of turbine steel is normally found in blades, rotors, bucket, and discs. Hydrochloric acid forms from Cl^- leakage from condensate polishers, or ammonium chloride when polishers are operated in the ammonia cycle (above $0.075\mu\text{S}/\text{cm}$, or when ammonium form [green] resin is employed. Note that ferric chlorides can form from BFW system steel, and carry over into the turbine, as well. The volatility of ammonium chloride is such that the contaminant is transported with steam into the turbine where it hydrolyzes, forming NH_3 gas and HCl . With the expansion of superheated steam, the concentration of impurities exceeds their solubility, resulting in deposition via evaporation on hot Turbine blade surfaces. Once the acidic contaminant contacts the surface of the turbine blade, passivation of the turbine steel ensues forming a pit.

The mechanism for corrosion induced pitting of turbine steel in the salt/wet zones of the LP turbine is the passivation of steel due to the anodic effect of the higher concentration of Cl^- (producing a lower pH at the site), thus producing ferric chlorides. While magnetite and hematite can form in the pits and subsequent crevices, the anodic charge is found to remain in the pits and crevices formed in the turbine steel. Consequently, the pits do not remain localized, but increase to form crevices and cracks in turbine blades.

CONDENSATE POLISHING SYSTEM

OVERVIEW

The apparatus utilized for the demineralization of condensate is a powdered precoat filter, commonly referred to as a Powdex System. The system is original equipment installed circa 1970. The design called for 5 vessels, with 4 in service and one on stand-by. Each vessel is precoated with twelve 30lb bags of precoat resin mix, which contains 10% cellulose fiber, 40% Strong Acid Cation (SAC) resin, and 50% Strong Base Anion (SBA) resin. The resin is dry granular type (200mesh), and is poured into a mixing tank, mixed, and then pumped onto the filter elements of each vessel. A holding pump retains the precoat on the vessel in stand-by configuration. The system was designed for AVT, and thus the operating run lengths and capacities were suitable for that application. Acid conductivity limits were not stringent. Evaporator makeup acid conductivity was normally around $1.0\mu\text{mho}$. DI acid conductivity was around $0.5\mu\text{mho}$. Cycle pH was around 9.3. The Powdex units could run for up to 14 days without a precoat. It is not beyond imagination that operating at a DI acid conductivity of $0.055\mu\text{S/cm}$ would render operating run lengths significantly less than with AVT.



Powdex Pulverized Resin
Product

Contrast this capacity with PAF1 and 2, in which each DI vessel contains 280ft³ of ion exchange resin, and in spite of additional ammonia loading, the vessels average 65 day service cycles.

CONDENSATE POLISHER
Effluent, Each bed

Cation Conductivity	µS/cm 0.055 - 0.075
Sodium	ppb <0.5
Chlorides	ppb <0.5
Sulfates	ppb<0.5
Silica	ppb<5ppb
Deaerator Inlet Dissolved Oxygen	ppb <20
Deaerator Outlet Dissolved oxygen	ppb <5
pH	7.0 to 7.5

Economizer

pH	8.0- 8.5	Target 8.3
Specific Conductivity	uS/cm 0.70 - 0.85	
Cation Conductivity	uS/cm <0.10 without contaminant ions	
Dissolved oxygen	ppb 30-150 (consistent with pH)	70-90ppb
Sodium	ppb <0.1	
Silica	ppb <5	
Iron	ppb <1	Target <0.5
Chlorides	ppb <0.5	
Sulfates	ppb <0.5	

ION EXCHANGE SCIENCE DEFINED

Ion exchange is defined as the reversible interchange of ions between a solid (ion exchange resin) and a liquid (condensate) in which there is no permanent change in the structure of the solid. The Condensate polisher is the heart of the cycle chemistry regimen; should the Condensate Polisher performance fail in any capacity for any reason, the entire cycle chemistry regimen fails. Whether AVT(O), AVT(R), or OT, the quality of Condensate Polisher effluent is paramount; all other chemical regimens are secondary.

ION EXCHANGE REACTIONS

STRONG ACID CATION HYDROGEN FORM

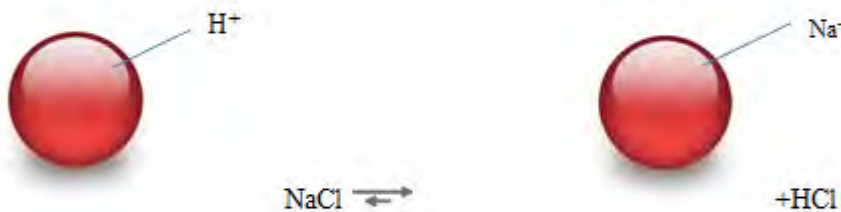
Strong Acid Cation resin in **hydrogen** form H^+ ($R-SO_3^-H^+$, abbreviated here as R-H), exchanges for all cations from solution:



or



The reaction can also be illustrated as



SAC in H^+ form exchanges the H^+ ion for the Na^+ ion. The dissolved salt, $NaCl$, is split by the reaction, and the product in solution of the exchange is HCl (Hydrochloric acid).

STRONG BASE ANION HYDROXIDE FORM

SBA in the hydroxide form OH^- ($\text{R-CH}_2\text{N}(\text{CH}_3)_3^+\text{OH}^-$), abbreviated here as R-OH, removes all anions from solution:



This reaction can also be illustrated as

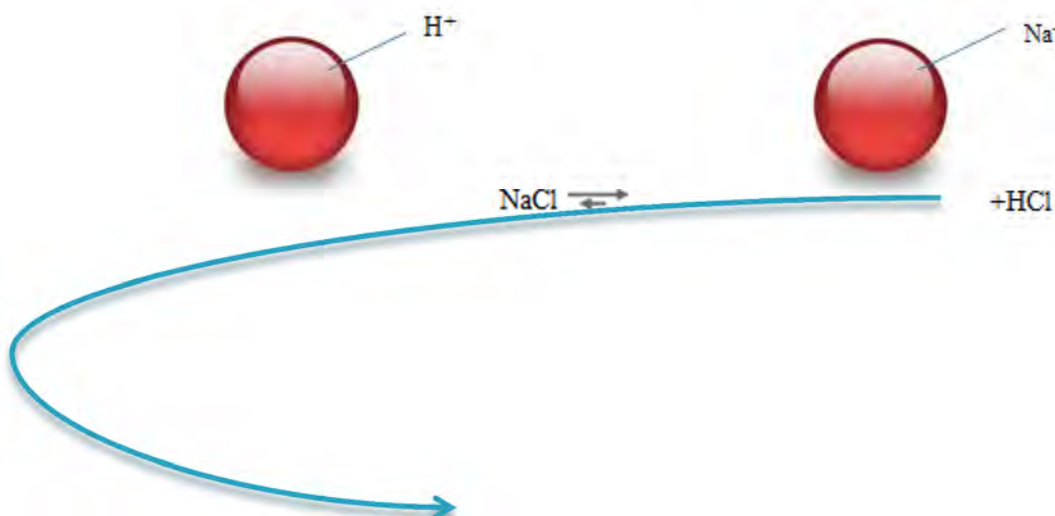


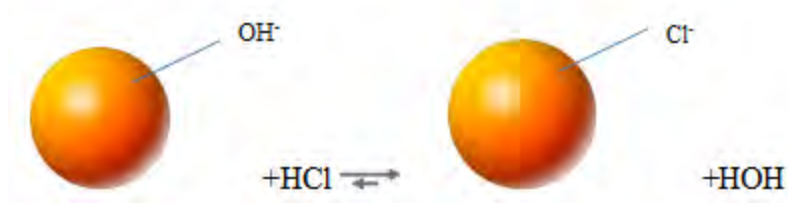
SBA Hydroxide Form exchanges the OH^- ions for Cl^- ions. The dissolved salt, NaCl, is split by the reaction, and the product in solution of the exchange is NaOH, or Sodium Hydroxide (Caustic Soda).

As stated above, the Ion Exchange systems, whether Deep Bed or Powdex, in Condensate Polishing Systems for OTSG on OT are universally Mixed Bed resins. The process is a two-step reaction, which may be written as follows:



Or illustrated as





The product of SAC Hydrogen Form resin and SBA Hydroxide Form resin is **WATER**.

Many Power Plant chemists and managers have been led to believe that the product of Hydrogen Form Mixed Bed resin is acidic, and mistakenly neglect the **Strong Base Anion** exchange resin in the Deep Beds or Powdex Vessels. Therefore, attempts are made to neutralize an acid ***which does not exist*** in solution; the result is a cycle chemistry regimen which is actually corrosive to the Boiler and Turbine systems. Therefore, if we make the same mistakes, we will reap the same results: boiler and turbine system failures.

Ion Exchange Resin functions according to the following equation:

SAC Resin H⁺ Form PLUS SBA Resin OH⁻ Form yields WATER

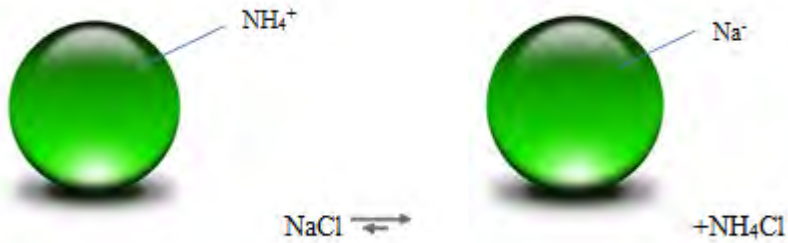


STRONG ACID CATION AMMONIUM FORM

Strong Acid Cation resin in **ammonium** form H⁺ (R-SO₃-NH₄⁺, abbreviated here as R-NH₄), exchanges for all cations from solution:



The reaction can be illustrated as



The SBA component remains the same, Hydroxide form. The product of the SAC reaction is ammonium chloride, which is a salt. However, should we stop here as some do with the SAC in Hydrogen form, an acid would still enter the steam generator circuits. Again, *failing to understand the SBA component of the resin mixture leads to corrosive chemistry regimens*, resulting in catastrophic damage to boiler tubes and LP Turbine blades.



The product of SAC Hydrogen Form resin and SBA Hydroxide Form resin is **WATER**. The pH is 7.00, which is *neutral*. The product of SAC Ammonia Form resin and SBA Hydroxide Form resin is **AMMONIA HYDROXIDE**. The pH of ammonia hydroxide is < 7.00 , or basic, with its basicity increasing with increasing concentration. Therefore, the equilibrium of the resin bed, or resin film in the case of a Powdex vessel, shifts to the alkaline side, which results in contaminant ion release. It is imperative that the reversibility of the ion exchange reactions is understood beyond an operational level.

ION EXCHANGE REACTION REVERSIBILITY

The Powdex system employs pulverized polystyrene DVB resins, which are not recovered for regeneration. Therefore, these resins are discarded as waste. Never the less, the reversal of the reactions during operation is detrimental to the material integrity of Condensate, Boiler, and Turbine systems. It is therefore paramount to know the requisite conditions for ion exchange reaction reversal, and the process of regeneration, in order to avoid these conditions during cycle operation. Reversibility of the ion exchange reaction is accomplished by a shift in equilibrium.

Regeneration of ion exchange resins can occur only when the concentration of the regenerant is high, which is normally 10 to 20% times higher than that of influent water. That is, influent condensate ammonia concentration is much lower than that of ammonia concentration following the ammonia injection point. As long as this condition persists, ammonia will not compete with the sodium ion for the exchange site of the SAC resin.

To regenerate the SAC to H^+ Form, the resin is sluiced into a specialized vessel, where a high concentration (10 to 20%) H_2SO_4 is introduced.

Conditions requisite to reverse the SAC ion exchange reaction:

1. Solution temperature of approximately 110°F to 120°F
2. Regenerant (competing ion) concentration of 10 to 20% (8 eq. for 100% conversion to the H^+ Form)
3. Contact time of approximately 30 minutes

Compare these conditions to ammonia cycle operation:

1. Solution temperature of approximately 110°F to 120°F
2. competing ion concentration of 10 to 20%
3. Contact time of over 30 minutes - continuous

These conditions are identical. The reaction shifts the pH to the right, in the case of regenerating the resins from the H^+ Form to the NH_4^+ Form. The reversal of equilibrium *is* the shift of pH to the right,

which is more *basic*. A 1.0M solution of NH_3OH is pH 11.6. The addition of 1.0M HCl shifts the pH left to 7.0. In converse, the addition of 1.0M NH_3OH to 1.0M HCl shifts the pH from 1.0 to 7.0.

Regeneration consists of reversing the equilibrium in increasing the concentration of the ion displaced in the equilibrium reaction. For instance, an SAC is regenerated by using a high concentration of $[\text{H}^+]$ ions on the right side of reaction $\text{R-H}^+ + \text{Na}^+ \rightleftharpoons \text{R-Na}^+ + \text{H}^+$. This causes the reaction to be shifted to the left $\text{R-Na}^+ + \text{H}^+ \rightleftharpoons \text{R-H}^+ + \text{Na}^+$.

Equilibrium coefficients are also called *selectivity coefficients*. Reverse reaction occurs when the ion on the fixed exchange site (on the resin surface) is displaced by an ion of *lesser* selectivity (an inferior ionic charge) via super saturation of the solution of the lower selective (of inferior charge) in solution. In the example above, supersaturating the solution with H^+ ions (via HCl) creates an overwhelming ionic charge such that the Na^+ ions which are on the exchange site of the resin surface are exchanged for the H^+ ions in solution. This is the opposite of the normal operating conditions, and a reversal of the equilibrium between solution and resin exchange sites.

Consider the normal operation of mixed bed ion exchange condensate polishers in once-through steam generators:

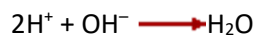
SAC Reactions



SBA Reactions



Final Reaction



In the H-OH form, the product of the Mixed Bed Resin is **water**. This is achievable only with H-OH form resin, and only when the operating limit for the absolute exhaustion point of the resin is equal to the point at which sodium breakthrough occurs, which is in the case of condensate polishing 0.075µS/cm. Operating beyond this point results in a super saturation of the solution, which in turn reverses the reaction of the SAC resin. This, in turn, super saturates the solution with NaOH, resulting in the reverse of the SBA resin reaction. At the point of sodium breakthrough, therefore, Chloride breakthrough follows. Ionization reactions migrate toward equilibrium unless acted upon by an outside force of greater magnitude.

PROBLEM ANALYSIS AND MITIGATION

ION EXCHANGE CAPACITY OF THE POWDEX SYSTEM

The Powdex system employs approximately 60ft³ total of ion exchange resin. This is considerably low, as the sum of the exchange sites is but a fraction of the exchange sites of a Deep bed polishing system (compare to PAF1 or 2, each having 280ft³ of ion exchange resin). The powdex aggregate contains 40% Cation, 50% anion, and 10% cellulose fibers; the content of the cellulose fibers reduces the Anion resin content 10% compared to a Deep Bed system, which contains 60% Anion resin, and 40% cation resin.

The electrochemical dynamics are significant when considering the purposes of a Condensate Deionizing system: ¹polish the condensate to UPW quality, ²demineralize the Condensate during contaminant excursions such as air inleakage or condenser tube leak events. During the period of July 2007 through September 2017, Paradise Unit 3 incurred 15 condenser tube leak events during normal operating conditions. The average duration of these events was 31 hours. The last such event occurred on October 26th, 2015. Paradise has, since 2007, implemented a proactive program during all outages to flood the condenser, examine the system for leaks, and mitigate all condenser issues. The condenser is scheduled to be re-tubed in 2019.

The scant ion exchange capacity of the Powdex system offers virtually no protection during such incidents. The magnitude of contaminant ingress in the BFW system is such that the unit should be taken offline and repaired, as the minimum duration of a Condenser Tube leak event over the past decade was 22 hours.

The same events would merely exhaust the Mixed Beds of the now retired adjacent units, with no immediate threat to the Boiler or Turbines; the resin volume of each DI vessel offered significantly more protection by virtue of the manifold ion exchange sites. The comparably low ion exchange capacity of the Powdex System renders the Boiler and Turbine systems vulnerable to pitting et al during any Condenser Tube leak or air inleakage event.

POWDEX PRECOATS

Recent data indicates that Powdex precoats remain relatively high. The following tables show the number of precoats for each vessel in 2015 and 2016:

2015	PDX 1	PDX 2	PDX 3	PDX 4	PDX 5	Total
	56	75	65	66	45	307

2016	PDX 1	PDX 2	PDX 3	PDX 4	PDX 5	Total
	124	134	110	126	98	592

An average of 450 precoats per year are performed at this station. Each vessel averaged a 4-day operating runtime, with the entire 5-vessel system turned over every 19 days. During this period, PAF3 incurred 18 unplanned outages, and 14 cold startups. An average of 675 man-hours per year were occupied precoating powdex vessels. Material costs of Powdex resin was averaged approximately \$900,000.⁰⁰ per year. Comparatively, PAF1 and 2 each consumed approximately a combined 120 hours sluicing resin during mixed bed exchanges; material cost was approximately \$75,000 combined. During this period, no Condenser tube leak events were incurred during normal operating runs due to ¹865 hours of unplanned downtime, and ²proactive Condenser inspection and repair program.

Historically, PAF3 has incurred the following condenser tube leak and air inleakage events :

Powdex Resin Expense Due to Contaminant Excursions
--

Cost per Precoat	Average Time of Excursion (hours)	Average Operating Time per Powdex (hours)	Number of Powdex Vessels	Number of Precoats During Excursions	Average Number of Excursions per Annum	Powdex Resin Cost per Excursion Period	Annual Additional Precoat cost per Excursions
\$2,000.00	120	8	5	75	3.33	\$240,000.00	\$799,200.00

The low ion exchange capacity of the Powdex system has proven considerably more costly than the Deep bed systems of the adjacent units (now retired), while offering virtually no protection to the Boiler and Turbine systems during contaminant excursion events.

FLUID DYNAMICS OF THE POWDEX SYSTEM

The fluid dynamics are such that precoating a vessel perfectly according to the schematic design is not possible under field conditions.

Precoat mix contains cation and anion resins which have been pulverized to granular form. Regardless, the two polymers are of different densities, and thus are prone to natural separation in the mixing tank in an aqueous environment. Proper mixing requires more precision than a simple impeller-type agitator can provide. Vortexing turbulence cannot achieve a truly homogenous mixture of insoluble substances in aqueous solutions. The densities of resins of different ionic forms vary. SAC in H^+ Form has a density of 1.20, whereas SBA in OH^- Form has a density of 1.07. It is important, therefore, that the resins be properly mixed to a completely homogenous state when introducing it into a service vessel. In the event that the mixture becomes heterogeneous, the SAC will sink to the bottom of the vessel, displacing the SBA by virtue of its higher density.

Precoat pumps are identically designed, and identically tuned. Yet, the vessels are not equal distance from the mixing tank. In order to achieve uniform mix delivery, a precoat pump would be required to deliver precoat mix to individual vessels, and be tuned to deliver a uniform mix to that particular vessel. Holding pumps would also have to be tuned to their respective vessels in order to maintain a uniform precoat. Filter elements are designed under specifications for retaining the precoat mix on the outer diameter of the element. Processed water enters the inner chamber of the elements, where it then flows to the outlet of the vessel. In order for the fluid dynamics to be uniform, each element must have uniform pore sizes, which is not the case, as this is impractical for the common element design.

Influent condensate is not uniformly delivered to each filter element. Rather, a single point of entry from the bottom of the vessel provides untreated condensate to the vessel, just as with a deep bed

deionizer. Failure can result from this design via pressure differentials. At points on filter elements in which granular resin has become embedded, and thus porosity of the element compromised, condensate will not readily flow, resulting in “dead spots” on the elements. As the condensate is under pressure from the discharge of the Condensate Booster Pumps, the path of least resistance will be utilized. Filter elements have a service rating of 100 precoats, at which point they are to be replaced with new elements. In the interim, improper precoating practices, worn equipment, or expired precoat mix can produce “dead spots”. The precoat mix contains cellulose fibers to prevent clumping, yet the effectiveness of the fibers is not 100%; clumping can occur, especially if the resin has been stored too long, or in non-optimal conditions.

Filter elements are constructed of wound cotton or wound polypropylene encasing perforated steel rods. Experience has lent preference to cotton wound elements, as the OEM specifications require. However, the OEM has authorized the use of polypropylene elements, although their performance proved unequal to the original design. Resin embedding is more pronounced in the polypropylene fibers, and thus dead spots are more prominent.

CYCLE MONITORING SYSTEM

Paradise Unit 3 employs the most advanced cycle Chemistry monitoring system in the fleet. Specific and Cation Conductivity measurements are performed via Mettler Toledo Thornton M800 multi-parameter instruments which utilize the proprietary measuring and temperature compensation algorithms developed by Drs. R.D. Thornton and T.S. Light. These algorithms enable UPW measurements and Condensate with amine treatment measurements with precision and accuracy beyond typical instruments used in the Electrical Power industry; moreover, the temperature compensation algorithm is truly non-linear, thus ensuring accuracy without Temperature Control Units on each sample stream.

pH measurement is achieved by the Engold combination cell which also feeds into the M800 multi-parameter instruments. This cell is internally pressurized, and is thus impervious to interference from sample intrusion and sample flow/pressure variance. The slope does not drift as frequently as is common with other pH instruments, as the cell design and algorithmic programs provide for a stable, well compensated system. The open junction between the reference electrolyte and sample eliminated junction leakage issues. Ingold has been the industry leader in Pharma for decades.

Dissolved oxygen measurement utilizes the Engold polarographic DO High Performance ISM DO Sensor. The electrodes and electrolyte used in this sensor provides a self-polarizing voltage that is inherent in the design, which allows the sensor to maintain consistent electrochemical characteristics whether in service or disconnected from the instrument, which minimizes startup time and upset recovery time due to power loss or any issue involving sensor disconnection from the instrument. The membrane material has a fast transport rate for oxygen. The membrane provides low permeability with fast response by reducing the amount of oxygen permeating the membrane. This reduces sensitivity to low flows and membrane coatings compared to conventional membranes. The flow chamber design directs the sample flow as a jet, directly at the membrane, ensuring flow against the membrane is turbulent and will not be depleted of oxygen. While the quantity of oxygen passing through the membrane is reduced, the velocity is faster than through conventional fluoropolymer membranes, as fluorine has a particular affinity for oxygen. The LLOD is 0ppb, which is not achievable by optical D.O. systems.

Sodium is measured by ISE using the Orion 2111LL analyzer. This analyzer employs the patented Orion passive-diffusion tubing mechanism with DiPA to increase the sample pH to 11, thereby eliminating interference from hydrogen ions. The microprocessor continuously measures and compensates sample temperature. The ISE/Reference Electrode system provides LLOD of 10ppt.

The HACH 5500sc Silica measures reactive silica via the heteropoly blue method as interpreted by HACH. The Hach adaptation of the heteropoly blue method is utilized for its low-low level of detection, accuracy, and repeatability. In comparison to most inline silica analyzers, the HACH is remarkably simple, and relatively easy to maintain. The use of pressurized reagent delivery system as opposed to peristaltic pumping systems enhances reliability and promotes repeatability. Interferences from gaseous contaminants infiltrating capillary tubing in peristaltic pumping systems are eliminated, as is inconsistencies in reagent delivery. While other OEMs are advancing in method level of detection, advances in reagent delivery systems and lamp power compensation remain virtually unaddressed. These features are vitally important to the analyst, as the low levels and strict range of permissible concentrations demand accuracy and repeatability at low-low levels in ultrapure water.

TOC is measured by the Thornton 550TOC Analyzer, which employs the Photo-Oxidation (UV Light) method. In this process, only ultra-violet light is used to oxidize the carbon present in the sample to produce carbon dioxide by the TOC analyzer. Photo-oxidation is the most reliable, low maintenance method used for TOC analysis of ultra-pure water. Conductivity measurements are made both upstream and downstream of the UV lamp. The measurement of the first sensor accounts for any conductive contaminants in the sample, while the second sensor detects the increased conductivity due to added carbon dioxide. The conductivity measurements and their difference are compared using a correlation curve to produce a consistent TOC measurement. A Cation Resin column is always placed before the first Conductivity sensor. This is necessary to remove any ammonia or other amine used in conditioning the Condensate and Boiler Feedwater. Oxidation takes place in a quartz coil surrounding the high intensity UV lamp. The sample flows continuously; the analyzer contains no solenoid valves, moving parts,

membranes or reagents. Response time is fast, due to the time (less than 60 seconds) required for the sample to pass from the inlet to the final conductivity sensor. The simple design reduces maintenance to annual replacement of the UV lamp. This system is designed for UPW applications with influent conductivity < 2.0µS/cm.

PENDING ANALYTICAL SYSTEMS

Chloride and Sulfate monitoring shall be accomplished via electrophoresis. The Mettler Toledo 3000cs instrument will utilize comparative conductivity measurement by electrophoretic process in which high voltage drives ionic species from the sample chamber (after initial conductivity measurement) through a capillary to a final conductivity measuring cell. The instrument measures each peak and comparatively analyzes the measurement against a reference measurement (from a reagent). The peaks are proportional to the ionic concentration of Chloride, followed by separate indication for Sulfate). This technology is common in DNA and Pharma testing.

Whereas a Sentry reboiler is currently utilized for DGCC measurement of the Hotwell, pending funding and approval, a Waters Technology Sparger with nitrogen generator shall replace the reboiler, thus eliminating interference from chlorides and sulfates during Condenser tube leak events.

PENDING PROJECTS

- Installation completion (electrical) of the 3A HW sample pump.
- FDFT Sampling Pump (3) Purchase and Installation
- DGCC Sparger Purchase and Install
- Coldwell sample Pump (2) Commissioning
- Ammonia Injection Pump remote Speed Controller logic programming

DEEP BED DEIONIZER PROJECT

A life cycle cost analysis factoring in start up savings was performed and submitted to Paradise Plant Management in February 2010 by Burt FitzHugh, TSA PAF. The project is in the Copper Leaf system.

Note: pertinent figures have been updated with current data.

DEEP BED DEIONIZER COST

Of the companies contacted for equipment cost quotation, two responded: Graver and Anderson Water Systems. Of these, Anderson is 46% less expensive. As both companies deliver world class deep bed systems, this analysis shall rely on Anderson's quote.

GRAVER U14-033JM		Anderson Water Systems (Degremont)		POWDER EX REVENUE EXPENSE DITUR E BREAK DOWN
Products	Cylindrical Condensate Polisher Vessels, 84” diameter x 5’-0” straight side, ASME Code, Section VIII, Division 1 tank, constructed of carbon steel ASTM A-516 Gr. 70 and a design pressure of 390 psig	Five (5) Mixed Bed Condensate Polisher Units, each 90” diameter x 74” straight height, 225 psig, rated for 2,160 gpm net continuous flowrate.		
Price	\$ 3,800,000.00	\$1,750,000.00		
Quality	5 vessels	5 vessels		
Reliability				
Service				REVENUE LOST DURING START UP PRECOMMISSIONING AT TIME
Lead Time	Delivery time for submittal of project specific P&I Diagram and Plot Plan is 4-6 weeks After Receipt of Purchase Order (ARO) and the vessel or assembly drawings is 8-10 weeks ARO. Shipment is approximately 44-46 weeks after receipt of an order	38 - 42 weeks after receipt of a Purchase Order		
				The unit is online

an average of 305 days per year. At an average of \$40.00/MWH, PAF3 generates an average of \$268,160,000.00 per year, an average of \$23,180,000.00 per month, or \$912,000.00 per day per 305 days average runtime , or \$38,000.00per hour. Thus, for a 4.5hour time savings, PAF3 would generate \$171,000.00 per each unit restart above the current capability. PAF3 incurs an average of 5 re-starts per year, and would generate \$855,000.00per year additional revenue with the use of deep-bed polishers.

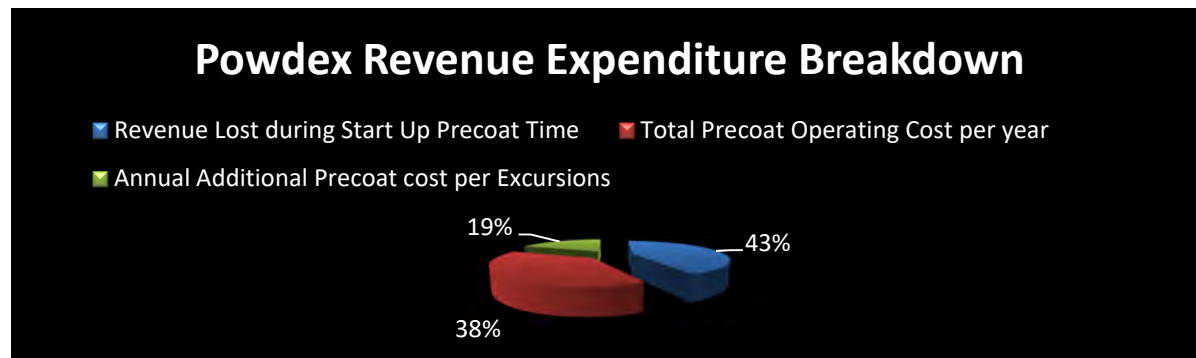
This additional revenue would pay TVA the \$4.4million dollar estimated cost of the Deep-Bed project in 2 years.

TOTAL PRECOAT OPERATING COST PER YEAR

PAF3 averages 480precoats/year. Each precoat costs \$2000.00, resulting in \$900,000.00per year resin cost. Each Mixed Bed costs \$2000.00. PAF1 averages 18.36 resin exchanges per year, or \$36,00.00/year. PAF3 averages \$863,000.00/year above PAF1 in resin material expenditures.

ANNUAL PRECOAT COST DUE TO EXCURSIONS

Cost per Precoat is \$2000 per vessel. The average Excursion endures for 120 hours. The Operating Time per Powdex vessel during each excursion is approximately 8 hours. Number of Precoats During Excursions is 75, on average. The Average Number of Excursions per Annum is 3.33, resulting in \$240,000.00 in Powdex Resin Cost per Excursion Period. Therefore, the Annual Additional Precoat cost due to excursions is \$800,000.00. Applying Deep Bed polisher capacity to the system will greatly reduce these expenditures, and relieve manpower requirements during periods of excursions while adverse conditions are mitigated.



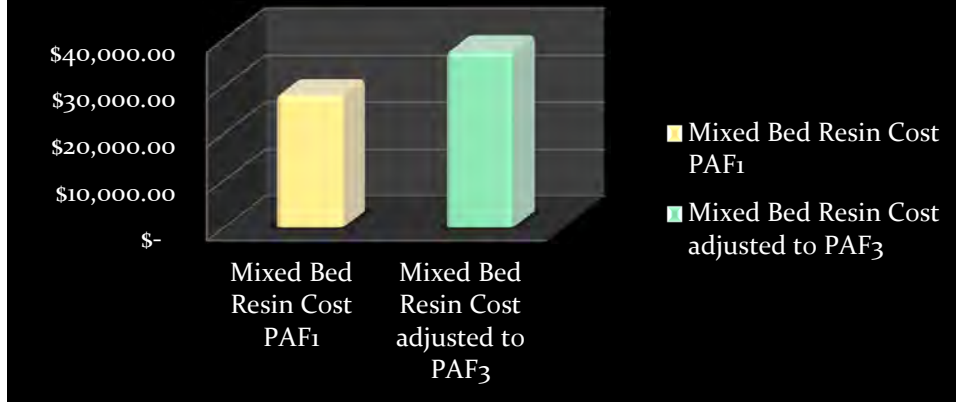
PULVERIZED RESIN COST CONTROL HAS BEEN THE CENTRAL FOCUS OF MANAGEMENT FOR OVER A DECADE

STANDARD MIXED BED POLISHER RESIN EXPENDITURE COMPARISON: PAF1 VS PAF3

PAF3 will require greater ion exchange capacity due to the greater condensate cycle flow rate. For equivalent performance of PAF1, PAF3 would exhaust 26.67 mixed beds per year, provided that the cycle chemistry of each unit was identical. However, PAF3 is an *all-ferrous system*, which allows the cycle chemistry to operate at much lower pH, and thus much lower ammonia loading. The DI inlet TDS is 0.335ppm on PAF3, compared to 1.072ppm on PAF1, or a reduction from 6.4kgr to 2.8kgr. Another way to view the data is that PAF3, should deep beds be employed, would increase the operating capacity of each Mixed Bed from 328kgr to 750kgr due to the reduction in ammonia loading.

Each Mixed Bed on PAF1 polishes 198.7million gallons of condensate per service cycle. PAF 3 polishes 3million per service cycle/Powdex vessel. Consider that a reduction in ammonia loading applied to PAF1 to match PAF3 cycle chemistry would increase the amount of polished condensate from 198.7million gallons per vessel per service cycle to 229.5million gallons per vessel per service cycle. *This is an 86% increase in operating capacity.* Thus PAF1, operating at ammonia loading rates of PAF3, would extend the service capacity from 60 days to 110 days. With the consideration of PAF3 increased condensate volume, PAF3 should achieve 65 day service cycles per each vessel. This will result in a cost reduction of \$718,760.00 /year. In 5.59 years, a savings of \$3.9million would be realized.

Standard Mixed Bed Resin Expenditure Comparison



STANDARD BEAD TYPE RESIN IS CONSIDERABLY CHEAPER THAN PULVERIZED RESIN, AND PAF3 IS WELL SUITED TO THE APPLICATION

ASSET PROTECTION

The 2007 LP Turbine failure resulted in \$26million in power replacement cost and over \$11million in repair costs. Offline revenue loss was approximately \$30million. In total, close to \$70million was lost due to improper cycle chemistry produced by an inadequate deionization system.

Graver Ecodex, citing Graver literature, can produce $<0.08\mu\text{S}/\text{cm}$, $<0.5\text{ppb}$ sodium, $<5\text{ppb}$ silica, $<1\text{ppb}$ chloride with a fresh precoat (lower levels may be obtained, but will quickly exhaust beyond the $0.075\mu\text{S}/\text{cm}$, etc. limits). This meets neither PWR nor super critical OTSG BWR requirements for OT cycle chemistry.

Analytical data taken during PAF3 startup and normal cycle operation indicates that the Graver assessment and Bechtel criteria are correct in that the Powdex system is unsuitable for supercritical OTSG OT cycle chemistry. During startup activities of June 2007, the each Powdex unit rinsed to $0.08\mu\text{S}/\text{cm}$ and exhausted to $0.10\mu\text{S}/\text{cm}$ within three to six hours. Confirmation of contaminant throw in the ammonia cycle ($\text{ACC} > 0.075\mu\text{S}/\text{cm}$) was captured by analysis data taken in August 2007. At total DI outlet After Cation Conductivity $0.08\mu\text{S}/\text{cm}$, the total chlorides were 2ppb, while sulfates ranged from 3 to 10ppb, depending upon the highest After Cation Conductivities of the Powdex vessels, as the total DI outlet approached $0.10\mu\text{S}/\text{cm}$. Silica throw was approximately 2.5X the concentration of the hotwell.

At $0.06\mu\text{S}/\text{cm}$, the Powdex vessels will leak approximately 0.1ppb chloride, yet as the rapid exhaustion of each vessel continues, the concentration of chloride quickly reaches 3ppb (at the point sodium break begins), the rate increasing exponentially with solution saturation. Levels of 5ppb are expected at $0.08\mu\text{S}/\text{cm}$ in individual vessels (total DI outlet will be slightly diluted until all vessels exhaust).

Paradise Unit 3 averages 7 incidences of boiler tube leaks each year. There is a 60% probability of a BTL occurring on any given year which results in Forced Outage. Recent data indicates a 90% probability of a BTL resulting in an Outage of forced or scheduled variety during the course of any year. LP Turbine

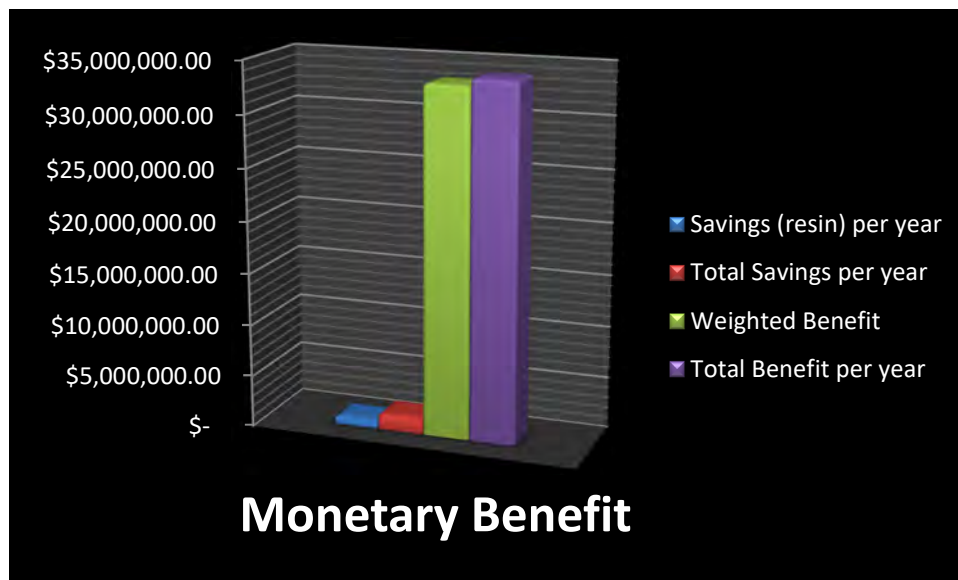
failure probability on any given year is determined via cycle chemistry data, white paper analysis, and Fy04 through FY07 benchmark data.

Risk area	Potential risk	Number of annual incidents	Cost per incident (Revenue Lost)	Total annual cost	Probability of occurrence	Weighted cost	Cost/benefit
PSH	Leak	2.33	\$14,289,461	\$33,294,444	60.0%	\$19,976,667	\$19,976,667
SSH	Leak	1.00	\$5,512,935	\$5,512,935	90.0%	\$4,961,642	\$4,961,642
RH	Leak	1.00	\$3,301,481	\$3,301,481	78.0%	\$2,575,155	\$2,575,155
Water Walls	Leak	2.40	\$7,640,541	\$18,337,297	25.0%	\$4,584,324	\$4,584,324
Economizer	Leak	0.25	\$3,701,880	\$925,470	33.0%	\$305,405	\$305,405
LP Turbine	Pitting	0.70	\$70,000,000	\$7,000,000	12.5%	\$875,000	\$875,000
TOTALS			\$104,446,298	\$68,371,628		\$33,278,193	\$33,278,193

MONETARY BENEFIT OF PAF3 DEEP BED POLISHING SYSTEM INVESTMENT

Forced Outage data has been compared with Net Generation data, which has been scrutinized against average market value MWh. Normal market rates render \$1.6million per annum in savings in material and startup time. From this analysis, the monetary gains in startup rapidity alone would pay the estimated \$4.4million project cost in 2.8 years. The TVA Corporate pay-back schedule of 3 to 5 years is easily met when monetary savings of ion-exchange resin are combined with the aforementioned gains. Further, a future \$70million LP Turbine failure can be successfully prevented with a deep bed polisher system, while the Powdex system can at best merely delay the inevitable.

Total cost of \$4.4million to purchase and install a proper Condensate Polishing system, a deep bed deionizer, renders a \$64million benefit per annum, or approximately \$610million over the next decade. Over the projected life of the unit, over half a billion dollars will be saved via this \$4.4million investment.



TOTAL SAVINGS IN MATERIAL AND TIME PRODUCE MUCH NEEDED REVENUES; WHEN WEIGHTED BENEFITS ARE CONSIDERED, ANNUAL GAINS OF IMPLEMENTING THE DEEP BED POLISHER PROJECT ARE ENORMOUS.

Reduction in operating cost has been the sole objective of TVA Corporate for over a decade; A deep Bed polisher provides this. It also places Paradise 3 on the grid remarkably quicker, thus generating even greater revenues.

<i>Technology Investment Payback Analysis -Asset Protection</i>											
PARADISE GENERATING STATION											
Year:	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total
In \$millions											
Technology Costs	\$1.75	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1.75
Installation Cost	\$2.64	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2.64
Total costs	\$4.39	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4.39

<i>Failure Prevention</i>											
<i>Savings</i>	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$310
Year:	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	Total

<i>Estimated Profit</i>	\$30	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$34.5	\$ 306
<i>payback period (years):</i>	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<i>Payback period (months):</i>	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

A one-time investment of \$4.4million serves to generate \$306million in its first decade via asset failure prevention. The investment can be recouped in as little as 1.53 months.

Total Investment Payback Analysis

In \$ millions													
Material Costs	\$1.7	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1.7	All revenue contributors produce a combined \$611million opportunity, hence repaying the \$4.4million investment in
Installation Cost	\$2.60	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2.60	
Total costs	\$4.4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4.4	
Savings	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$615	
Estimated Profit	\$64	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 68	\$ 611	
payback period (years):	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Payback period (months):	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

as little as 0.77months.

MATERIAL AND STARUP REVENUE SAVINGS PAYBACK ANALYSIS

Paradise Unit 3 Deep Bed Deionizer Investment											
Year:	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	10 Year Total
Technology Costs	\$1,750,000.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,750,000.00
Installation Cost	\$2,800,000.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,800,000.00
Total costs	\$4,495,000.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,495,000.00
Annual Savings Lost Startup Time	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$855,000.00	\$8,550,000.00
Savings (resin) per year	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$884,360.00	\$8,843,600.00
Total Savings	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$1,739,360.00	\$17,393,600.00
Deep Bed Resin Cost	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$37,240.00	\$372,400.00
Start Up Cost	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$95,000.00	\$950,000.00
Estimated Profit	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 1,607,120.00	\$ 16,071,200.00
payback period (years):	2.58	1.58	0.58	0	0	0	0	0	0	0	

The project has been processed through the Copper Leaf system :

Date	User	Action	Comment
10/19/2017 01:13:54 PM	Raines, Jeffrey L (jlraines)	Pending	
10/19/2017 01:13:54 PM		Informational	Sent to delegate(s) (Nale, Leslie W (lwnale), Ball, Phil (dpball...
10/19/2017 01:13:54 PM	Urbaniak, Dennis (DURBANIA)	Reassigned	
06/05/2017 07:32:44 AM	West, C Steven (scwest)	Approved	
12/01/2016 06:33:36 AM	Godbehere, Stephen A (SAGODBE1)	Approved	
10/21/2016 06:59:52 AM	Beasley, Clyde W (CWBEASL2)	Approved	
10/06/2016 03:59:52 PM		Informational	Rule Validation for Entered By Corporate. Rule: 'Entered By' I...
10/06/2016 03:59:52 PM		Notification	Notification email sent to 'West, C Steven (scwest)'
10/06/2016 03:59:52 PM	Urbaniak, Dennis (DURBANIA)	Approved	PM is Steve West
10/06/2016 03:59:31 PM		Informational	Sent to delegate(s) (Urbaniak, Dennis (DURBANIA)) of 'Cahill...
10/06/2016 03:59:31 PM	Urbaniak, Dennis (DURBANIA)	Approved	Resources assigned
10/06/2016 08:12:16 AM		Informational	Investment stage change from Initial to Long Term Planning.
10/06/2016 08:12:16 AM	Gamble, Terry L (tlgamble)	Approved	approved
10/05/2016 11:49:34 AM		Informational	Rule Validation for Entered By Corporate. Rule: 'Entered By' I...
10/05/2016 11:49:34 AM	Halcomb, D Chadwick (dchalcom)	Initiated	

PROBLEM MITIGATION SUMMARY

POWEDEX SYSTEM

The Powdex System is original equipment installed circa 1970 and designed for AVT. According to Graver, the manufacturer of the system and supplier of the pulverized ion exchange resins, Ecodex can produce conductivity <0.08µmho/cm, <0.5ppb sodium, <5ppb silica, <1ppb chloride, < 0.1ppb iron, and a 60 day operating capacity. Paradise Unit 3 is a OTSG on an OT cycle chemistry regimen, requiring ,0.075µS/cm, <0.5ppb sodium, <5ppb silica, <.5ppb Chloride. Further, test data provides that at 0.080µS/cm, the Chloride concentration is approximately 3.0ppb. The Powdex system is proven by OEM data, PAF data, and experience to be inadequate to produce and sustain proper effluent for OTSG Cycle Chemistry for OT regimen.

PRIMARY ADVANTAGES OF DEEP BED DEIONIZERS

A Deep Bed system will protect the unit components during periods of Condenser Tube Leaks, because the resin column is sufficient to withstand the ingress of contaminants, whereas the thin film septa of the pulverized resin coating the Powdex elements cannot. The Powdex was designed primarily as a filtration system for AVT(R) applications, and not as a demineralizer. It has low ion exchange capacity, and thus is a light duty polisher, at best. It is not designed for operation under high-level influent contaminant conditions.

A Deep Bed system, while purposed for polishing, has a high level of ion exchange capacity, and is therefore capable of operation as a demineralizer. It possesses less filtration properties than the Powdex, which is not necessary under OT cycle chemistry (or AVT(o)). Periods of air inleakage and condenser tube leaks are less of an emergency with Deep Bed polishing systems due to the high ion exchange capacity.

Human asset levels are presently depleted to levels which render the Powdex system burdensome to operate and maintain, and increases the demand on Engineering, whose personnel levels are also drastically reduced. Thus, a stable, reliable Condensate Polishing system increases in prominence. With all systems, Paradise must rely more on technology, while decreasing dependency on human assets. Paradise must possess the correct apparatus for the process, a Deep Bed deionizer in this instance.

Operations performs an average of 450 precoat per year, whereas a mere 18 Deep Bed exchanges were performed on PAF1 or 2 on any given year; with the increased Condensate capacity on PAF3, yet with reduced ammonia loading, Paradise 3 can expect to exchange no more than 22 beds per year (presuming the beds are of identical size). Thus, approximately 90 man-hours would be devoted to exchanging deep bed resin, as opposed to 675 man-hours for the Powdex system.

Resin savings would amount to approximately \$700,000 per annum. Currently, TVA risks \$69million per year in Boiler and LP Turbine failures due to lost revenues for downtime: \$62million is at risk in boiler circuits, and \$7million is at risk annually in the LP Turbine. Considering the financial risk, and the high probability of Boiler Tube failures and LP Turbine Failure, the expense of \$4.4million to purchase and install a Deep Bed Deionizer is minimal; the projected risk assessment justifies the expense. Material conservation coupled with rapid online time will generate revenue sufficient to repay the project cost in an average of 2.6years.

The Deep Bed polishing system should be purchased and installed to replace the existing system. As the data analysis demonstrates, this can be done in a cost effective manner during the FY19 Planned Outage.

HUMAN PERFORMANCE

Human error is the error of a person who is intricately connected to other people. This offers that the decision of a person may be based upon the perception of and interaction with others to whom they are connected. Therefore, it is incumbent upon the investigator to continue the Root Cause investigation until certainty is obtained as to the origin of the human error.

In this analysis, the documented scientific facts have been identified, extensively examined, and certified accurate (see works cited). Moreover, by virtue of the scientific facts, the human error prevalent throughout this investigation was exhibited long before the LP-B Turbine was damaged in 2007. The current incident is the second in a decade, and both share a common human performance failure.

Scientific data and research reveal the person in error was responsible for the 2007 LP-B Turbine pitting due to his prescribing an error-laden Cycle Chemistry regimen for Paradise Unit 3 from 2004 to 2007, which he immediately restored to practice upon his contracted return in 2014. The undeniable fact is that this regimen accelerated the failure rate in both incidences by significantly increasing the concentration of contaminant ion leakage from the Powdex system. That the errors of 2004 - 2007 were

instantly repeated by the same person beginning in October 2014 reveals that this person remains nescient of the science of ion exchange and its employment in OTSG on OT Cycle Chemistry. While relying upon EPRI Guidelines to protect the Boiler, the same individual remained oblivious to the fact that the Steam Turbines are protected solely by the quality of the Deionizer Effluent; that this lesson was not learned from the first incident revealed in 2007 contributed to the accelerated and repeated failure of the same Turbine in the same stages. Therefore, culpability lies solely with the individual who made the error.

The gap was not remedied when it first arose a decade ago as administrative management understandably is not required to hold detailed and intimate scientific and technical knowledge of each system, sub-system, and component for which their subordinates are responsible, as this is demonstrably untenable. Administrative management must rely on their subordinates to be fully competent in their respective fields. The failure and acceleration thereof were predictable in both incidences only by personnel holding extensive expertise in the field of Industrial Water Chemistry, and more specifically, ion exchange and Condensate Polishing.

CONCLUSION

Analysis of the current PAF3 LP-B Turbine pitting and hematite incursion incident reveals identical Root Cause as the incident of 2007. Such incidences are inevitable due to the employment of the Powdex system, by virtue of its low ion exchange capacity and poor fluid dynamics. Incidences are accelerated when erroneous cycle chemistry regimens are instituted. Thus, the events are common in the two-fold Root Cause: inadequate condensate polishing equipment, and nescience of ion exchange science, particularly for the purpose of condensate polishing of OTSG on OT Boiler Cycle Chemistry regimen.

Mitigation of the incidences is consequently two-fold. Regarding the ineptitude of the Powdex system, the Deep Bed polishing system, as described in this report, must be purchased and installed at the earliest possible date. Concerning the human performance aspect of these occurrences, it is incumbent upon responsible management to place competent personnel in the proper positions.

REFERENCE CITATIONS:

1. Controlling Mechanisms of Contaminant Ion Leakage in Condensate Polishing Systems Stephen W. Najmy, the Dow Chemical Co.
2. Condensate Polishing Guidelines: Ammonium Form Operation EPRI TR-1004322, September 2001
3. Cycle Chemistry Guidelines for Fossil Plants: Oxygenated Treatment EPRI TR-102285, December 1994
4. Dow Liquid Separations Dowex Ion Exchange Resins Guide to Condensate Polishing May 2003
5. Dow Liquid Separations Fundamentals of Ion Exchange
6. "Performance Report on Water Treatment and Condensate Polishing plants commissioned in 2004 ESB Lough Ree and West Offaly Power Stations, Ireland Issued November 2007" Michael Lynch B.F.I.C.I.
7. Half A Century of Condensate Polishing Eli Salem and Terrance LaTerra, Graver Water Systems, Inc.
8. Condensate Polishing For Nuclear And Super Critical Power Plants For The 21st Century Al Taveres, Graver Technologies, LLC, Glasgow, Delaware, and Robert A. Applegate, Graver Water Systems, LLC, Cranford, New Jersey
9. Dow Liquid Separations Dowex Ion Exchange Resins Water Conditioning Manual
10. Deionization Capacity Monitoring David M. Gray, Thornton, Inc. NUSIS International Chemist On-Line Process Instrumentation Seminar November 1999 - Clearwater Beach, FL
11. Condensate Treatment Stefan Hilgar, Bayer Chemicals AG
12. Condensate Purification, The Influence of Operating Conditions on the Ion Exchange Processes, 1999 The Purolite Company
13. Factors in High Purity Mixed Bed Demineralizers Michael C. Gottlieb and Francis DeSilva, Resin Tech, Inc.
14. Water treatment for fossil fuel power generation report no. Coal r300 dti/pub urn 06/705 Dr. Alan Paton, Paul McCann and Nick Booth, E.ON UK plc, Power Technology Centre, Ratcliffe on Soar, Nottingham, NG11 0EE, January 2006 © Crown copyright 2005
15. Steam Turbine Operating Conditions, Chemistry of Condensates, and Environment Assisted Cracking – A Critical Review Shengqi Zhou and Alan Turnbull May 2002
16. Water Purification Handbook - Chapter 16 Steam Purity, GE Water Publications

17. Water Purification Handbook - Chapter 18 Stream Turbine Deposition, Erosion, and Corrosion, GE Water Publications
18. Water Purification Handbook - Chapter 19 Condensate System Corrosion, GE Water Publications
19. Steam Turbine Corrosion and Deposits Problems and Solutions, Otaker Jonas and Lee Machemer, Jonas, Inc., Wilmington, DA, Proceedings of the Thirty-seventh Annual Turbomachinery Symposium 2008
20. Steam Turbine Corrosion, Otaker Jonas, Materials Performance, February 1985
21. Electrochemical Crevice Corrosion Behaviors of Low-Pressure Steam Turbine Materials in the Simulated Boiler Water Added Chloride and Sulfate Ions, Li-Bin Niu, Hodaka Kato, Kunio Shiokawa, Kenji Nakamura, Mitsuo Yamashita and Yoshihiro Sakai. Materials Transactions, Vol. 54, No. 12 (2013) pp. 2225 to 2232
©2013 The Japan Institute of Metals and Materials
22. Critical Review paper of Steam Turbine Blades Corrosion and its Solutions
Akash Deep Kushwaha; Aakash Soni; Lovelesh Garewal. International Journal of Scientific Research Engineering & Technology (IJSRET), ISSN 2278 – 0882
Volume 3, Issue 4, July 2014



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From: Fleming, Katherine [REDACTED]
Sent: Friday, December 14, 2018 1:46 PM
To: Bean, Lana D [REDACTED]
Subject: From Cong. Brett Guthrie

TVA External Message. Please use caution when opening.

Lana,

I was given your information by Bryan Myers who informed me you may be able to provide more information on a constituent inquiry. Would you be able to clarify the below message Congressman Guthrie received? :

As a Paradise Fossil employee, I would like for you to address and combat the latest Potential draft environmental assessment concerning the retirement of Paradise Fossil Unit 3.

Sir, this assessment is completely off the mark and wrong. It is in place because of an anti coal Obama appointee Bill Johnson. It was based off of 2010-2015 time frame. Since then, many of the complaints in study simply aren't there anymore. Not mentioned in the report are some of the following advancements we have IN PLACE 2018 1. total revamp of superheater section of boiler, 2. New Cyclones throughout boiler, 3.ash handling/ dewatering (plant currently 90% complete, meeting and exceeding 2023 environmental standards, 4. New turbine controls ie....EX 2000exciter controls, Mark 6 modular controls. I understand you may not know exactly what these advancements are or the billion or so that has been put into the plant since 2010 but I wish for you to get these technical statistics in order to present to Mr. Allen on board and try to combat the railroading of this plant and our community.

Thank you,

Katherine Fleming
Legislative Correspondent
U.S. Congressman Brett Guthrie (KY-02)
[REDACTED]



December 5, 2018

Ashley Pilakowski
NEDA Compliance
400 West Summit Hill Drive WT11D
Knoxville, Tennessee 37902

Dear Ms. Pilakowski:

My name is Gary Jones and I serve as the Director of the Muhlenberg Alliance for Progress, the economic development group for Muhlenberg County. I am writing to oppose the announcement of your intent to close the last coal fired generating unit at the Paradise Plant in Drakesboro, Kentucky.

As the economic development director for Muhlenberg I would like to express my sincere concern about what closing Unit 3 would do to our economy. Recent closure of many coal mines, the closing of Units 1 and 2 and KU's closing of their coal fired plant a few years ago has hit our economy hard. Muhlenberg County's current unemployment rate is 6% as of October 2018. The loss of 130 more jobs at the Paradise Plant due to the closing of Unit 3, the residual loss of at least 50 trucking jobs and the loss of jobs in other coal related industries is a tough pill to swallow during this holiday season.

I, along with the Muhlenberg Alliance for Progress board of directors, understand the need for diversified energy production, but we can't understand the total elimination of the use of coal at the Paradise Plant, especially since it is located in a county that has an abundance of coal. It seems a little out of whack to haul coal long distances to other TVA power plants in your system and not burn coal in a plant that is located in a county that has abundant coal resources.

The Muhlenberg Alliance Board of Directors and I strongly encourage you to reconsider your decision and keep Unit 3 in operation. The residents of Muhlenberg County have been loyal supporters of TVA and all they bring to our region. We ask that you continue to support our economy and residents by keeping Unit 3 in operation. Thank you for listening to our request. We look forward to a favorable decision for our residents.

Sincerely,

A handwritten signature in black ink, appearing to read "Gary W. Jones". The signature is fluid and cursive, with the first name "Gary" being more prominent.

Gary W. Jones
Director, Muhlenberg Alliance for Progress



December 19, 2018

Via Electronic Mail: aapilakowski@tva.gov

Ms. Ashley Pilakowski
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
WT 11B
Knoxville, Tennessee 37902

Re: Comments of The Kentucky Coal Association on *Potential Paradise Fossil Plant Retirement: Draft Environmental Assessment* (Muhlenberg County, Kentucky) (November 2018)

The Kentucky Coal Association ("KCA") submits the following comments on the Draft Environmental Assessment ("EA") of the potential retirement of the Paradise Fossil Plant in Muhlenberg County, Kentucky.

About KCA

KCA represents the producers of the majority of coal mined in Kentucky, along with over 100 additional businesses that support the Kentucky coal mining industry. KCA's mission is to provide effective leadership for the coal industry and ultimately to enhance the ability of the Kentucky coal industry to compete in domestic and world coal markets. KCA's membership includes a number of entities with a direct interest in the ongoing operation of Paradise Unit 3, including the producers of coal that powers Unit 3 and numerous TVA ratepayers.

Summary of Comments

KCA is strongly opposed to the potential retirement of Paradise Unit 3. KCA believes any potential retirement would be short-sighted and not in the best interests of TVA's ratepayers or the local communities that depend upon the continued operation of the facility. The EA is merely one more flawed piece of TVA's politically-based decision to shift its generating mix away from coal-fired power. The EA appears to have been crafted to support TVA's apparently predetermined result to retire the unit as quickly as possible and without a full environmental impact statement (EIS). This is contrary to the spirit and purpose of NEPA and TVA's own procedures for NEPA compliance. Simply put, TVA should go back to the drawing board and re-evaluate its decision. Should retirement be pursued again, an environmental impact statement (EIS) should be prepared.

KCA is particularly concerned that TVA is seeking to short-circuit the review process to exclude or limit meaningful public involvement. It is beyond question that retirement of Unit 3 is highly controversial; indeed, the decision is deeply unpopular because it will potentially devastate the local and regional economy. In such a situation, both NEPA and TVA's own procedures for NEPA compliance require a more robust public participation process and a more detailed environmental review.

The EA fails to demonstrate a need for Unit 3's retirement, because it offers only a cursory statement of justifications for the action, and fails to provide hard data supporting the alleged costs that TVA claims will make future operation of the unit too expensive.

The EA's presentation of only two alternatives – full retirement and de-commissioning or continued operation at current levels –impermissibly limits the range of alternatives under consideration. Indeed, the EA appears specifically designed to avoid consideration of any alternative other than retirement of Unit 3. Such an outcome-oriented assessment is antithetical to

the spirit, purpose and requirements of NEPA and TVA's own procedures for NEPA compliance. TVA must consider additional alternatives, and must do so in the context of an EIS with sufficient supporting documentation, not just a conclusory EA.

The EA is also flawed because it fails to consider the environmental impacts of additional projects that will result from the retirement decision. By improperly segmenting "retirement" from additional activities that necessarily flow from retirement, the EA does not assess the full scope of the projects at issue.

Finally, and most importantly, the EA fails to give adequate consideration to the socioeconomic impacts of the decision. To the extent that the EA recognizes the economic consequences of the decision, it merely brushes them off as unimportant to the environmental review. By failing to properly account for massive job losses that TVA itself acknowledges will result from retirement, the EA gives socioeconomic review no meaningful consideration in the analysis.

1. Insufficient Public Notice and Opportunity for Involvement.

TVA's NEPA procedures encourage "timely and meaningful public input" on the EA process.¹ In this case, however, TVA has largely kept the public shut out of the decision-making process and appears to be rushing ahead with a retirement decision before the voices of Kentuckians can be heard.

¹ *TVA's Procedures for Compliance With the National Environmental Policy Act*, Section 5.3.2 (hereinafter, "TVA NEPA Procedures").

The timing of TVA's announcement of the potential retirement decision and release of the EA raise significant concerns about whether TVA has any interest in hearing from the impacted public. The draft EA was released to the public right before the Thanksgiving holiday, with comments due in a mere 30 days, just before the Christmas and New Years holidays, thereby effectively limiting the time available for most members of the general public to offer input.

The amount of information that a reader would need to review, digest and analyze in order to fully and meaningfully evaluate the numerous conclusions in the EA is staggering. The EA itself is sixty-two pages in length and cites 37 other reports or documents totaling thousands of additional pages.² The EA further assumes that the reader will be knowledgeable of the thousands of pages of information generated as part of six other environmental assessments and impact statements.³ Yet the EA fails to cite in most instances to specific sections of any of these documents to support its many conclusory statements. As such, to weigh in on each conclusion in the EA, a reader would somehow need to digest thousands of pages of highly technical material, and develop comments, in less than 30 days. This is virtually impossible for most, if not all, members of the general public. The purpose of NEPA's EA process is to generate "meaningful" public comment.⁴ Such meaningful input is not possible in the limited time provided for comment, and TVA should at a minimum support its decision not with a cursory EA but with a full EIS.

Moreover, the timing of this rushed public review demonstrates that TVA does not really intend to give any consideration to the public comments it does receive. TVA is purportedly

² EA at Chapter 6 (Literature Cited).

³ EA Section 1.3 (Related Environmental Reviews).

⁴ *Ohio Valley Env'tl. Coalition v. U.S. Army Corps of Engineers*, C.A. No. 3:08-0979 (S.D. W.Va. Oct. 31, 2008) (granting injunction where NEPA notice was insufficient).

planning to make a *final* decision on Unit 3's retirement at its February, 2019 Board meeting. Even assuming the public went through the incredibly time-consuming exercise of reviewing and analyzing the many documents cited in the EA and providing detailed comments, there is simply no way TVA could meaningfully consider those comments in a few short weeks prior to the Board meeting in February.

Additionally, if TVA finalizes the NEPA review by issuing a FONSI based on the EA just prior to the February board meeting, it will be apparent that TVA is attempting to rush a decision before the Board has a full complement of members. A decision of such momentous importance, which threatens the livelihoods of hundreds of individuals and the reliability and resilience of TVA's power supply, deserves more than a few weeks of consideration. Instead, the monumental decision requires a full EIS, as TVA's own NEPA procedures recognize.⁵

The need for more deliberation, by a fully staffed board, is all the more necessary here in light of serious allegations that TVA has intentionally misled or misdirected key policy makers regarding its intentions with respect to Unit 3. For example, Senator Rand Paul's office has stated, "[t]hroughout discussions regarding TVA's entire generating fleet being placed under review, no mention of a potential retirement of Paradise Unit 3 was made" until the draft EA was released in late November.⁶ The numerous community members, industries, policy makers and stakeholders with an interest in this process were therefore caught off guard by the EA's publication and are

⁵ TVA NEPA Procedures at Section 5.4.1 ("The following actions normally will require an environmental impact statement... 1. Major power generating facilities... 4. Any major action, the environmental impact of which is expected to be highly controversial... 5. Any other major action which will have a significant effect on the quality fo the human environment...").

⁶ <https://www.paul.senate.gov/news/sen-rand-paul-blasts-tva-proposed-closure-western-kentucky-coal-fired-plant> (last visited December 12, 2018).

being forced to respond to it on an unnecessarily truncated timeline, while TVA is also allowing itself virtually no time to meaningfully review the numerous comments it is still likely to receive.

Thus, at a minimum, TVA must provide additional time for the public to participate in the EA process, and allow itself additional time to evaluate public input after comments are received. Only by doing so can TVA begin to repair the damage it has continually caused to its relationship with ratepayers and the local community.⁷

Following additional time for meaningful public input, TVA should – at a minimum – produce a full EIS in support of its decision. Such an EIS must demonstrate an actual need for the retirement of Unit 3, provide adequate opportunity for public involvement, and consider a meaningful range of alternative actions.

2. No Demonstrated Need.

The foundation of NEPA review is a fully articulated statement of purpose and need for the proposed project, and an agency cannot define “need” so narrowly “that the outcome [is] preordained.”⁸ Here, TVA asserts that it “needs” to retire Unit 3, but has failed to demonstrate that such need actually exists. By not fully justifying the need to retire Unit 3, the EA also fails to consider a sufficient range of reasonable alternatives. Indeed, the only conclusion that can be

⁷ Even today, TVA continues to send mixed messages to the general public with respect to Unit 3. For example, one portion of TVA’s website states unequivocally that “Unit 3 will continue operation.” <https://www.tva.gov/Energy/Our-Power-System/Coal/Paradise-Fossil-Plant> (last visited December 12, 2018). Although this may not be a deliberate attempt to mislead the public, such statements would lead the public to believe that TVA is not considering retirement of the unit, when in fact the EA indicates that retirement is the only option truly under consideration.

⁸ See *Alaska Survival v. Surface Transportation Bd.*, 705 F.3d 1073, 1084 (9th Cir. 2013).

drawn is that TVA has an animus against coal-fired power generation and is performing the EA as a mere rubber stamp on a policy decision to abandon coal as a portion of its generation mix.

The EA makes cursory reference to “costs that would be incurred at PAF Unit 3 in the next few years” as the need to assess potential retirement of the unit.⁹ But the fact that Unit 3 will incur costs in future years is no reason to retire it. All generating options will incur certain costs. The issue is whether the costs warrant retirement or pursuit of other options. The analysis in the EA fails to support the conclusion that costs at Unit 3 require retirement of the unit, because it fails to provide necessary data supporting cost estimates, fails to provide any methodology for analyzing these costs, and fails to provide any justification for why the alleged cost assumptions were reasonable. The EA is in fact utterly devoid of data outlining the “costs” involved, and wholly fails to compare these costs to the costs of other generation sources or similar sources in the industry. NEPA does not require the interested public to merely accept at face value all of the conclusions in the EA. Instead, the conclusions should be supported with meaningful data, which is wholly lacking in the statement of need.

The EA points to costs associated with EPA’s CCR Rule as a reason to retire the unit. But this justification fails for several reason. First, the EA does not actually document any costs at all; instead, it simply lists projects. And the EA recognizes that many of these projects associated with coal combustion residuals management *will be carried out regardless of whether the unit is retired or not*.¹⁰ The EA therefore fails to demonstrate that CCR projects, standing alone, create a need to retire the unit.

⁹ EA, p. 2.

¹⁰ EA, p. 8-9 (listing ten separate CCR projects that will be performed “under either alternative”).

The EA also points to a purported future rotor replacement as a need to retire the unit.¹¹ But again, no supporting information regarding this project is provided. The interested public is therefore left to wonder whether this is a legitimate cost, or instead a pretext to further TVA's agenda to move its generation mix away from coal power. And even if the rotor replacement is a legitimate cost item, there is no indication in the EA that this single project is of such an enormous cost as to support the drastic decision to retire the unit, especially in light of the costs TVA has already recently expended to upgrade the unit to meet various environmental requirements.

In fact, the EA does not address at all the costs already expended to upgrade Unit 3 or whether TVA will continue to recoup these costs from its ratepayers. TVA, and in turn its ratepayers, made massive investments in pollution control technology at Unit 3 over the past several years. The extent to which the ratepayers have already funded these projects (and the extent to which they will continue to do so for years to come), warrants significant consideration in determining whether a need to retire the unit exists. Indeed, the EA recognizes that the continued operation of the unit will not cause a negative environmental impact precisely because the unit has already been upgraded with modern pollution control technology.¹² It only seems logical that TVA would continue to obtain the benefit of this prior investment by running the unit to produce low-cost, reliable, and resilient electricity for as long as reasonably possible, given the significant investment already made in the unit. Continuing to operate a unit that is already upgraded, and already paid for, certainly seems like a smarter decision than shuttering this viable unit and then **spending approximately \$8 Billion over the next twenty years on new generating**

¹¹ EA, p. 2.

¹² EA, pp. 15-17.

facilities, as TVA has committed to doing.¹³ Ratepayers should be shocked that a utility which already claims to have so much generating capacity that it can retire a 1,150 MW unit without any need to replace that unit's lost capacity¹⁴ would be spending \$8 Billion dollars on new generation, at the same time that it continues to raise rates.¹⁵

KCA also questions whether “costs”, standing alone, can ever be a sufficient basis for the retirement of Unit 3, given its crucial role in driving economic development in the western Kentucky region.¹⁶ TVA's mandate is unique, and extends beyond simply reducing its costs and increasing operating margins. Instead, TVA's mission extends to fostering economic development of the region. The EA itself recognizes (but does not fully capture) the vital role the coal-fired generation at Paradise Unit 3 plays in economic development. In light of the outsized role this unit plays in the economic well-being of the region, an unnecessary move to retire a unit directly employing over 130 workers (and providing employment to hundreds more in other industries) is contrary to TVA's economic development mandate, and calls into question whether any “need” to retire the unit exists.

¹³<https://platform.mi.spglobal.com/web/client?auth=inherit#news/article?id=46098556&cdid=A-46098556-11814> (last visited December 12, 2018) (stating that TVA remains committed to spending \$8 Billion renewable energy generation in the next 20 years).

¹⁴ EA, p. 3 (indicating TVA has “no immediate need to replace the generating capacity currently provided by PAF Unit 3).

¹⁵ <https://www.tva.gov/Newsroom/Press-Releases/TVA-FY19-Budget-Maintains-Focus-on-Providing-Long-Term-Value-to-the-Valley> (last visited December 12, 2018) (reporting on TVA's recent 1.5% rate increase approved in August).

¹⁶ <https://www.tva.gov/Newsroom/News-Features/Our-Year-of-Achievement> (last visited December 12, 2018) (describing one of TVA's core missions as promoting economic development).

Finally, any determination of “need” for retirement is necessarily premature given that TVA is still reviewing its future generation needs. Although the EA points to the 2015 integrated resource plan,¹⁷ that IRP does not support the retirement of Unit 3. Moreover, the 2019 IRP process is still underway,¹⁸ and so it cannot form the basis of a retirement decision at this point, unless of course the outcome of the current IRP is already a foregone conclusion with respect to abandonment of coal from the generating mix. KCA strongly opposes the secrecy that has surrounded TVA’s 2018 IRP process.¹⁹ But assuming TVA is acting in good faith in its ongoing evaluation of resource planning needs, it would be premature to make a retirement decision while that IRP process is still underway.²⁰ Further, TVA apparently intends to make a retirement decision at its next board meeting, but the board does not have its full composition of members. At least one board nomination remains pending before the Senate for confirmation and another seat becomes vacant in January. A decision of such major importance should await the outcome of the current IRP process and should be made by a full board. Unless and until the current IRP process is complete and TVA has a full Board, there can be no true demonstration of need for the project.

¹⁷ EA, p. 2.

¹⁸ <https://www.tva.com/Environment/Environmental-Stewardship/Integrated-Resource-Plan> (last visited December 12, 2018).

¹⁹ *Id.* (members of the IRP committee are anonymous).

²⁰ Of course, it is logical to question whether the outcome of the IRP process is predetermined, given that TVA has already announced a commitment to spend \$8 Billion on renewables in the next 20 years, whether it actually needs to do so or not, and apparently without regard to what this might cost ratepayers.

3. The EA Fails to Consider Available Alternatives.

NEPA requires a consideration of a full range of reasonable alternative to the proposed action.²¹ In contravention of this requirement, the EA analyzes only two options: continued operation or full retirement of the unit. By presenting a black or white choice between continued operation of Unit 3 and full retirement and decommissioning, the outcome of the EA process is naturally slanted to support the preferred alternative. By ignoring other alternatives, the EA violates NEPA, and more fundamentally deprives TVA's ratepayers and other interested parties of a meaningful role in the environmental review process.

It is well known that alternatives to retirement and full decommissioning exist. For example, Unit 3 could be idled, but not fully retired. Although KCA believes that idling would be a poor decision, it does provide benefits when compared to full retirement. Leaving Unit 3 available for future use would allow the unit to serve as a hedge against future increases in the price of natural gas or other fuel sources.

Maintaining the potential to operate a fuel-secure coal-fired unit also provides reliability and resiliency benefits compared to the inherently intermittent nature of renewable sources. The National Energy Technology Laboratory (NETL) issued a study of the "Bomb Cyclone" event experienced last winter that establishes the significant resilience benefits imparted to the electricity grid by coal-fired units while simultaneously documenting the resilience penalty imposed on the grid by renewables. Among the many compelling facts documented by NETL in the report, the following statement is directly relevant to TVA's evaluation of the value of Unit 3 given that it

²¹ 40 CFR 1502.14(a).

releases to PJM, which encompasses the remainder of the Kentucky electric grid not served by TVA:

*In PJM, the largest of the ISOs, coal provided the most resilient form of generation, due to available reserve capacity and on-site fuel availability, far exceeding all other sources (providing three times the incremental generation from natural gas and twelve times that from nuclear units); **without available capacity from partially utilized coal units, PJM would have experienced shortfalls leading to interconnect-wide blackouts.** . .*

*. . . In PJM, coal and nuclear provided 70 percent of output during the BC, gas 22 percent, and renewables 4 percent. Coal increased an average of 367 GWh/day or approximately 30,000 MW. The surge in coal accounts for 74 percent of incremental energy, with fuel oil 22 percent. Other sources provided little to no surge capacity: natural gas, primarily because of economics; nuclear, because of maxed-out capacity; and wind, due to highly variable output (Exhibit 1-8). On average, wind declined. As detailed above, fuel oil was critical to the northeast, but, in terms of scale, was dwarfed by PJM coal output growth. According to EIA, **peak coal generation in PJM of 1,200 GWh on January 5 exceeded the total output of NYISO (500 GWh) and ISO-NE (370 GWh) combined; the aforementioned increase in PJM coal generation was as large as the output of ISO-NE.***

. . . Examining the performance of the major sources of power in PJM leads to the conclusion that it was primarily coal that responded resiliently, with some contribution from oil-firing units. The value of the resilient coal- and oil-fired generation can be quantified by integrating over the term of the BC. The increase in the cost of energy services over the two-week period from December 27 to January 9 was \$288M per day, equivalent to \$98 per MW, compared with costs from the preceding two-week period, and \$225M per day, or \$73 per MW, higher than the following two-week period that featured a short return of extreme cold. This, in effect, represents a value of resilience (), which, during the BC, rose to \$3.5 billion. . .

*. . . In the case of PJM, it can also be shown that the demand could not have been met without coal. At peak demand, January 5, 2018, natural gas prices exceeded \$95/MMBtu in eastern PJM. **Had coal been removed, a 9-18 GW capacity shortfall would have developed, depending on assumed imports and generation outages, leading to system collapse.** . . ²²*

²² Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units, Volume I: The Critical Role of Thermal Units During Extreme Weather Events (DOE/NETL 2018/1883) (March 13, 2018), pp 1, 12, and 15-17 (emphasis added). This report, along with other concerns about coal and nuclear retirements led FERC to consider the importance of grid resiliency and security. It is possible that other utilities will soon be required to value these important attributes. See, e.g., FERC Docket No. RM18-1-000. TVA will place its ratepayers at a significant disadvantage to those served by other utilities if it continues to take steps that make its generation fleet less resilient and less secure.

In light of the compelling data and conclusions included in the DOE/NETL report, the proposal to prematurely retire a highly resilient coal unit like Unit 3 and replace it with less resilient gas and much less resilient renewables should be subject to the highest level of scrutiny. Given the magnitude of costs and economic impacts involved with retirement, and given the fact that ongoing regulatory reforms could significantly reduce regulatory costs in the near term, it is premature to move forward with retirement of Unit 3 at this time. Once this highly resilient unit is retired, it becomes an irreversible decision. By waiting until ongoing regulatory reforms are better understood, TVA and the public will have a better understanding of the advisability of the retirement proposal.

Because the EA presumes no load growth, it appears that TVA would necessarily be required to make additional capital investments should demand increase after Unit 3 is retired. Rather than boxing itself in to a reliance on intermittent and unreliable sources, the alternative of idling Unit 3 would serve as a protection against many future risks. By not considering this important alternative, the EA's analysis is constrained to the point of being ineffective.

The EA also gives almost no consideration to alternative means of compliance with various CCR and wastewater management options. EPA continues to work toward making compliance with the CCR Rule less burdensome.²³ Specifically, on July 30, 2018, EPA published a final rule amending the 2015 CCR Rule to (1) allow states with approved CCR permit programs under the WIIN Act or EPA where EPA is the permitting authority the ability to use alternate performance standards; (2) revise the groundwater protection standard for constituents which do not have an

²³ See <https://www.epa.gov/newsreleases/epa-finalizes-first-amendments-coal-ash-disposal-regulations-providing-flexibilities> (last visited December 12, 2018) (describing proposed CCR management regulatory changes announced by EPA in July, 2018).

established drinking water standard; and (3) extended the deadline by which facilities must cease the placement of waste in CCR units for certain circumstances that trigger such an outcome. One situation where the deadline is extended is if the facility has detected a statistically significant increase above a groundwater protection standard from an unlined CCR surface impoundment – the deadline has been extended by 18 months to October 31, 2020. The 2015 CCR Rule allows for extensions of that deadline in certain circumstances as well, but the impact of the July 2018 CCR Rule amendment was that the initial deadline was extended by rule without a showing of such circumstances. Additional issues that are expected to be addressed in announced future rule making include the inclusion of risk-based components in groundwater remediation, and potential changes to the requirement to close unlined units due to the post-WIIN Act ability of states (and EPA) to exercise for site-specific judgment as part of risk-based corrective action programs.

The EA relies on studies of CCR compliance that predate EPA's CCR flexibility changes described above and therefore necessarily do not take them into account. TVA should reassess CCR and ELG compliance options in light of the current regulations potentially relaxed future regulatory scenarios to develop a more meaningful range of potential alternatives for consideration.

Chief among the alternative compliance scenarios TVA should reconsider is an increase in the beneficial reuse of CCR material. Kentucky is poised to become a national leader in CCR reuse industries. The CCR at Unit 3 may therefore have many future uses that could drive economic development in the region, making the continued future generation of CCR a net benefit to the region, helping TVA carry out its important economic development mission.

4. The EA Improperly Defers Consideration of Numerous Decommissioning Projects.

The EA acknowledges that if Unit 3 is retired, a number of decommissioning activities will need to take place in the near term. Yet the EA glosses over or ignores entirely the environmental impact of the de-commissioning activities. Indeed, the EA does not analyze the environmental impact of chemical impoundment closure or deconstruction and demolition of the unit, even though these projects are foreseeable in a retirement scenario.²⁴ By failing to give any consideration to the environmental impact of these de-commissioning activities, the EA improperly segments “retirement” of the unit from its de-commissioning, even though the EA acknowledges that de-commissioning and retirement are inextricably intertwined. The intent is apparent – to avoid a meaningful study of environmental consequences by analyzing only “retirement” in a vacuum in a hypothetical future scenario that will never actually come to pass, thereby supporting TVA’s preferred (and apparently predetermined) outcome of retirement. NEPA review must reflect the natural direct results of the proposed action. In this case, the unit will not simply be “retired” and cease producing power. Instead, a number of additional activities will take place. By failing to analyze foreseeable future projects and the environmental or socioeconomic impact of these additional activities, the EA fails to comply with the requirements of NEPA.

5. The EA’s Socioeconomic Analysis is Insufficient.

There is no doubt that the retirement of Unit 3 will have a devastating impact on the local economy of Muhlenberg County and the surrounding area in western Kentucky. Because the socioeconomic analysis is not supported by the most accurate data, ignores indirect impacts, and fails to accurately analyze the data that is provided, the conclusions in the socioeconomic analysis

²⁴ EA, p. 7.

are significantly flawed. For this reason alone, TVA must engage in additional study before making any retirement decision.

First, the EA understates direct job losses. The EA assumes that only a portion of the 131 direct TVA employees at Paradise will lose their jobs if the unit is retired and does not quantify jobs losses in any associated businesses other than coal mining. For example, while the EA recognizes that the transportation and limestone mining industries will be impacted, no attempt is made to determine the extent of these impacts.²⁵

The EA provides no meaningful support for the assumption that some (vague, unstated) percentage of the plant employees will be able to find other employment. Aside from passing references to those workers maybe being able to find (lower paying) jobs in health care and education,²⁶ there is no data in the EA to support any conclusion that the lost employment resulting from Unit 3's retirement will ever be replaced.

The data relied upon to determine the lost coal mining jobs is very generalized, based on average productivity of average mines.²⁷ TVA likely has access to more accurate data on coal mine employment; it knows the mines from which it purchases coal, and has the ability to learn whether that coal production can be replaced by other coal orders at other utilities or whether that production will be lost once Unit 3 retires. In any event, the EA seems to assume no significant loss of coal mining employment as the result of the decision, as it describes the coal mining

²⁵ EA, p. 47.

²⁶ EA, p. 46.

²⁷ EA, p. 47.

employment impact as “minor.”²⁸ The conclusion that the loss of hundreds of jobs is “minor” is insulting to the hard working miners who will be impacted. The EA itself acknowledges that unemployment in most of the region is well above the state average, so any loss of high-paying employment in the region is more than “minor” to those people who are impacted.

The EA also makes no meaningful effort to consider indirect employment impacts. Truncating the analysis to only direct job losses ignores reality. The EA concedes that the jobs that will be lost as a result of retirement are among the highest-paying in the region. What this necessarily means is that each direct TVA employee, and each associated coal miner, limestone miner, or truck driver working to keep Unit 3 in operation, represents not one single job per employee, but actually many more, because these high paid workers spend their income in service industries that support many more employees.

Economic impact studies on the Kentucky coal industry suggest that each direct coal mining job creates 1.13 jobs in other sectors of the Kentucky economy.²⁹ Given the relatively high wages and associated benefits of the TVA jobs involved, a similar economic impact could be anticipated for each worker at Paradise. Thus, terminating 131 employees who currently operate Unit 3 has the potential to cause an equivalent loss of 262 jobs in the local community. A similar impact would be seen in terms of lost coal mining employment. The EA assumes that 135 coal mining jobs are tied to the coal consumed by Unit 3. As stated above, this equates to roughly a 270-job overall economic impact in the local community. Thus, over 500 job losses could be

²⁸ *Id.*

²⁹ See Kentucky Coal Facts, 17th ed. (2017) (“Kentucky Coal Facts”) at p. 34 available at [http://energy.ky.gov/Coal%20Facts%20Library/Kentucky%20Coal%20Facts%20-%202017th%20Edition%20\(2017\).pdf](http://energy.ky.gov/Coal%20Facts%20Library/Kentucky%20Coal%20Facts%20-%202017th%20Edition%20(2017).pdf) (last visited December 12, 2018).

expected just in the industries – utilities and coal mining – that are most directly tied to the plant, without accounting for direct and indirect job losses in limestone mining, transportation, or other associated industries. As the EA itself acknowledges, there are only approximately 10,000 jobs in Muhlenberg County as a whole. The loss of 500 jobs in a community that has only about 10,000 jobs to begin with threatens to send the local economy into Depression-era levels of unemployment.

Not only does the EA understate the devastating economic impact to western Kentucky, it makes numerous unfounded or irrelevant assumptions in a misguided attempt to argue that the socioeconomic impact will be minimized. For example, in a shocking and insulting affront to the western Kentuckians who will be harmed by a retirement decision, the EA claims that retirement of Unit 3 will have “positive indirect economic impacts throughout the Southeast Region” because Alabama, Mississippi and Tennessee will receive additional in lieu of tax payments.³⁰ This statement unnecessarily confuses the analysis, and borders on disingenuous. First, it is cold comfort to an unemployed coal miner in Muhlenberg County that the tax situation in other states may slightly improve after he loses his job. Second, the assumption that other states will see increased in lieu of tax payments may not be accurate, given that TVA plans to retire units in other states as well, so those other states may also see a decrease in payments.³¹ Third, the discussion of alleged positive indirect impacts does not take into account the various taxes paid by Kentucky

³⁰ EA, p. 47.

³¹ At the same time it announced a potential retirement of Paradise Unit 3, TVA also announced plans to retire units at the Bull Run plant in Tennessee. The retirement of Bull Run would likely reduce in lieu of tax payments made in Tennessee as well, so it is unclear how TVA supports its assertion that in lieu of tax payments will increase in Tennessee. Indeed, the conclusion that in lieu of tax payments will increase anywhere is supported by no data.

companies in other industries like coal mining, limestone mining and transportation that support Unit 3.³²

6. **An EIS Is Required, At a Minimum.**

Only an EIS can “guarantee[] that the relevant information will be made available to the larger audience that may also play a role” in the decision-making and implementation of an important decision such as retiring a generating facility.³³ The “larger audience” of TVA’s ratepayers, impacted local citizens, and the many individuals and industries that depend on operation of Unit 3 certainly could benefit from a more robust discussion of a full range of alternatives, based on a meaningful review of available data. TVA should reconsider its decision to retire Unit 3, but if it does not, it must at a minimum prepare an EIS to support its decision.

KCA would welcome the opportunity for further engagement and input on this momentous and highly controversial decision. Should you have any questions or concerns regarding these comments, please do not hesitate to contact me.

Sincerely,



Tyler White, President
Kentucky Coal Association

³² Kentucky’s coal producers alone create hundreds of millions of dollars in severance, unmined minerals, sales, payroll and other taxes in Kentucky. *See Kentucky Coal Facts* at p. 34 (describing extent of taxes paid by Kentucky coal industry).

³³ *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989).



Ashley Pilakowski
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
WT 11B
Knoxville, TN 37902

Dear Ms. Pilakowski,

I am writing in support of keeping TVA's Paradise unit in operation for the following reasons:

- As a business person, it does not make economic sense to shutter a very valuable asset, not only in value but also in jobs.
- The impact that Paradise and Bull Run have on the environment are a drop in the bucket compared to what China spews out.
- It is very hypocritical for environmentalist to point their finger at two struggling communities to shut them down and yet not practice what they preach in their own personal life.

These are the basic reasons I am opposed to closing these two facilities.

Respectfully Submitted,

A handwritten signature in black ink that reads "Bill Kurtz".

Bill Kurtz

Copies:

Sen. Mitch McConnell
Sen. Rand Paul
Rep. James Comer

A SUNNY PATH TO GREEN COAL

By: Avery N. Goldstein, Ph.D. & Patrick L. Maloy, CEO Nanosolarlysis

Coal has powered the American economy for well over a century. Fortunes have been made while modern labor and environmental standards were borne from its' excesses. Our current rail and shipping infrastructure was also built in no small part to transport coal to the far flung power plants and factories. This nostalgic, past tense view of the coal industry is a new refrain with the recent bankruptcy declaration of Peabody Energy, a one-time behemoth in the coal industry.

Democratic presidential candidate, Hillary Clinton's observation that "we're going to put a lot of coal companies and coal miners out of business" was widely seen as costing votes in her Democratic primary loss in West Virginia; yet, viewed against the macro economic backdrop that plentiful and clean natural gas brought on-line by fracking had hastened the inevitable demise of the coal industry. This inopportune statement was considered as unremarkable. Today, the industry employs about 70,000 people, of which about 20,000 are miners. By comparison, employment topped 250,000 during the oil embargo of the late 1970s.

This macro economic disdain for the coal industry and the offsets of job retraining and new industries replacing these jobs belies a misunderstanding of the temporal lag in societal remediation of concentrated job losses. Additionally, the ancillary economic losses that historically ripple through the economy in support and services industries supporting coal have proven to be far more dire and persistent than forecasters have predicted as evidenced when manufacturing jobs were located from the US Midwest to Mexico and offshore facilities. The denizens of Flint, Gary, and Akron dwell in the decades long shadow of attempts to rebuild a post-industrial economy.

Positive thinking is not a strategy; rather, a technology must be found to extend the value of coal against the steady head wind of problems faced by coal. Carbon dioxide is the principle human produced greenhouse gas and categorized as a hazard to human health. Natural gas, composed mostly of methane has energy released from carbon-hydrogen bonds, coal has carbon-carbon bonds that produce less energy per unit of carbon dioxide produced. According to the U.S. Energy Information Administration anthracite coal produces nearly double the carbon dioxide of natural gas to produce the same amount of energy. A technology that could buy coal some time to reinvent itself must yield “green coal” and produce energy with an emissions profile comparable to that of natural gas.

A nascent solution to turn coal green shines on us every day. By using sunlight to produce hydrogen inexpensively, the exothermic reaction of flue gas rich in carbon dioxide to form combustible methane and steam can change the prospects of coal. This reaction, known for over 100 years as the Sabatier Reaction had been impractical in the past when electrical energy needed to produce hydrogen was derived from fossil fuel combustion. The sun offers the paradigm shift in providing a free power source. The efficiency of using the energy of the sun to directly split water into hydrogen and oxygen gases appears to be optimal for performing the Sabatier Reaction on coal combustion flue gases. The fact that the energy of hydrogen is stored in a chemical bond offers still greater advantages as compared to solar electricity production that must then be stored in complex and expensive batteries for off-peak usage.

A window exists for bringing solar hydrogen systems on-line to treat coal flue gas to give the coal industry time to adapt to the 21st century energy demands and to provide those communities economically tied to coal a chance to not only survive but again thrive. Green coal boosted by sun powered hydrogen also represents a strategic energy reserve in the event that the

hidden environmental costs of fracking curtail our current dependency on cheap natural gas. We have named this Patented Process Nanosolarlysis; and, contrary to those driving the death nail into the U.S. Coal Industry, inexpensive hydrogen for inclusion in coal treatment to counter harmful emissions is now possible. Given a fair chance for American Ingenuity to see the light of day, the pivotal transition toward energy independence and green coal is just a sunrise away!



MATTHEW G. BEVIN
GOVERNOR

DEPARTMENT FOR LOCAL GOVERNMENT
OFFICE OF THE GOVERNOR

SANDRA K. DUNAHOO
COMMISSIONER

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

December 7, 2018

Mrs. Ashley Pilakowski
Tennessee Valley Authority
400 W Summit Hill Dr.
Knoxville, TN 37902

RE: Potential Retirement of Paradise Fossil Plant
SAI# KY201811191146
CFDA# 00.000

Dear Mrs. Pilakowski:

The Kentucky State e-Clearinghouse is the official designated Single Point of Contact (SPOC) for the Commonwealth pursuant to Presidential Executive Order 12372, and supported by Kentucky Statutes KRS 45.03. The primary function of the SPOC is to streamline the review aforementioned process for the applicant and the funding agency. This process helps in vocalizing the statutory and regulatory requirements. Information in the form of comments, if any, will be attached to this correspondence.

This proposal has been reviewed by the appropriate state agencies in the e-Clearinghouse for conflicts with state or local plans, goals and objectives. After receiving this letter, you should make it available to the funding agency and continue with the funding agencies application process. This e-clearinghouse SPOC letter signifies only that the project has followed the state reviewing requirements, and is neither a commitment of funds from this agency or any other state or federal agency. Please remember if any federal reviews are required the applicant must follow through with those federal agencies.

The results of this review are valid for one year from the date of this letter. If the project is not submitted to the funding agency or not approved within one year after the completion of this review, the applicant can request an extension by email to [REDACTED]. If the project changes in any way after the review, the applicant must reapply through the eclearinghouse for a new review. There are no exceptions.

If you have any questions regarding this letter or the review process please contact the e-Clearinghouse office at [REDACTED]

Sincerely,

Lee Nalley, SPOC
Kentucky State Clearinghouse

Attachment

Fish and Wildlife

Dan Stoelb

Based on the information provided, the Kentucky Department of Fish & Wildlife Resources has no comments concerning the proposed project. Please contact Dan Stoelb @ [REDACTED] if you have further questions or require additional information.

Housing Building and Construction

Carlos Spicer

The Department of Housing Buildings and Construction, Division of Building Code Enforcement, has no comments concerning the proposed project.

Kentucky Transportation Cabinet, District 2

Nick Hall

no comments

KY Heritage Council

Yvonne Sherrick

To receive a review from the KY Heritage Council/State Historical Preservation Office (SHPO) you must follow the instructions located on their website at <http://www.heritage.ky.gov/siteprotect/> . There you will find the required documents for the Section 106 Review and Compliance for 36 CFR Part 800. This Section 106 submission process to SHPO will assist applicants and agencies in providing the appropriate level of information to receive comments from SHPO. If you have any questions please contact Yvonne Sherrick, Administrative Specialist III, [REDACTED]

Please note: If your project is funded through Transportation Alternative (TAP), Transportation Enhancements (TE), Congestion, Mitigation, Air Quality (CMAQ), or Safe Routes to School (SRTS) you will need to send this information to Michael Jones, Historic Preservation Program Administrator with the Kentucky Transportation Cabinet via email [REDACTED] or hard copy to Michael Jones, Office of Local Programs, KY Transportation Cabinet, 200 Mero Street Frankfort, KY 40622. Do not send materials directly to SHPO if your project involves funding from these four sources as it will cause delays in the review process. Michael Jones will consult directly with the SHPO on projects with these funding sources to complete the Section 106 review.

Pennyrile ADD

Melody Goodwin

Amy Frogue - Endorse with Comments No comment

To Whom It May Concern:

I was writing you in regards to the possible shut down of Unit 3 in Muhlenberg County. My husband and I have lived in Muhlenberg County our entire lives. Muhlenberg County is a small community with a friendly and close-knit group of people. We are raising our children in this community currently, not because we have to, but because we want to. My hope will be that job opportunities will be available for my children in our county when they graduate. TVA has always offered jobs that gave people the chance to provide for their families and give back to their community. If you shut down Unit 3 it will be devastating to our community as well as the future of Muhlenberg County. Shutting Down Unit 3 would result in many jobs lost and people would have to move away to look for work. TVA is a vital part of Muhlenberg County and coal is a vital part of our nation, it has been for years and will continue to be. When you sit down and discuss the future of Unit 3 please remember you are deciding the future of a community, future youth that want to pursue a job at TVA and the jobs of current employees of TVA that have families to provide for. We have so few jobs that can provide for a family in the county. Please do not take the remaining ones away. This decision will not only devastate TVA employees but it will trickle down to a whole community of people.

Thank you for your time!

Brian and Candace Lile

Humphreys-Rowe, Abbey

From: Board of Directors
Sent: Wednesday, December 19, 2018 7:39 AM
To: Pilakowski, Ashley Anne
Cc: Campbell, Laura J; Tudor, Andrew Wade; Hydas, James Hunter
Subject: FW: PAF Closure

From: Maxwell, Erica [REDACTED]
Sent: Monday, December 17, 2018 8:29 PM
To: Board of Directors <bod@tva.gov>
Subject: PAF Closure

TVA External Message. Please use caution when opening.

Dear TVA Board Members,

I am certain with the influx of letters most will not be read so I will keep this short and sweet. I sincerely ask that you consider more than numbers and statistics as you make your decision in closing PAF. For a community that is already economically disadvantaged, this will have devastating impacts to those of us who want to remain. Many here are not fortunate enough to simply "pack up and leave" and to our school system there will be undoubtable negative consequences. Through much research, I have learned that the need for coal seems to be disappearing globally. I would ask that you consider reinvesting in our community in hopes of becoming leaders in clean energy. If economically it is not possible for PAF to remain as a backup, then I would ask that you consider replacing it with another gas plant at this site. It will in no way replace the number of jobs lost, but could at least soften the blow to our community.

Thank you for your time and consideration.

Sincerely,

Erica Maxwell

Humphreys-Rowe, Abbey

From: Board of Directors
Sent: Monday, December 10, 2018 4:56 PM
To: Pilakowski, Ashley Anne
Cc: Campbell, Laura J; Tudor, Andrew J; Hydass, James Hunter
Subject: FW: Unit 3

Follow Up Flag: Flag for follow up
Flag Status: Flagged

From: DOUGLAS MAYHUGH [REDACTED]
Sent: Monday, December 03, 2018 1:29 PM
To: Board of Directors <bod@tva.gov>
Subject: Unit 3

TVA External Message. Please use caution when opening.

We need to keep this in operation.

From: [Jon McCay](#)
To: [Pilakowski, Ashley Anne](#)
Subject: Paradise Fossil Plant
Date: Monday, December 17, 2018 7:37:30 PM

TVA External Message. Please use caution when opening.

TVA,

Please DO NOT shut down the Muhlenberg County Paradise Fossil Plant operating on coal. Please allow it to continue to operate on coal. My chief concern is national security. If all plants are operated by natural gas, and the pipeline stretches for quite a ways, it is possible natural disaster or terrorists could cause severe disruptions to service. If the coal fired plant is kept, and natural gas service is disrupted, coal can keep on burning for customers until service to natural gas can be restored to the other units.

Today, if one would drive around Muhlenberg County, you can easily see the effect of the downturn of the local coal economy. Once proud and thriving communities are turning into slums and ghost towns. Several businesses have closed, such as the movie theater, several restaurants, and stores. I think the most recent downturn is due to Louisville going to natural gas as well as the Paradise location going to 2 out of 3 burners operating off of natural gas. Soon, Owensboro (OMU) will go all gas as well, probably causing a further downturn in the local economy. I don't have solid numbers available, but a short drive around Muhlenberg County, and one can easily see what I'm talking about.

People around here are economically depressed and this is causing emotional distress. Many just don't have any fight anymore. This could be why so many have turned to drugs & alcohol abuse. Further cuts to coal jobs could only cause more heartache and family strife as well as added hardship to the local economy.

What are people supposed to do if they lost their jobs? It's easy to say "just move", but when you have friends and family around, it isn't always easy to just pick up and leave. I personally had my cousin's husband to lose his job and he left and moved out west to work in a mine. This caused him and my cousin to divorce, setting her down a very self destructive path.

In any case, the vast majority of environmentalists don't live in Muhlenberg County, Western KY, or even in the Commonwealth of Kentucky. They don't see and probably don't care what shutting down coal mines have done to the people Kentucky and West Virginia. Those people are probably not customers of TVA either.

Please DO NOT shut down the coal fired unit at Paradise. I am a customer of TVA and the coal fired plant at Paradise.

Sincerely,

Jonathan McCay

A black rectangular redaction box covering the signature area.

From: [REDACTED]
To: [Pilakowski, Ashley Anne](#)
Subject: Ashley A. Pilakowski, NEPA Compliance, Paradise Fossil Plant
Date: Thursday, December 6, 2018 9:52:00 PM

TVA External Message. Please use caution when opening.

Please consider leaving operating Unit 3 open, as our community will die if this unit is closed. Families, children, will have to leave where they were born and their parents. It will hurt our schools, our children education and many jobs in our community. Taxes will have to be raised each years on everyone, even the elderly, in order to keep our schools opened. Businesses will leave, as there will be few jobs here, hospitals will close, grocery stores will close, and many more. We need to build our Rural Community up, not let them die, so our young people for generations can remain in their (Home) Community.

Even though we have Unit 1, and Unit 2, that have gone to gas, what will happen in years to come if gas will get higher and then people cannot afford to pay for the heating of their homes or in the Unites States we have a terrible situations like 911 in New York or other extreme situations, where we would need a coal burning unit. It is always good to have a backup plan in place. With only 1 coal unit going the environmental impact should not be as bad, as all 3 going. Everyone is now telling our country we need to train our young people in Tech, instead of them going to college for other type jobs.

I am an citizens of Muhlenberg County and I am asking you to Give Back to our Community and leave Unit 3 Open, which is a Coal Burning Unit. Please consider the impact this will have on our small community.

Sincerely, Joan McClellan



www.murrayenergycorp.com

December 19, 2018

Via Electronic Mail: aapilakowski@tva.gov

Ms. Ashley Pilakowski
NEPA Compliance
Tennessee Valley Authority
400 West Summit Hill Drive
WT 11B
Knoxville, Tennessee 37902

Re: Comments of Murray Energy Corporation on the Tennessee Valley Authority's *Potential Paradise Fossil Plant Retirement: Draft Environmental Assessment* (Muhlenberg County, Kentucky) (November 2018)

Dear Ms. Pilakowski:

Murray Energy Corporation ("Murray Energy") is pleased to have the opportunity to submit comments on the Tennessee Valley Authority's ("TVA") Draft Environmental Assessment ("EA") prepared by TVA to assess the site-specific impacts of the potential retirement of Paradise Fossil Plant Unit 3 ("Unit 3") located in Muhlenberg County, Kentucky. This letter sets forth the comments of Murray Energy on the EA and provides additional information for consideration by TVA in connection with TVA's evaluation of the future operation of Unit 3.

Murray Energy employs over 6,000 individuals at 13 major coal mining complexes in 6 states and Colombia, South America and produces 76 million tons of high-quality, bituminous coal each year predominantly for electric power generation. In Kentucky, Murray Energy, through its subsidiary companies, owns and operates KenAmerican Resources, Inc.'s Paradise Mine, The Western Kentucky Coal Company, LLC's Genesis Mine and The Muhlenberg County Coal Company, LLC's Pride Mine. For calendar year 2018, the Paradise Mine, Genesis Mine and Pride Mine are projected to produce a total of approximately 4.8 million tons of coal. Of that amount, approximately 29% or 1.4 million tons is slated for delivery to TVA's Unit 3. For calendar year 2019, the 3 mines are projected to produce a total of 5.5 million tons of coal with 36% of that figure, or 2.0 million tons, being scheduled for delivery to TVA's Unit 3.

Murray Energy is strongly opposed to the potential retirement of Unit 3 as contemplated in the EA. As an initial matter, the EA is flawed because TVA has failed to provide a sufficient opportunity for public review and comment on the EA. The 30 day comment period set forth in the EA is simply not sufficient for members of the general public to obtain, read and evaluate the EA along with the 37

other reports or documents cited in the EA. In addition, the retirement of Unit 3 is highly controversial and could devastate local and regional economies in the areas of western Kentucky surrounding the Paradise Fossil Plant. Yet, the EA fails to demonstrate a need for Unit 3's retirement, offers only a cursory statement of justifications for the action, and fails to provide hard data supporting the alleged costs that TVA claims will make future operation of Unit 3 too expensive.

The EA is also flawed because it only presents 2 alternatives – full retirement and decommissioning or continued operation at current levels – thereby impermissibly limiting the range of alternatives under consideration. Indeed, the EA appears specifically designed to avoid consideration of any alternative other than retirement of Unit 3. Such an outcome-oriented assessment is antithetical to the purpose and requirements of the National Environmental Policy Act (“NEPA”) and TVA's own procedures for NEPA compliance. In short, TVA must consider additional alternatives for Unit 3. The EA also fails to consider the impacts from required decommissioning projects that will inevitably result from a decision by TVA to retire Unit 3.

Finally, and most importantly, the EA's assessment of the employment and economic impacts of a decision by TVA to retire Unit 3 significantly understates or ignores the expected loss of coal mining jobs and jobs in other industries in the region and generally fails to fully apprehend the direct and indirect consequences of retiring Unit 3 on the economy of western Kentucky. The EA gives economic and employment consequences no meaningful consideration in the analysis, and to the extent that the EA recognizes the economic and employment consequences of a retirement decision, it merely brushes them off as unimportant to the EA review.

1. TVA has failed to provide a Sufficient Opportunity for Public Review and Comment on the EA.

Murray Energy believes that the 30 day comment period set forth in the EA is not sufficient to allow for meaningful public review and comment on the EA. TVA's NEPA procedures encourage “timely and meaningful public input” on the environmental assessment process.¹ However, the EA was released by TVA on Monday, November 19 just before the Thanksgiving holiday and the beginning of the Christmas holiday season. While Murray Energy routinely monitors announcements affecting the coal and electric utility industries, it is very likely that word of the TVA announcement concerning the EA did not immediately reach members of the general public in sufficient time to allow for “timely and meaningful public input.”

Further supporting the argument that the 30 day comment period is not sufficient to allow for meaningful public review and comment on the EA is that the amount of information that a member of the general public would need to review, digest and analyze in order to fully and meaningfully evaluate the numerous conclusions in the EA is staggering. The EA itself is 62 pages in length and cites 37 other reports or documents totaling thousands of additional pages.² The EA further assumes that the reader will be knowledgeable of the thousands of pages of information generated as part of 6 other environmental assessments and impact statements.³ Yet, the EA fails to cite in most instances to

¹ *TVA's Procedures for Compliance With the National Environmental Policy Act*, Section 5.3.2 (hereinafter, “TVA NEPA Procedures”).

² EA at Chapter 6 (Literature Cited).

³ EA Section 1.3 (Related Environmental Reviews).

specific sections of any of these documents to support the EA's many conclusory statements. As such, to weigh in on each point made by the EA, a reader would somehow need to digest thousands of pages of highly technical material, and develop comments, in less than 30 days. This is virtually impossible for most, if not all, members of the general public.

A decision by TVA to retire Unit 3 will have significant and far-reaching economic consequences for the entire western Kentucky region. Accordingly, TVA should not short-circuit the public review and comment process to exclude or limit meaningful public involvement. In this situation, both NEPA and TVA's own procedures for NEPA compliance require a more robust public participation process. In this case, however, TVA has largely kept the public shut out of the decision-making process and appears to be rushing ahead with a retirement decision before the voices of Kentuckians can be heard.

The purpose of NEPA's EA process is to generate "meaningful" public comment.⁴ Such meaningful input is not possible in the limited 30 day period provided for comment, and TVA should extend the comment period by at least an additional 90 days -- or in the alternative, if TVA desires to pursue the retirement of Unit 3, TVA should support its decision not with a cursory EA but with a full environmental impact statement.⁵ A decision of such momentous importance, which threatens the livelihoods of hundreds of individuals and the reliability and resiliency of TVA's power supply, deserves a full and complete opportunity to allow for public review and comment on the EA and associated documents.

Moreover, the timing of this rushed public review gives the impression that TVA does not really intend to give any consideration to the public comments it does receive. TVA is purportedly planning to make a *final* decision on Unit 3's retirement at its February, 2019 Board of Directors meeting. Even assuming the public went through the incredibly time-consuming exercise of reviewing and analyzing the many documents cited in the EA and providing detailed comments, there is simply no way TVA could meaningfully consider those comments in a few short weeks prior to the Board meeting in February.

Therefore, the need for more deliberation, by a fully staffed TVA Board, is all the more necessary here in light of serious allegations that TVA has intentionally misled or misdirected key policy makers regarding its intentions with respect to Unit 3. For example, U.S. Senator Rand Paul's office has stated, "[t]hroughout discussions regarding TVA's entire generating fleet being placed under review, no mention of a potential retirement of Paradise Unit 3 was made" until the draft EA was released in late November.⁶ The numerous community members, industries, policy makers and

⁴ *Ohio Valley Env'tl. Coalition v. U.S. Army Corps of Engineers*, C.A. No. 3:08-0979 (S.D. W.Va. Oct. 31, 2008) (granting injunction where NEPA notice was insufficient).

⁵ TVA NEPA Procedures at Section 5.4.1 ("The following actions normally will require an environmental impact statement...1. Major power generating facilities...4. Any major action, the environmental impact of which is expected to be highly controversial...5. Any other major action which will have a significant effect on the quality of the human environment...").

⁶ <https://www.paul.senate.gov/news/sen-rand-paul-blasts-tva-proposed-closure-western-kentucky-coal-fired-plant> (last visited December 12, 2018).

stakeholders with an interest in this process were therefore caught off guard by the EA's publication and are being forced to respond to it on an unnecessarily truncated timeline, while TVA is also allowing itself virtually no time to meaningfully review the numerous comments it is still likely to receive.

Thus, at a minimum, TVA must provide a minimum of 90 additional days for the public to participate in the EA process, and to allow TVA itself additional time to evaluate public input after comments are received. Only by doing so can TVA begin to repair the damage it has continually caused to its relationship with ratepayers and the local community.⁷

2. TVA's Retirement of Unit 3 will result in Significant Job Losses and Devastating Impacts to the Economy in Western Kentucky.

The EA significantly understates both the direct and indirect job losses that will result from the retirement of Unit 3. First, the EA assumes that only a portion of the 131 direct TVA employees at Paradise will lose their jobs yet the EA provides no meaningful support for the assumption that some percentage of the Unit 3 employees will be able to find other employment. Aside from passing references to those workers maybe being able to find (lower paying) jobs in health care and education,⁸ there is no data in the EA to support any conclusion that the lost employment resulting from Unit 3's retirement will ever be replaced.

In addition, the EA appears to assume no significant loss of coal mining employment as the result of a decision to retire Unit 3 stating that unless coal mines find alternative markets for the coal tonnage purchased for Unit 3, "minor indirect adverse economic impacts to the affected counties and a portion of western Kentucky would occur."⁹ (Emphasis added). The problem is that the EA assumes that only 135 coal mining jobs are tied to the coal consumed by Unit 3, but in actuality, this number is much greater. Total employment at the Paradise Mine, Genesis Mine and Pride Mine is approximately 700 employees – well in excess of the 135 figure assumed in the EA. These jobs represent over \$75 million in value to the local economy in the form of wages and benefits.

In 2018, each of the 3 mines produced coal for sale and delivery to TVA's Unit 3. The retirement of Unit 3 would certainly have a significant negative effect on each mine although due to the short time frame for submitting comments on the EA, Murray Energy has not yet determined the exact impact. Given that the Paradise Mine, Genesis Mine and Pride Mine are projected to deliver approximately 1.4 million tons of coal to Unit 3 in 2018 with that number projected to increase to 2.0

⁷ Even today, TVA continues to send mixed messages to the general public with respect to Unit 3. For example, one portion of TVA's website states unequivocally that "Unit 3 will continue operation." <https://www.tva.gov/Energy/Our-Power-System/Coal/Paradise-Fossil-Plant> (last visited December 12, 2018). Although this may not be a deliberate attempt to mislead the public, such statements would lead the public to believe that TVA is not considering retirement of the unit, when in fact the EA indicates that retirement is the only option truly under consideration.

⁸ EA, p. 46.

⁹ EA, p. 47.

million tons in 2019, the impact of the closure of Unit 3 could be substantially more than the 135 jobs assumed by the EA.

Moreover, the EA's conclusion that the loss of hundreds of jobs is "minor" is insulting to the hard working coal miners who will be impacted by a decision to retire Unit 3. The EA itself acknowledges that unemployment in most of the region is well above the state average, so any loss of high-paying employment in the region is more than "minor" to those people who are impacted.

The EA also makes no meaningful effort to consider indirect employment impacts in the western Kentucky region. For example, while the EA recognizes that the transportation and limestone mining industries will be impacted, no attempt is made to determine the extent of these impacts.¹⁰ In addition, indirect job losses affecting other industries including the retail, restaurant and service industry sectors can be expected to result from a decision to retire Unit 3. The indirect job losses could be staggering. A Penn State University study projects that in coal mining regions of the country, for every coal mining job, 11 jobs are created in the community. Although the EA significantly understates the potential loss of coal mining jobs, even using the EA's low figure of 135 coal mining job losses tied to Unit 3, the loss of those jobs has the potential to cause a total loss of almost 1,500 jobs in the surrounding communities. Given the relatively high wages and associated benefits of the TVA jobs involved at Unit 3, a similar impact could be anticipated for each worker at the Paradise Plant. Accordingly, a decision to retire Unit 3 has the potential to cause a total loss of well over 2,000 jobs in the region. As the EA itself acknowledges, there are only approximately 10,000 jobs in Muhlenberg County as a whole. The loss of over 2,000 jobs in Muhlenberg County and the surrounding counties threatens to send the local economies into Depression-era levels of unemployment.

In summary, the conclusions in the EA's socioeconomic analysis are significantly flawed. There is no doubt that the retirement of Unit 3 will have a devastating impact on jobs and the local economy of Muhlenberg County and the surrounding areas in western Kentucky. Yet, the EA significantly understates direct impacts to coal mining employment in the region, ignores indirect employment impacts to other industries, and fails entirely to apprehend the devastating economic impact to western Kentucky if Unit 3 is retired.

Additionally, the EA makes numerous unfounded or irrelevant statements in a misguided attempt to argue that the socioeconomic impact of the retirement of Unit 3 will be minimized by positive benefits of the retirement realized in other states. For example, in a shocking and insulting affront to the western Kentuckians who will be harmed by a retirement decision, the EA claims that retirement of Unit 3 will have "positive indirect economic impacts throughout the Southeast Region" because Alabama, Mississippi and Tennessee will receive additional in lieu of tax payments.¹¹ This statement unnecessarily confuses the analysis, and borders on disingenuous. First, it is cold comfort to any western Kentucky resident that loses his or her job as a result of the retirement of Unit 3 that the tax situation in other states may slightly improve after he loses his job. Second, the assumption that other states will see increased in lieu of tax payments may not be accurate, given that TVA plans to

¹⁰ EA, p. 47.

¹¹ EA, p. 47.

retire units in other states as well, so those other states may also see a decrease in payments.¹² Third, the discussion of alleged positive indirect impacts does not take into account the various taxes paid by the Kentucky companies in other industries like coal mining, limestone mining and transportation that support Unit 3.¹³

3. **There is No Demonstrated Need for Retirement of Unit 3.**

The EA fails to demonstrate a need for the retirement of Unit 3 offering only a cursory statement of justifications for the action. The EA further fails to provide hard data supporting the alleged costs that TVA claims will make future operation of the unit too expensive.

The foundation of NEPA review is a fully articulated statement of purpose and need for the proposed project, and an agency cannot define “need” so narrowly “that the outcome [is] preordained.”¹⁴ Here, TVA asserts that it “needs” to retire Unit 3, but has failed to demonstrate that such need actually exists. By not fully justifying the need to retire Unit 3, the EA also fails to consider a sufficient range of reasonable alternatives. Indeed, the only conclusion that can be drawn is that TVA has an animus against coal-fired power generation and is performing the EA as a mere rubber stamp on a policy decision to abandon coal as a portion of its generation mix.

The EA makes cursory reference to “costs that would be incurred at PAF Unit 3 in the next few years” as the need to assess potential retirement of the unit.¹⁵ But the fact that Unit 3 will incur costs in future years is no reason to retire it. All generating options will incur certain costs. The issue is whether the costs warrant retirement or pursuit of other options. The analysis in the EA fails to support the conclusion that costs at Unit 3 require retirement of the unit, because it fails to provide necessary data supporting cost estimates, fails to provide any methodology for analyzing these costs, and fails to provide any justification for why the alleged cost assumptions were reasonable. The EA is in fact utterly devoid of data outlining the “costs” involved, and wholly fails to compare these costs to the costs of other generation sources or similar sources in the industry. NEPA does not require the interested public to merely accept at face value all of the conclusions in the EA. Instead, the conclusions should be supported with meaningful data, which is wholly lacking in the statement of need.

¹² At the same time it announced a potential retirement of Paradise Unit 3, TVA also announced plans to retire units at the Bull Run plant in Tennessee. The retirement of Bull Run would likely reduce in lieu of tax payments made in Tennessee as well, so it is unclear how TVA supports its assertion that that in lieu of tax payments will increase in Tennessee. Indeed, the conclusion that in lieu of tax payments will increase anywhere is supported by no data.

¹³ Kentucky’s coal producers alone create hundreds of millions of dollars in severance, unmined minerals, sales, payroll and other taxes in Kentucky. See *Kentucky Coal Facts*, 17th ed. (2017) (“Kentucky Coal Facts”) at p. 34 available at [http://energy.ky.gov/Coal%20Facts%20Library/Kentucky%20Coal%20Facts%20-%202017th%20Edition%20\(2017\).pdf](http://energy.ky.gov/Coal%20Facts%20Library/Kentucky%20Coal%20Facts%20-%202017th%20Edition%20(2017).pdf) (last visited December 12, 2018) (describing extent of taxes paid by Kentucky coal industry).

¹⁴ See *Alaska Survival v. Surface Transportation Bd.*, 705 F.3d 1073, 1084 (9th Cir. 2013).

¹⁵ EA, p. 2.

The EA points to costs associated with EPA's Coal Combustion Residuals ("CCR") Rule as a reason to retire Unit 3. But this justification fails for several reasons. First, the EA does not actually document any costs at all; instead, it simply lists projects. And the EA recognizes that many of these projects associated with coal combustion residuals management *will be carried out regardless of whether the unit is retired or not*.¹⁶ The EA therefore fails to demonstrate that CCR projects, standing alone, create a need to retire the unit.

The EA also points to a purported future rotor replacement as a need to retire the unit.¹⁷ But again, no supporting information regarding this project is provided. The interested public is therefore left to wonder whether this is a legitimate cost, or instead a pretext to further TVA's agenda to move its generation mix away from coal power. And even if the rotor replacement is a legitimate cost item, there is no indication in the EA that this single project is of such an enormous cost as to support the drastic decision to retire the unit, especially in light of the costs TVA has already recently expended to upgrade the unit to meet various environmental requirements.

In fact, the EA does not address at all the costs already expended to upgrade Unit 3 or whether TVA will continue to recoup these costs from its ratepayers. TVA, and in turn its ratepayers, made massive investments in pollution control technology at Unit 3 over the past 10 to 15 years. The extent to which the ratepayers have already funded these projects (and the extent to which they will continue to do so for years to come), warrants significant consideration in determining whether a need to retire Unit 3 exists. Indeed, the EA recognizes that the continued operation of Unit 3 will not cause a negative environmental impact precisely because the unit has already been upgraded with modern pollution control technology.¹⁸ It only seems logical that TVA would continue to obtain the benefit of this prior investment by operating Unit 3 to produce low-cost, reliable, and resilient and electricity for as long as reasonably possible, given the significant investment already made in the unit. Continuing to operate a unit that is already upgraded, and already paid for, certainly seems like a smarter decision than shuttering this viable unit and then spending approximately \$8 Billion over the next twenty years on new generating facilities, as TVA has committed to doing.¹⁹ Ratepayers should be shocked that a utility which already claims to have so much generating capacity that it can retire a 1,150 MW unit without any need to replace that unit's lost capacity²⁰ would be spending \$8 Billion dollars on new generation, at the same time that it continues to raise rates.²¹

¹⁶ EA, p. 8-9 (listing ten separate CCR projects that will be performed "under either alternative").

¹⁷ EA, p. 2.

¹⁸ EA, pp. 15-17.

¹⁹ <https://platform.mi.spglobal.com/web/client?auth=inherit#news/article?id=46098556&cdid=A-46098556-11814> (last visited December 12, 2018) (stating that TVA remains committed to spending \$8 Billion renewable energy generation in the next 20 years).

²⁰ EA, p. 3 (indicating TVA has "no immediate need to replace the generating capacity currently provided by PAF Unit 3).

²¹ <https://www.tva.gov/Newsroom/Press-Releases/TVA-FY19-Budget-Maintains-Focus-on-Providing-Long-Term-Value-to-the-Valley> (last visited December 12, 2018) (reporting on TVA's recent 1.5% rate increase approved in August).

TVA must consider whether “costs”, standing alone, can ever be a sufficient basis for the retirement of Unit 3, given its crucial role in driving economic development in the western Kentucky region.²² TVA’s mandate is unique, and extends beyond simply reducing its costs and increasing operating margins. Instead, TVA’s mission extends to fostering economic development of the region. The EA itself recognizes (but does not fully capture) the vital role the coal-fired generation at Unit 3 plays in economic development. In light of the outsized role this unit plays in the economic well-being of the region, an unnecessary move to retire a unit directly employing over 130 workers (and providing employment to hundreds more in other industries) is contrary to TVA’s economic development mandate, and calls into question whether any “need” to retire the unit exists.

Finally, any determination of “need” for retirement is necessarily premature given that TVA is still reviewing its future generation needs. Although the EA points to the 2015 integrated resource plan,²³ that IRP does not mandate the retirement of Unit 3. Moreover, the 2019 IRP process is still underway,²⁴ and so it cannot form the basis of a retirement decision at this point, unless of course the outcome of the current IRP is already a foregone conclusion with respect to abandonment of coal from the generating mix. Murray Energy strongly opposes the secrecy that has surrounded TVA’s 2018 IRP process.²⁵ But assuming TVA is acting in good faith in its ongoing evaluation of resource planning needs, it would be premature to make a retirement decision while that IRP process is still underway.²⁶ Further, TVA apparently intends to make a retirement decision at its next Board of Directors meeting, but the board does not have its full composition of members. At least one Board nomination remains pending before the Senate for confirmation. A decision of such major importance should await the outcome of the current IRP process and should be made by a full Board. Unless and until the current IRP process is complete and TVA has a full Board, there can be no true demonstration of need for the project.

²² <https://www.tva.gov/Newsroom/News-Features/Our-Year-of-Achievement> (last visited December 12, 2018) (describing one of TVA’s core missions as promoting economic development).

²³ EA, p. 2.

²⁴ <https://www.tva.com/Environment/Environmental-Stewardship/Integrated-Resource-Plan> (last visited December 12, 2018).

²⁵ *Id.* (members of the IRP committee are anonymous).

²⁶ Of course, it is logical to question whether the outcome of the IRP process is predetermined, given that TVA has already announced a commitment to spend \$8 Billion on renewables in the next 20 years, whether it actually needs to do so or not, and apparently without regard to what this might cost ratepayers.

4. The EA Violates NEPA by Failing to Consider Available Alternatives to Retirement of Unit 3.

NEPA requires a consideration of a full range of reasonable alternatives to the proposed action.²⁷ In contravention of this requirement, the EA analyzes only two (2) options: continued operation or full retirement of Unit 3. By presenting a black or white choice between continued operation of Unit 3 and full retirement and decommissioning of Unit 3, the outcome of the EA process is naturally slanted to support the preferred alternative. By ignoring other alternatives, the EA violates NEPA, and more fundamentally deprives TVA's ratepayers and other interested parties of a meaningful role in the environmental review process.

It is well known that alternatives to retirement and full decommissioning exist. For example, Unit 3 could be utilized as a peaking unit or potentially idled, but not fully retired. In addition, TVA could evaluate whether the sale of Unit 3 to a private entity for continued operation is a viable course of action. Alternatively, TVA could consider engaging a private party to operate Unit 3 with TVA having the option to purchase the electric power generated by Unit 3. Yet, in the EA, TVA has only considered 1 alternative to the continued operation of Unit 3, that being full retirement. Clearly, there are viable alternatives for Unit 3 that the EA has completely ignored.

The alternatives to full retirement mentioned above may better serve the ratepayers and customers of TVA by providing greater benefits when compared to full retirement of Unit 3. But the EA fails to consider any alternatives for Unit 3 other than full retirement. For example, operating Unit 3 as a peaking unit or idling Unit 3 would allow the unit to serve as security against disruptions in the nation's electric power grid and as a hedge against current natural gas price volatility and future increases in the price of natural gas or other fuel sources. Maintaining the potential to operate a fuel-secure coal-fired unit also provides reliability and resiliency benefits compared to the inherently intermittent nature of renewable sources.²⁸ Indeed, because the EA assumes no electric load growth, TVA would necessarily be required to make additional capital investments should electricity demand increase after Unit 3 is retired. Rather than boxing itself in to a reliance on intermittent and unreliable sources of fuel, the alternative of operating Unit 3 as a peaking unit or idling Unit 3 would serve as a protection against many future risks. By not considering these important alternatives, the EA's analysis is constrained to the point of being ineffective and incomplete.

5. The EA Violates NEPA by Failing to Consider Full Costs of Retiring Unit 3.

The EA acknowledges that if Unit 3 is retired, a number of decommissioning activities will need to take place in the near term. However, the EA glosses over or completely ignores the environmental impact of the de-commissioning activities. Indeed, the EA does not analyze the environmental impact of chemical impoundment closure or deconstruction and demolition of Unit 3,

²⁷ 40 CFR 1502.14(a).

²⁸ Federal energy regulators are urging utilities to consider the importance of grid resiliency and security. It is possible that other utilities will soon be required to value these important attributes. *See, e.g.*, FERC Docket No. RM18-1-000. TVA will place its ratepayers at a significant disadvantage to those served by other utilities if it continues to take steps that make its generation fleet less resilient and less secure.

even though these projects are foreseeable in a retirement scenario.²⁹ By failing to give any consideration to the environmental impact of these de-commissioning activities, the EA improperly segments “retirement” of Unit 3 from its de-commissioning, even though the EA acknowledges that de-commissioning and retirement are inextricably intertwined. The intent is apparent – to avoid a meaningful study of environmental consequences by analyzing only “retirement” in a vacuum in a hypothetical future scenario that will never actually come to pass, thereby supporting TVA’s preferred (and apparently predetermined) outcome of retirement. NEPA review must reflect the natural direct results of the proposed action. In this case, Unit 3 will not simply be “retired” and cease producing power. Rather, a number of additional follow-on activities will take place. By failing to analyze these foreseeable future projects and the environmental or socioeconomic impact of these additional activities, the EA fails to comply with the requirements of NEPA.

In summary, for the reasons described in this letter, Murray Energy is strongly opposed to the potential retirement of Unit 3 as contemplated in the EA. Moreover, any decision by TVA to retire Unit 3 will result in significant job losses and devastating impacts to the local and regional economies in the areas of western Kentucky surrounding the Paradise Fossil Plant. In such a situation, both NEPA and TVA’s own procedures for NEPA compliance require a more extensive public participation process. As such, the opportunity for public review and comment should be extended by a minimum of 90 days, or in the alternative, if TVA desires to pursue retirement of Unit 3, TVA should support its decision with a full environmental impact statement instead of a conclusory EA.

Thank you for considering this additional information.

Sincerely,



Jason D. Witt
Assistant General Counsel

²⁹ EA, p. 7.

From: [Steve](#)
To: [Pilakowski, Ashley Anne](#)
Subject: Paradise unit 3
Date: Thursday, December 6, 2018 11:01:49 AM

TVA External Message. Please use caution when opening.

I feel its a mistake to idle this unit. It would be detrimental to the local economy.

Thank you

Steve Michael



Paradise Environmental Assessment (EA) Inaccuracies

- The EA data is based off of the 2015 Integrated Resource Plan (IRP) and under the assumption that natural gas prices have remained relatively low.
 - The natural gas prices have increased since 2015 and current prices is \$4.43/MMBtu.
- The EA states that PAF3 falls into this category of - assets that have relatively high projected future maintenance cost and environmental compliance expenditures, a high forced outage rate and poor generation portfolio fit, are now the focus of more detailed study for potential retirement. The EA stated that material condition deterioration has resulted in reliability challenges and higher forced outage rates.
 - The EA does not acknowledge several updates and/or replacement of major equipment and controls, that have taken place over the past few years. These improvements have greatly improved reliability and increased the runtime between outages. The recent 145 day runtime is a testament to these improvements. The wording in the EA gives the perception of the plant is in disrepair and requires major funding to meet system needs.
- The EA addresses the projected future environmental compliance costly expenditures needed to remain in operation and meet the USEPA's Coal Combustion Residual (CCR) and Effluent Limitation Guidelines rules; the need to build a gypsum dewatering facility and a dry fly ash handling system.
 - The EA gives perception that the funding has not been allocated for future compliance. In reality the dewatering facility is nearing completion, with the commissioning of equipment in Dec 2018, and commissioning of equipment for the dry fly ash in the summer of 2019.
- The EA, is worded as if to persuade or guide those making the decisions that PAF3 does not fit in TVA's current portfolio needs. It reference that PAF 3 is in the bottom quartile of the U.S coal fleet for forced outages occurrences.
 - PAF3 is currently leading the coal fleet for EFOR. Target FYTD: 15.09 and Actual FYTD: 12.37
 - PAF 3 is also leading the fleet in Safety with over 1200+ days of no Recordable Injury and no Significant Human Performance (HU) events.
 - PAF3 has been under budget for NFOM and has averaged Continuous Improvements (CI) that have averaged for the past two years of \$1.6 Million/year and helped support Fleet budgetary needs for reallocating funds to needed areas.

- The EA reference that - Additionally, it is beneficial for coal units to offer fuel flexibility, such as being able to utilize existing coal supplies from many different mines and/or geographic locations. As a large, inflexible coal unit with medium operating costs and a high forced outage rate, as well as the need for significant repairs, PAF Unit 3 does not fit current portfolio needs.
 - PAF3 is the most flexible in receiving and fuel quality utilization in the coal fleet. It can burning coal in the surrounding area and has the lowest cost of fuel delivery due to many different means of receipt options.
 - PAF3 can burn coal ranging from Powder River Basin (PRB) to Illinois Basin (ILB) and the scrubber allow burning the higher sulfur coal without any effects to Unit Reliability or Performance.
 - PAF3 can also burn coal fines to off set fuel cost and allow for cheaper rates to the consumer. Burning of the coal fines will eliminate the need of a costly closure of the coal fines area in the future.

- According to the EA, the closure of PAF 3 will have minor effects to social economics of the surrounding area.
 - The Muhlenberg County School system receives in lieu of tax payments that funds the school system needs for better education.
 - HARSCO Mineral Company depends on our byproducts for their manufacturing process and sustain future longevity.
 - The local coal mines and trucking industry will be affected and potential employment will be impacted.
 - Vendors that provide to the Plant and Supporting companies will be affected by lost revenue.
 - Local merchants and surrounding community will be affected by lost revenue and have a harsh impact on the community way of life.

Children are warming up to global warming



BY KRIS O'DANIEL
Community columnist

Remember the song, "Greatest Love of All"? It starts with, "I believe the children are our future. Teach them well and let them lead the way."

That song came to mind when I attended a community forum on global warming in Washington County some time ago. The main speakers were from Kentucky State University and The Berry Center. But what was so compelling was a group of sixth graders' adamant presentations.

What is more powerful than to see children argue and reason with conviction?

First, they played a game to illustrate that when sunlight hits the surface of Earth, it can either be reflected or absorbed. They demonstrated how solar radiation is transformed into heat because it is absorbed — not reflected — by the increasing levels of carbon emissions, water vapor and other gasses.

Second, they focused on data analysis. They determined that the increasing concentration of greenhouse gases was a result of the increasing use of fossil fuels. They saw how coal was the worst. They reasoned that the continued use of fossil fuels, would produce only more heat-trapping greenhouse gasses.

Their analysis is reinforced by the just-released National Climate Assessment that climate change is already causing deaths and disease, environmental destruction, spread of disease and financial damage to this country. If you don't understand the negative impacts of global warming on weather patterns, you live in denial.

The students, I was later informed, had studied according to the Next Generation Science Standards and that the "key is to teach students science concepts, learning reasoning and initiate claims."

They felt their future was at stake and, worse, that the state they live in had not taken any action.

Science cannot dictate our actions, but scientific evidence must inform our actions. Kentucky and the U.S. need strong leadership to inform actions.

While the U.S. has been the biggest accumulated contributor to carbon emissions in the world, less than one third of the states have policies that target emissions and direct needed improvements in power sector and energy infrastructure.

Kentucky is the seventh-biggest carbon emitter in the U.S. and produce 29 metric ton (MT) CO₂ per capita versus the U.S. average 15 MT CO₂ per capita. The European Union produces 6 MT per capita; China 7 MT per capita.

The 10 states with lowest emissions are New York, California, Oregon, Massachusetts, Vermont, Maryland, Connecticut, Rhode Island, Washington and Idaho. The average of this group is 10 metric ton CO₂ per capita.

The cleaner states are also wealthier states, indicating that investing in clean energy doesn't prevent a state from progressing — on the contrary.

The electric power sector and transportation are biggest emitters. Although the shift from coal to natural gas with lower carbon emissions have reduced U.S. total emissions by 11 percent since 2005, much more is needed. And every home ought to have one electric vehicle.

The U.S. power grid needs to become a national grid which will make the electricity market broader, more competitive and efficient. That would bring flexibility, resilience and reliability benefits which are all needed transitioning to renewables and to tackle the effects of global warming.

America will be great only if all states invest in clean-energy technology. And the power sector needs to reform and become competitive by diverting into generation and distribution as separate businesses.

Coal has come at a very high price in Kentucky and has not contributed to any economic progress. Let's use the right resources and invest in clean energy so Kentucky can prosper.

Kentucky leaders need to consult with Washington County's sixth graders for advice on energy policies. Inhale the future, exhale the past.

Kris O'Daniel of Springfield is a scientist who raises beef cattle and trains horses. Reach her at krisodaniel@ncsmaail.net.



This Oct. 12 photo shows devastation from Hurricane Michael over Mexico Beach, Fla. A massive new federal report warns that extreme weather disasters are worsening in the United States.

Re: Comments of Senator Rand Paul on the *Potential Paradise Fossil Plant Retirement Draft Environmental Assessment* (Muhlenberg County, Kentucky) (November 2018)

Senator Paul submits the following comments on the Draft Environmental Assessment regarding the potential retirement of the Paradise Fossil Plant in Muhlenberg County, Kentucky.

On behalf of my constituents, I write in strong opposition to the potential retirement of the Paradise Fossil Plant in Muhlenberg County, Kentucky. In 2013, I joined other members of the Kentucky congressional delegation urging the Tennessee Valley Authority to maintain its use of coal for electricity generation at Paradise Units 1 and 2. At the time, Paradise employed 400 full-time employees and generated \$13.19 million in tax receipts in 2012 for the Muhlenberg area. After the Supreme Court's 2015 ruling regarding the Environmental Protection Agency's Mercury and Air Toxics Standards regulation, I again joined my fellow Kentuckians in voicing support of maintaining operations at Paradise Units 1 and 2. Our fears that retiring Units 1 and 2 would cut the Paradise workforce in half were realized in 2017 as the doors of Units 1 and 2 closed.

Today, Paradise Unit 3 directly employs 131 full-time employees and indirectly impacts hundreds more jobs from the miners who supply coal and limestone to Unit 3 to the trucking companies who deliver approximately 200 truckloads of coal to Paradise each day.¹ The retirement of Paradise would be detrimental to the local economy of Muhlenberg and its negative impact would be felt throughout the surrounding counties. Such action would not only prolong the war on coal, picking winners and losers in the energy sector, but it would also be contrary to the core mission of TVA to provide reliable, low-cost energy to those in its service area. It is for these reasons I ardently oppose the retirement of the Paradise Fossil Plant.

¹ Environmental Assessment at Section 3.8.1 (Transportation – Affected Environment).

Summary of Comments

The Paradise facility aids both the mission and purpose of TVA in helping provide reliable, low-cost energy to those living in the Tennessee River Valley, and promoting economic development throughout the service area. Retiring Paradise would be contrary to that mission. Additionally, Paradise plays a vital role in the economies of Muhlenberg and the surrounding counties, facts not fully accounted for in the Environmental Assessment. The draft Environmental Assessment released in November poses only two options for Paradise: (1) maintain Paradise as is, or (2) completely retire it. Neglecting additional alternatives would be short-sighted considering the dire economic consequences that would result from retirement. For these reasons I urge the TVA Board to maintain the use of coal-fired electricity generation at the Paradise Fossil Plant and stop all plans for its retirement.

I. Retirement of the Paradise Fossil Plant would be contrary to the purpose and mission of TVA.

Retirement of the Paradise Fossil Plant would be in direct contradiction to the purpose and mission of TVA. The Tennessee Valley Authority Act (TVA Act) states the Tennessee Valley Authority (TVA) was created for the purpose of maintaining and operating the properties within its jurisdiction in "... the interest of national defense and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control destructive flood waters in the Tennessee River and Mississippi River Basins..."² TVA's "threefold mission" is: (1) to provide clean, reliable energy at the lowest possible cost; (2) to maintain environmental sustainability and provide recreational opportunities for the people of the Tennessee Valley; and (3) to diligently

² 16 U.S.C. § 831

support economic development activities that draw new jobs and investment our the region, or help companies stay here and grow.³

Paradise has not only created jobs for the 131 employees at Unit 3, but also for the coal miners and trucking companies who daily supply approximately 200 truckloads of coal to the plant.⁴ Since Paradise first opened in 1963, it has been a reliable source of energy capable of producing enough electricity for more than 950,000 homes.⁵ A diverse energy production portfolio aids the interest of national defense by ensuring reliable energy, which coal-fired electricity generation has provided. Despite its reliability, TVA decided to transition its electricity generation away from coal.⁶ This low-cost, reliable energy has attracted industries and businesses to the area. To shutter the operations of Paradise would be contrary to the interest of national defense, contrary to providing reliable energy at a low-cost, and contrary to economic development. In short, retirement of Paradise would be in direct contradiction to the purpose and mission of TVA.

II. The draft Environmental Assessment does not accurately assess the economic impact of retiring the Paradise Fossil Plant.

Retirement of the coal-fired Unit 3 will have profound impacts extending far beyond the 131 employees of Paradise, impacts not fully taken into consideration by the Potential Paradise Fossil Plant Retirement Draft Environmental Assessment (Environmental Assessment or EA). The EA states Paradise Unit 3 directly employs 131 people, and the mining of coal consumed at Unit 3 supports the employment of an additional 135 people

³ <https://www.tva.gov/Newsroom/News-Features/Our-Year-of-Achievement> (last visited December 17, 2018).

⁴ Environmental Assessment at Section 3.8.1 (Transportation – Affected Environment).

⁵ <https://www.tva.gov/Energy/Our-Power-System/Coal/Paradise-Fossil-Plant> (last visited December 17, 2018).

⁶ <https://www.tva.gov/Energy/Our-Power-System/Coal> (last visited December 17, 2018).

in coal mining.⁷ Though the EA acknowledges the retirement of Unit 3 would also impact individuals mining limestone used at Paradise and the number of truckloads of coal coming into Paradise each day, it does not estimate the number of people that would be impacted.⁸

The EA grossly underestimates the future loss of jobs resulting from retirement. According to the EA, 131 people could become temporarily unemployed, but TVA would try to offset the unemployment by transferring interested employees to other TVA facilities. The EA also states this decrease in unemployment represents less than 2% of the total employment in Muhlenberg County and any direct adverse economic effects would be “minor.”⁹ To say the potential loss of 266 jobs is a would have a minor adverse economic effect in a county where the unemployment rate is already at 6%¹⁰, 2 percentage points of above the national average, is not only misleading but insulting. The resulting unemployment and underemployment from retiring Paradise will lead to a loss of tax revenue for Muhlenberg County.

Recovering from job losses will not be easy for workers and their families. While TVA may offer to transfer interested employees, jobs for all of the 131 cannot be guaranteed, let alone jobs for the affected limestone miners and trucking companies. The EA also makes no estimate of how many jobs might be available for Unit 3 employees willing to transfer. The EA suggests that displaced employees could simply find employment in another field in the Muhlenberg area such as “educational services, health

⁷ Environmental Assessment at Section 3.10.1.2 (Employment and Income).

⁸ *Id.*

⁹ Environmental Assessment at Section 3.10.2.2 (Environmental Consequences - Alternative B: Potential Retirement of Paradise Fossil Plant).

¹⁰ Letter from Gary Jones, Director of the Muhlenberg Alliance for Progress.

care, and social assistance, manufacturing, and retail trades.”¹¹ Unit 3 employs “general laborers, steamfitters, machinists, electricians, analysts, administrators, and supervisors.”¹² It does not employ teachers or healthcare professionals. Adding insult to injury is the fact that these alternative employment options have a median income approximately \$16,000 to \$29,000 less than that of an individual in the utility industry.¹³ To suggest displaced Unit 3 workers could easily find work in another field, fields which on average pay significantly less than at Unit 3, fields for which they have no training, is yet again misleading and shows the inaccuracy of the EA’s economic impact assessment.

III. The draft Environmental Assessment does not demonstrate a sufficient need for or present “reasonable alternatives” to retiring the Paradise Fossil Plant.

According to *TVA NEPA Procedures (Procedures)*, an Environmental Assessment is an appropriate tool for determining whether an Environmental Impact Statement or a Finding of No Significant Impact should be reached.¹⁴ The *Procedures* also state that in preparing an EA, “reasonable alternatives”¹⁵ are to be determined. The EA speaks to the deterioration in the material condition of Paradise, but rather than listing the costs of repairs, it names certain projects needed to repair Paradise.

Listed among the problems with Paradise is its current deteriorated state and lack of fuel flexibility.¹⁶ According to the EA, an emergent steam turbine rotor needs to be replaced and its current condition has led to forced power outages. By not replacing the

¹¹ Environmental Assessment at Section 3.10.2.2 (Environmental Consequences - Alternative B: Potential Retirement of Paradise Fossil Plant).

¹² Environmental Assessment at Section 3.10.1.2 (Employment and Income).

¹³ Environmental Assessment at Section 3.10.2.2 (Environmental Consequences - Alternative B: Potential Retirement of Paradise Fossil Plant).

¹⁴ *TVA NEPA Procedures* at Section 5.3.1 (Environmental Assessments – Purpose and Scope).

¹⁵ *TVA NEPA Procedures* at Section 5.3.3 (Environmental Assessments – EA Preparation).

¹⁶ Environmental Assessment at Section 1.2 (Purpose and Need)

turbine, TVA has added to the deteriorated state of Paradise and the resulting power outages as the turbine sits without proper and timely replacement. To blame the present condition of Paradise as sufficient need for its closure is misleading and lends to the conclusion TVA intentionally acted to ensure the retirement of Paradise.

Lack of flexibility is also listed as a need for retirement, stating the benefit of coal units offering fuel flexibility, “such as being able to utilize existing coal supplies from many different mines and/or geographic locations.”¹⁷ Paradise purchases 1.1 million short tons of coal per year from two existing mines within 40 miles of the facility.¹⁸ As one of the top five coal producing states in the country,¹⁹ Kentucky has the ability to “utilize existing coal supplies from many different mines and/or geographic locations” through the state. Yet again, claims that Paradise needs to be retired due to costs and inflexibility do not measure up.

Based upon these “needs” for retirement, the EA proposes just two “alternatives”: (1) no action, and (2) potential retirement. Doing nothing or shutting down Paradise cannot be conceived as “reasonable alternatives” as prescribed for EA preparation in the *Procedures*. Kentucky’s status as a top 5 producer of coal in the U.S. ensures Paradise has the ability to offer the fuel flexibility the EA says is needed for it to continue supporting the TVA mission of providing reliable, low-cost power.

IV. There has been insufficient time for public hearing, debate, and comment on the draft Environmental Assessment.

¹⁷ *Id.*

¹⁸ Environmental Assessment at Section 3.10.1.2 (Employment and Income).

¹⁹ <https://www.eia.gov/tools/faqs/faq.php?id=69&t=2> (U.S. Energy Information Administration – Which states produce the most coal?) (last visited December 17, 2018).

TVA NEPA Procedures states that in preparing an EA, the preparers “may request public involvement” to help “facilitate timely and meaningful public input to the EA process.”²⁰ Additionally, the TVA Act states that the Board is duty-bound to hold public hearings, when it deems appropriate, on issues that substantially impact the “economic, environmental, social, or physical well-being of the people of the service area.”²¹

It is unclear from the EA what, if any, public involvement was requested. The listed preparers and contributors all work for either TVA or the consulting group, HDR. Considering the EA was prepared in examination of potentially retiring Paradise, a public hearing on the EA should be deemed appropriate by the Board as retirement would substantially impact the people within the service area. At present, we are unaware of any such public hearing.

Of equal concern is the timing of the EA’s release. The EA was released on November 19, just days before Thanksgiving, and the comment period set to close on December 19, six days before Christmas.²² The EA contains 62 pages of highly technical reporting and references over 30 additional sources. The sheer volume of information to be processed through is daunting and provides insufficient opportunity for “timely and meaningful input” as encouraged by the *Procedures*.

Conclusion

Retirement of the Paradise Fossil Plant would be contrary to TVA’s mission of providing reliable, low-cost energy and promoting economic development within its service area. The vital role Paradise plays in the economies of Muhlenberg and the surrounding counties is not fully

²⁰ *TVA NEPA Procedures* at Section 5.3.2 (Environmental Assessments – Public Participation in EA Preparation).

²¹ *Id.* at § 831a(g)(1)(K)(ii)

²² Environmental Assessment at Section 1.5 (Public and Agency Involvement).

accounted for in the Environmental Assessment. The EA lists only two options for Paradise: (1) no action, or (2) retirement. In light of the economic impacts retirement would have, not exploring additional alternatives would be short-sighted, irresponsible, and contrary to *TVA NEPA Procedures*. For these reasons, I urge the TVA Board to maintain the use of coal-fired electricity generation at the Paradise Fossil Plant and stop all plans for its retirement.

Addendum

Letter from Gary Jones, Director – Muhlenberg Alliance for Progress



www.mafp.u

December 5, 2018

TVA Board of Directors
Board Services
400 West Summit Hill Drive WT7
Knoxville, Tennessee 37902

Dear TVA Board of Directors:

My name is Gary Jones and I serve as the Director for the Muhlenberg Alliance for Progress the economic development group for Muhlenberg County. I am writing to oppose the announcement of your intent to close the last coal fired generating unit at the Paradise Plant in Drakesboro, Kentucky.

As the economic development director for Muhlenberg I would like to express my sincere concern about what closing Unit 3 would do to our economy. Recent closure of many coal mines, the closing of Units 1 and 2 and KU's closing of their coal fired plant a few years ago has hit our economy hard. Muhlenberg County's current unemployment rate is 6% as of October 2018. The loss of 130 more jobs at the Paradise Plant due to the closing of Unit 3, the residual loss of at least 50 trucking jobs and the loss of jobs in other coal related industries is a tough pill to swallow during this holiday season.

I, along with the Muhlenberg Alliance for Progress board of directors, understand the need for diversified energy production, but we can't understand the total elimination of the use of coal at the Paradise Plant, especially since it is located in a county that has an abundance of coal. It seems a little out of whack to haul coal long distances to other TVA power plants in your system and not burn coal in a plant that is located in a county that has abundant coal resources.

The Muhlenberg Alliance Board of Directors and I strongly encourage you to reconsider your decision and keep Unit 3 in operation. The residents of Muhlenberg County have been loyal supporters of TVA and all they bring to our region. We ask that you continue to support our economy and residents by keeping Unit 3 in operation. Thank you for listening to our request. We look forward to a favorable decision for our residents.

Sincerely,

A handwritten signature in black ink, appearing to read "Gary W. Jones", written over a horizontal line.

Gary W. Jones
Director, Muhlenberg Alliance for Progress



December 3, 2018

TVA Board of Directors
Board Services
400 West Summit Hill Drive WT7
Knoxville, TN 37902

RE: Paradise Coal-fired Fossil Plant

I am writing on behalf of the nearly 200 Greater Muhlenberg Chamber of Commerce businesses asking you to repair Paradise Coal-fired Fossil Plant Unit 3. The Tennessee Valley Authority Paradise Plant has been a great friend to Muhlenberg County for many years. Countless jobs, community investments and revenue in lieu of taxes have benefited our county, but we took a hit when Units 1 and 2 were taken off the grid in 2016. Our community is still recovering from the job displacements, lower household income levels, and lower skill trade jobs from the mothballing of Unit 1 and 2.

Our community heavily relies on the Paradise Coal-fired Fossil Plant as a large employer for our area. Not only would closing the plant displace workers employed by TVA, but it would have a negative impact on other residual industries. Muhlenberg County has two large trucking companies that haul many loads of coal each day to Unit 3. These come from local coal mines which operate around the clock to supply coal to the plant. Several other industries and businesses would be very negatively impacted if Unit 3 was to close resulting in job loss.

I want to encourage you to find ways to repair Unit 3 at Paradise.

Thanks

A handwritten signature in black ink, appearing to read "Logan Porter".

Logan Porter
President, Greater Muhlenberg Chamber of Commerce

www.greatermuhlenberg.com

James L. Rogers
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]



December 6, 2018

Tennessee Valley Authority
Board of Directors
400 West Summit Hill Drive
Knoxville, TN 37902

To the Members of the Tennessee Valley Authority Board,

I am writing to express my deep concern over the potential closure of the fossil fuel Unit #3 at the Paradise Steam Plant in Drakesboro, Muhlenberg County KY.

Both my wife and I were born and raised in Greenville, Muhlenberg County KY and we maintain our home there which we built in 1975. Both of our families have extensive business and real property interests in Muhlenberg County where our families date back 150 and 200 years respectively. So we know and are intimately entwined in the fabric of this community.

I would call your attention to two major issues concerning the closure of fossil fuel Unit 3 at Paradise Steam Plant, Drakesboro. My concerns are one: the economic impact upon Muhlenberg County KY and the surrounding area, and two: just as important, the protection of the security of our nation. The closure of fossil units #1 and #2 at Paradise a couple of years ago had an immediate crippling effect upon the



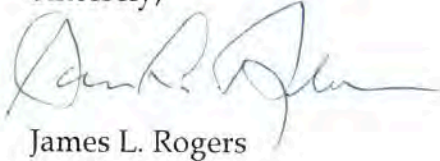
economy of the entire area. Many businesses have since closed in the area which a tour of Drakesboro, Greenville, Central City and Madisonville would show. One of your own members, Kenny Allen, can testify to this. The closure of Unit #3 will deal a devastating crushing blow to the remainder of our economy. One-hundred and thirty jobs will be lost at Paradise; coal miners will be laid off; truck drivers delivering coal to Paradise will see their jobs disappear and suppliers to the mines will lay off workers. The rippling effect will badly damage the economy throughout the area. The County will suffer revenue loss from taxes, and the State of KY as a whole will see revenues from Unmined Mineral Taxes and Coal Severance Taxes disappear. We have suffered enough. This action to close Unit #3 and its economic impacts is contrary to the purpose of the TVA Act established in 1933.

The second critical concern is that the security of our country depends on the importance of maintaining coal within the nation's energy mix. The 24" natural gas pipeline that crosses both my wife's family's property and that of my own family is only four feet deep. It currently supplies the natural gas turbines at Paradise which generates approximately 50% of that plant's electrical output. Fossil Unit #3 supplies approximately 50% of the rest of the plant's generation. It would be simple and easy to sabotage this pipeline with explosives. Also there is no way to store this gas on site, nor is it feasible to guard the some 30 miles of pipeline from its storage source (which is also owned by my wife's family under lease to the leaseholder). It seems elementary to point out that a multiple month supply of coal can be safely stored with security on the Paradise plant site.

The nation's growing dependence on natural gas for energy generation is exposed to the same dangers pointed out above for the Paradise plant. Moreover, the existing supply of natural gas is in question and thought to be only 90 years or less. The known supply of coal is in excess of 200 years. The methods of producing energy from clean coal are now well known. I am requesting your immediate attention to these most vital concerns that affect so many people in Kentucky and in our nation as a whole.



Sincerely,

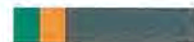
A handwritten signature in black ink, appearing to read "James L. Rogers", written over a light blue horizontal line.

James L. Rogers

Cc: Senator Mitch McConnell

Senator Rand Paul

Mr. Jon Rogers



12-12-18

SCOTT ROGERS

[REDACTED]

[REDACTED]

DEAR, SIR/MAN

I CAME BACK TO CENTRAL CITY, KY.
WHEN I WAS 10 YRS. OLD, THIS MATTER
WORRIES ME ABOUT T.V.A. IN THE
COUNTY OF MUHLENBERG CLOSING ONE
OR BOTH OF THESE ALNITS.

I HAVE A UNCLE THAT WORKED AT
TVA WHEN IT WAS BUILT, I
HAVE WORKED IN THE COAL MINES
FOR 30 YRS. ISLAND CREEK, PEABODY
AND MAPCO.

I WORKED FOR A COMPANY FOR
3 YEARS A BARGE COMPANY THAT
PUSHED COAL OFF THE GREEN
RIVER TO THE MOUTH THAT ENDS
AT THE OHIO RIVER, TOOK COAL OUT
OF PEABODY, RIVER QUEEN

THIRTY YEARS AGO WEST KY.
WAS CALLED THE COAL FIELDS
WE TOOK COAL TO BIG RIVERS
AT SEDREE, KY. IT IS A POWER PLANT
AND STILL BURNS COAL.

WE HAVE USED COAL FOR 100 OF
YEARS, WIND, SOLAR BUT NOTHING
CAN BEAT COAL.

BUT TO DO WHAT YOU ARE THINKING
ABOUT CLOSING THE UNITS AT
T.V.A YOU ARE TALKING ABOUT
JOBS.

PAST PRESIDENTS HAVE SAID
CLOSE THE COAL MINES.

STATE ~~REPRESENTATIVE~~ REPRESENTATIVE
MELINDA GIBBONS PRUNTY HAVE
TALKED TO YOU, IN CLOSING
LISTEN TO THE PEOPLE DON'T CLOSE
THESE UNITS

SINCERELY

BRUCE SCOTT ROGERS

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Ashley Pilakowski
NEPA Compliance
400 W. Summit Hill Dr., WT 11D
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Re: SACE Comments on Potential Paradise Fossil Plant Retirement Environmental Assessment

Dear Ms. Pilakowski:

On behalf of the Southern Alliance of Clean Energy (SACE), we submit these comments in response to the Tennessee Valley Authority's (TVA) draft Potential Paradise Fossil Plant Retirement Environmental Assessment (Draft EA). The power sector is in the midst of transformation, and we support the conclusion TVA has drawn that the region will experience economic and environmental benefits if the inflexible and unreliable Paradise Fossil Plant (PAF) is retired by 2020.

We have two disagreements with the analysis presented in the Draft EA:

1. Air quality impacts depend on replacement resources.
2. Economic impacts of alternative replacement resources were not considered.

Air quality impacts depend on replacement resources

The Draft EA characterizes the beneficial air quality impacts associated with the retirement of PAF as minor because it assumes PAF will be replaced primarily with gas generation. Air quality impacts depend on the replacement generation, as seen in Table 1.

Table 1. Air Quality Impacts of PAF Retirement by Replacement Resource^{1,2}

	Reduction in CO₂ Emissions	Health Benefits from PM_{2.5}, SO₂, and NO_x Reductions
Replace with NGCC	2.764 Million Metric Tons	\$253-778 Million
Replace with EE & Renewables	4.377 Million Metric Tons	\$263-809 Million

Sources: Draft EA, [EPA Technical Support Document: Estimating the Benefit per Ton of Reducing PM_{2.5} Precursors from 17 Sectors, February 2018](#)

¹ TVA is considering retiring PAF early because it "has experienced flat to declining load" (Draft EA, page 1). Therefore, TVA would likely need to replace less than 100% of PAF's generation. However, for consistency, we have estimated the range of air emissions impacts of replacing 100% of PAF's generation with generation from an NGCC or with 100% energy efficiency and renewable generation.

² Calculations assume 4,467,017 MWh of annual generation, PAF's actual generation in 2016, and emission rates listed on page 18 of the Draft EA.

Replacing PAF primarily with generation from gas resources results in beneficial air quality impacts, but replacing PAF with energy efficiency and renewable generation sources would provide an additional over 5 million metric tons of annual CO₂ reduction and \$10-31 million in health benefits from PM_{2.5}, SO₂, and NO_x emission reductions. Since these figures use the valuation of just some of the health benefits of just three of the seven pollutants avoided by retiring PAF, the monetary benefit brought to the region through improved air quality is likely much greater. Retiring PAF and replacing it with NGCC generation or with EE and renewables would be the equivalent of taking approximately 592,000 or 937,000 cars off the road each year, respectively.³

The air quality benefits of replacing PAF with energy efficiency and renewables would be more than minor. Air quality impacts should be presented as a range in the final EA to show how future replacement decisions can impact the environmental and economic impacts from retiring PAF.

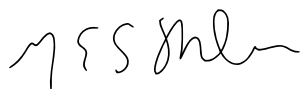
Economic impacts of alternative replacement resources were not considered

According to the Solar Foundation's 2017 Solar Jobs Census Kentucky had 1,293 jobs in the solar industry in 2017, an increase of 8% in 2017.⁴ Energy efficiency is an even greater job driver. Kentucky's 1st congressional district, which covers western Kentucky and includes Muhlenberg County, boasted 4,499 jobs in the energy efficiency industry in 2018.⁵ In addition to the promise to explore moving PAF 3 employees to other TVA jobs in their service area, TVA should also invest in energy efficiency and solar in Kentucky and add to these booming energy industries. Such investments by TVA could reverse and potentially outweigh any adverse economic impacts of retiring PAF.

Conclusion

The Draft EA, despite the critiques discussed above, already presents a case to retire PAF. Retiring PAF would have a measurable, positive economic and environmental impacts on the region for years to come.

Respectfully submitted,



Maggie Shober
Director of Power Market Analytics

On behalf of the Southern Alliance for Clean Energy



³ Passenger car CO₂ emission equivalent calculated using EPA's Greenhouse Gas Equivalencies calculator: Source: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

⁴ Solar Foundation, *Solar Jobs Census 2017 Fact Sheet: Kentucky*, <https://www.thesolarfoundation.org/solar-jobs-census-factsheet-2017-ky/>

⁵ E2, *Energy Efficiency Jobs in America: Kentucky Fact Sheet*, <https://www.e2.org/wp-content/uploads/2018/09/KENTUCKY-Dist.pdf>

12-18-2018

Page (1) of (2)

TO: TVA | URGE CLOSURE OF PARADISE FOSSIL UNIT #3 IN KENTUCKYI

FROM: Ronald E. Whitmore

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

There are huge added economic costs to the KY Health Care System related to the burning of coal. A recent study by Harvard School of Public Health indicated that burning coal adds over \$100 per capita to the health care costs of Kentuckians. . Recent reports from the Center For Disease (CDC) show a resurgence of Black Lung Disease, adding millions of dollars to the cost of the already overburdened Health Care System, as well the underfunded Federal Black Lung Disability program. Early mortality is an endemic problem for coal miners. A recent CDC MMWR report of August 2018, indicates that Kentucky coal miners "livelihood" is shortened by an average of over 11 years per miner

Costs of mitigation for environmental damage as result of mining and burning Coal are becoming a major economic liability for all coal fired plants. Millions of tons of Coal Ash are generated annually and surface impoundments threaten clean water supplies with highly toxic heavy metals. .Continued long term operation of Paradise Unit #3 will only add to the problem, as many millions of tons accumulate. Billions have already been spent by TVA to mitigate Coal Ash Spills. As a result of decades of burning coal, airborne mercury pollution has contaminated our lakes, rivers and streams. . Ky. Health advisories in regard to MERCURY /fish consumption extend to "all Kentucky waters"

The implications of massive Carbon Dioxide emissions must also be considered. The long term negative economic impacts of Climate Change due to anthropogenic greenhouse gas emissions are well documented.

I realize the I act of shutting down Paradise #3 will be an economic hardship for the local area. However impact can be mitigated by your support of the RECLAIM ACT which has been proposed by Senator Hal Rogers, and TVA investment in Kentucky into more sustainable sources of electric generation. According to press release by TVA's Chief Sustainability Officer, \$8 billion for renewable energy is planned by TVA over next 20 years. Huge opportunities in job growth related to renewable energy development have been demonstrated, with over 250, 00 jobs created over the past several years. Analysis of levelized cost of generating electricity using renewable resources indicate it is highly competitive with Coal fired Generation. There are recent reports of Utility Scale Solar Power Purchase agreements as low as 2.5 cents/kilowatt hour.

It seems morally and economically unconscionable that one should continue to support the burning of coal, especially when economically viable renewable energy alternatives to coal are available, with far less cost to our health and damage to the environment. Closure of Paradise Fossil Plant #3 in Kentucky should be a priority of TVA as well as consideration to investment in renewable energy alternatives.

References:

- 1) Harvard School of Public Health Feb 2011 Report
<http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2010.05890.x/pdf>
“Mining Coal, Mounting Costs: the Life Cycle Consequences of Coal”
- 2) Resurgence of Progressive Massive Fibrosis in Coal Miners CDC MMWR December 16, 2016
- 3) Despite decades of Evidence, Kentucky Hasn’t Stopped Plant’s Coal Ash Pollution
<https://wfpl.org/despite-decades- of- evidence-Kentucky-hasn’t-stopped-coal-ash-pollution/>
- 4) Fish Consumption Advisories Ky. Dept. of Health
<http://fw.ky.gov/Fish/pages/fish-consumption-advisories.aspx>
- 5) Coal Workers Pneumoconiosis: Attributable Years of Potential Life Lost CDCMMWR August 3, 2018
- 6) Sustainability A Key to TVA’s Lower Carbon Future
<http://www.chattanooga.com/2017/6/21/350203/Sustainability-A-Key-to-TVAs-lower.aspx>
- 7) Long Draw Solar signs 100MWac at 2.5Cents/kWh PV Magazine 12/12/2018
https://pv-magazine-usa.com/2018/12/12/long-draw-solar-signs-100-mwac-at-2.5%c2%a2-kwh/?utm_source=pv+magazine+USA&utm_campaign=f3f
- 8) Harvard T.H. Chan School of Public Health
June 7, 2016 “An Analysis of Costs and Health Co-benefits for a U.S. Power Plant Carbon Standard”
- 9) Solar Costs now lower than Coal and Even Natural Gas
<https://www.seia.org/blog/solar-costs-now-lower-coal-and-even-natural-gas>
- 10) Health Care Burden of Fossil Fuels
<http://www.scientificamerican.com/article/graphic-science-health-care-burden-of-fossil-fuel>
- 11) Congressional Budget Justification: Black Lung Disability Trust Fund OWCP report BLDTF 2015
- 12) 4th National Climate Assessment Report 2018
Science 2017.global.change.gov
- 13) “Even in Indiana, new renewables are cheaper than existing coal plants” utilitydive 10/22/18
<https://www.utilitydive.com/new/even-in-indiana-new-renewables-are-cheaper-than-existing-coal-plants/540242/>



CHAMBERSVILLE BRIDGE
13 DEC 2005 PM 11



Figure 100

Ashley P. Rakowski;
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37902-141999





December 19, 2018

Ms. Ashley Pilakowski
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Via electronic mail and upload on www.tva.gov/nepa

Re: Comments on Tennessee Valley Authority's Potential Paradise Fossil Plant Retirement Draft Environmental Assessment (Nov. 2018)

Dear Ms. Pilakowski:

On behalf of the thousands of members throughout Kentucky and the rest of the Tennessee Valley Authority ("TVA") service territory, Sierra Club and the National Parks Conservation Association ("NPCA") (jointly the "Conservation Groups") submit the below comments concerning TVA's November 2018 Draft Environmental Assessment ("Draft EA") regarding the potential retirement of the Paradise Fossil Plant ("PAF") in Muhlenberg County, Kentucky.

The Conservation Groups enthusiastically support TVA's proposed Alternative B, to retire PAF's coal-fired Unit 3. The boiler is an old, inefficient, unwieldy, uneconomical, and highly polluting unit. It is not needed for reliable power, it is a bad deal for ratepayers, and it harms public health and the environment. Operating and maintaining PAF is particularly costly during this age of plummeting costs for clean, renewable energy and energy efficiency. As TVA has observed, PAF "does not fit current portfolio needs," whereas "retirement of [this] inflexible unit with high maintenance and other costs could facilitate TVA's statutory mission to provide reliable power at the lowest system cost." Draft EA at 3. Moreover, retiring PAF will confer tremendous environmental benefits to the Tennessee Valley and beyond, as the Draft EA also recognizes, putting an end to the vast quantities of air, water, carbon, and coal ash pollution generated by the facility. By contrast, propping up this uneconomic, inefficient plant indefinitely into the future would require exorbitant capital expenditures, while continuing to pollute our communities and natural resources. Those expenses and that would be foisted on the backs of TVA's customers, but which could and should be avoided, if Unit 3 ceases operations.

Accordingly, for the additional reasons detailed below—including reasons beyond those acknowledged by the Draft EA—the Conservation Groups urge TVA to adopt Alternative B.

TVA should do right by its customers, and all the citizens who would benefit by retiring PAF, by making the economically sensible and environmentally beneficial decision: retire Unit 3.

I. Background

a. Factual Background: PAF and Its Shaky Economics and Diminished Usefulness

PAF, owned and operated by TVA, is located in western Kentucky on the Green River, near the village of Paradise. For decades, the plant had three coal-fired electric generating units, but now operates only one: the 1,150 MW Unit 3, which became operational in 1970 and continues to run today. (Coal-fired Units 1 and 2, each 704 MW, went online in 1963 but were retired in 2017.)

PAF Unit 3, like other coal-fired units in TVA's fleet, lacks certain environmental controls necessary to comply with impending federal Clean Water Act requirements such as the Effluent Limitation Guidelines ("ELGs"), which require elimination of certain waste streams and setting limits on discharges of mercury, arsenic, and selenium for others. *See* 80 Fed. Reg. 67,838 (Nov. 3, 2015); 40 C.F.R. part 423. TVA estimates that it would need to spend \$466 million by 2023 to upgrade its coal fleet with such controls, with a substantial amount of that tremendous price tag being connected to PAF.¹ TVA's customers could be spared PAF's hefty share of that exorbitant expense, however, if TVA retires Unit 3. That money needed for ELGs compliance would be additional to the nearly \$1.2 *billion* TVA estimates is required for the utility's fleet to comply with the Coal Combustion Residuals ("CCR") rule, to address legacy pollution issues from coal ash generated by plants like PAF. Although some work—to deal with already-produced coal ash, in existing ash impoundments—will be needed regardless of whether PAF retires, the decision to retire Unit 3 will stop the continued production of coal ash, thereby avoiding the costly process of dealing with that much more additional CCR material.

Notably, PAF's capacity is not needed for TVA to continue reliably serving its customers. As TVA itself has recognized, there will be "no immediate need to replace the generating capacity currently provided by PAF Unit 3," if the plant is retired. Draft EA at 3. Indeed, the plant's average capacity factor through the year 2017 was a paltry 20.62% (with brief summer spike around 75%), making 2017 the third consecutive year in which PAF's annual capacity factor has dropped, steadily down from 65.93% in 2014.² Nor is the plant needed to ensure reliability or to satisfy any purported grid "resiliency" needs.³

¹ *See* TVA Form 10-K (Sept. 30, 2018), at 29, *available at* <https://www.sec.gov/Archives/edgar/data/1376986/000137698618000046/tve-10xk09302018.htm>.

² Data provided by S&P Global Market Intelligence, *available at* <http://www.snl.com>.

³ *See, e.g., Grid Reliability & Resilience Pricing Grid Resilience in Reg'l Transmission Organizations & Indep. Sys. Operators*, 162 FERC ¶ 61,012 (Jan. 8, 2018) (rejecting the Department of Energy's suggestion that retirements of uneconomic coal plants have threatened energy security); *id.* at *16 & nn. 65-66 (Glick, Comm'r, concurring) ("There is no evidence in the record to suggest that temporarily delaying the retirement of uncompetitive coal and nuclear generators would meaningfully improve the resilience of the grid. ... In addition, coal and nuclear generators face resilience challenges of their own. As has been well-documented, many coal and nuclear plants with significant on-site fuel supplies have

b. Legal Background: NEPA Statutory & Regulatory Background

The National Environmental Policy Act of 1969 (“NEPA”), our country’s bedrock environmental planning statute, is “our basic national charter for protection of the environment.” 40 C.F.R. § 1500.1(a); *see* 42 U.S.C. § 4321 *et seq.* NEPA applies broadly “to promote efforts which will prevent or eliminate damage to the environment,” 42 U.S.C. § 4321, and ensures informed decision-making vis-à-vis environmental impacts generally, whereas other environmental statutes focus on particular media (like air, water or land), specific natural resources (such as wilderness areas, or endangered plants and animals), or discrete activities (such as mining, introducing new chemicals, or generating, handling or disposing of hazardous substances). As the U.S. Supreme Court has explained, NEPA has “twin aims”:

First, it places upon [a federal] agency the obligation to consider every significant aspect of the environmental impact of a proposed action. Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decisionmaking process.⁴

To achieve informed decision-making, NEPA requires federal entities proposing action to conduct and submit a full and fair analysis of the environmental impacts of a proposed action and its alternatives. *See, e.g.*, 40 C.F.R. § 1502.14. Engaging in this analysis, a federal agency must, *inter alia*, (1) define the purpose of its action; (2) identify alternatives that might help it achieve that purpose; and (3) describe an accurate environmental baseline against which to evaluate the impacts of the proposed action and its alternatives. *See, e.g., id.* §§ 1502.02, 1502.13-14. To the extent an agency proposes to “tier” its analysis from a programmatic EIS, such tiering is not intended to allow the agency to obscure the extent of site-specific environmental impacts or to narrow artificially the alternatives available during site-specific analysis. *See id.* § 1502.20.

NEPA requires coherent and comprehensive environmental analysis at the outset, in order to ensure that “the agency will not act on incomplete information, only to regret its decision after it is too late to correct.”⁵ Only after fully evaluating a reasonable range of alternatives and the environmental impacts associated with each in compliance with NEPA may an agency determine its preferred course of action.

c. The Conservation Groups: Sierra Club, NPCA, and Their Interested Members

America’s largest grassroots environmental group, Sierra Club is a non-profit organization with more than 3.5 million enthusiastic members and supporters nationwide. More than 6,200 Kentuckians count themselves as Sierra Club members of its Cumberland Chapter in the Commonwealth alone, and thousands more Americans belong to neighboring Club chapters

failed to function during extreme weather events because those fuel supplies froze, flooded, or were otherwise unavailable.”).

⁴ *Balt. Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (internal quotations and citations omitted).

⁵ *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 371 (1989).

in the rest of the Tennessee Valley. Sierra Club's mission is to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the Earth's resources and ecosystems; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out those objectives. Its activities include public education, advocacy, and litigation to enforce environmental laws. Sierra Club has deep expertise and experience with issues related to power plants and electricity generation; he comparative economics and health impacts of coal-fired power versus clean energy; air, water, coal ash, and carbon pollution; proposals and decisions under NEPA and other federal and state statutes and regulations. Sierra Club routinely comments on and litigates these issues, in Kentucky and throughout the nation.

NPCA, established in 1919, was founded to give the public a voice and an active role in protecting our national heritage. NPCA's mission is to protect and preserve America's national parks and their resources, including air quality, for the use and enjoyment of present and future generations. Since its founding in 1919, NPCA has pursued its mission through advocacy, education, and strategic litigation to enforce environmental laws. Through a presence in its 36 locations across the country, and with our more than 1.3 million members and supporters, including 14,979 in Kentucky, NPCA engages with decision-makers on a national and state level, while maintaining a strong presence that is deeply connected to local and regional communities.

II. TVA Should Choose Alternative B, Retirement of PAF Unit 3, Whose Benefits Are Even More Significant Than the Draft EA Recognizes.

As indicated above, the Conservation Groups strongly support TVA's proposed Alternative B in the EA. Retiring PAF Unit 3 is not only the economically sound path for TVA and its customers, but will also provide tremendous, multifarious environmental benefits to the Tennessee Valley and its residents. As such, the Conservation Groups agree with the EA's findings insofar as they conclude that the substantial benefits of Alternative B, relative to the No Action Alternative, render retirement the clearly superior, preferable option.

That said, the Conservation Groups believe that the Draft EA actually *under*-recognizes certain public health and environmental benefits that would be secured by retiring PAF, as discussed below. Accordingly, the Conservation Groups exhort TVA to recognize even more strongly and broadly that retiring Unit 3 is the only responsible choice.

TVA observes that "[i]mplementation of the proposed action to retire PAF would affect air quality both locally and regionally by elimination of the emissions from coal-fired electricity generation." Draft EA at 18. However, the Draft EA inappropriately downplays the prospective benefits of eliminating all of PAF's air emissions by retiring the plant—describing the prospective improvements as "expected to be minor." *Id.* at 16, 18. That characterization is unfoundedly weak; in actuality, the prospective emissions would be very significant.

Contrary to the suggestions in TVA's draft assessment, PAF currently emits huge amounts of both conventional and greenhouse gas ("GHG") pollutants. In 2017, TVA reports that PAF Unit 3 emitted⁶:

- **30,297 tons** of smog-forming **nitrogen oxides** ("NO_x");
- **41,114 tons** of harmful **sulfur dioxide** ("SO₂");
- **3.13 million tons** of climate-disrupting **carbon dioxide** ("CO₂"); and
- **substantial amounts** of a number of dangerous **air toxins**, such as arsenic and mercury.

Emissions of these pollutants in such considerable quantities must not be taken lightly. For one, the tremendous amount of NO_x pollution, a critical precursor for ground-level ozone, poses serious impacts to public health and welfare must be fully and accurately accounted for. Ozone, the main component of smog, is a corrosive air pollutant that inflames the lungs, constricts breathing, and likely kills people.⁷ It causes and exacerbates asthma attacks, emergency room visits, hospitalizations, and other serious health harms.⁸ Ozone-induced health problems can force people to change their ordinary activities, requiring children to stay indoors and forcing people to take medication and miss work or school.⁹ Ozone also damages vegetation and forested ecosystems, causing or contributing to widespread stunting of plant growth, tree deaths, visible leaf injury, reduced carbon storage, and reduced crop yields.¹⁰

A significant amount of this pollution is emitted in short-term spikes, which may be of particular concern given the short-term 8-hour NAAQS for ozone, as illustrated by certain emissions events and timeframes provided in Table 1, below.¹¹ Many of those high-emission

⁶ See TVA, Paradise Fossil Plant Emissions, <https://www.tva.gov/Environment/Environmental-Stewardship/Air-Quality/Paradise-Fossil-Plant-Emissions> (last accessed Dec. 17, 2018); see also, e.g., Draft EA at 17; U.S. EPA's Clean Air Markets Program Data database, available at <https://ampd.epa.gov/ampd/>.

⁷ See, e.g., U.S. EPA, *National Ambient Air Quality Standards for Ozone*, 80 Fed. Reg. 65,292, 65,308/3-09/1 (Oct. 26, 2015); U.S. EPA, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants 2-20 to -23 tbl.2-1* (EPA-HQ-OAR-2008-0699-0405, Feb. 2013) ("ISA").

⁸ See, e.g., EPA, *Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards* 3-18, 3-26 to -29, 3-32 (EPA-HQ-OAR-2008-0699-0404, Aug. 2014) ("PA"); ISA 2-16 to -18, 2-20 to -24 tbl.2-1.

⁹ See, e.g., PA 4-12. Ozone can harm healthy adults, but others are more vulnerable. See 80 Fed. Reg. at 65,310/1-3. Because their respiratory tracts are not fully developed, children are especially vulnerable to ozone pollution, particularly when they have elevated respiratory rates, as when playing outdoors. See, e.g., PA 3-81 to -82. People with lung disease and the elderly also have heightened vulnerability. See 80 Fed. Reg. at 65,310/3. People with asthma suffer more severe impacts from ozone exposure than healthy individuals do and are more vulnerable at lower levels of exposure. *Id.* at 65,311/1 n.37, 65,322/3.

¹⁰ PA 5-2 to -3; ISA 9-1. The damage includes tree-growth losses reaching 30- 50% in some areas, and widespread visible leaf injury, including 25-37% of sites studied in just one state. PA 5-13; ISA 9-40. By harming vegetation, ozone can also damage entire ecosystems, leading to ecological and economic losses. 80 Fed. Reg. at 65,370/1-2, 65,377/3.

¹¹ Data from U.S. EPA, Air Markets Program Data, available at www.epa.gov/ampd.

rate hours occur during startup and shutdown of the boiler, when the plant's NO_x-controlling Selective Catalytic Reduction ("SCR") technology may not be engaged or effective. Table 1 below illustrates a number of SCR engagement events in which NO_x emissions spiked substantially, even around times when the SCR was engaged (the yellow highlighting below denotes hours when SCR was engaged).

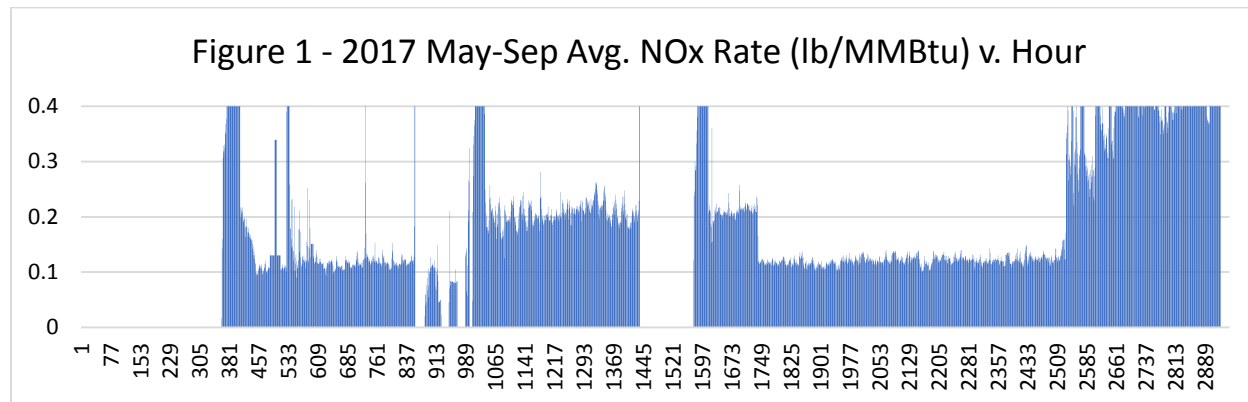
Table 1 – SCR Engagement Events in 2016-2018

Year	Date	Hour	GL (MW)	Avg. NO _x Rate (lb/MMBtu)	HI (MMBtu/hr)	Peak Nox During Startup
2016	5/27/2016	23	701	0.228	7455.2	1.144
2016	5/28/2016	0	699	0.16	7449.1	
2016	6/14/2016	17	908	0.201	9403	1.245
2016	6/14/2016	18	917	0.14	9504	
2016	6/26/2016	9	934	0.385	9928.5	1.276
2016	6/26/2016	10	934	0.146	10067.8	
2016	7/18/2016	8	938	0.212	9647.6	1.364
2016	7/18/2016	9	940	0.146	9624.7	
2017	5/17/2017	23	814	0.534	7497	1.885
2017	5/18/2017	0	815	0.419	7428.3	
2017	7/7/2017	9	948	0.209	10906.1	1.374
2017	7/7/2017	10	950	0.187	11068.9	
2017	7/12/2017	10	944	0.221	11083.1	
2017	7/12/2017	11	923	0.165	11056.8	
2018	5/8/2018	9	997	0.39	10345.7	1.288
2018	5/8/2018	10	999	0.183	10320	
		Average	897	0.193		1.368

Notably, even when not in startup/shutdown, PAF's NO_x emissions have often substantially greater than 0.1 lb/MMBtu, as shown below in Figure 1, below.¹²

¹² See *id.*

Figure 1 plots Unit 3's NO_x emissions rate against time (the X-axis represents hours, counting from May 1 through September 30) for the 2017 ozone season.



Of further note, not only do PAF's NO_x emissions remain significant (although declined, in part given Unit 3's diminished capacity factor in recent years), but an analysis of its publicly available emissions data reveal that PAF's NO_x emissions in recent years (2016-2018) are considerably higher than in 2005, when its SCR was initially installed.¹³ More particularly, Sierra Club has discerned, among other findings, that (a) the heat rate for the unit has deteriorated considerably as compared to 2005; (b) the NO_x emissions leaving the boiler are substantially greater now than before; and (c) the SCR, when engaged, it is achieving higher NO_x emissions than before.

In other words, not only do PAF's NO_x emissions remain substantial, but the facility's NO_x performance has unmistakably deteriorated. (Insofar as TVA may need to repair or otherwise address such deterioration, that investment would entail additional substantial expense.) The Draft EA does not appreciate these points.

The Draft EA likewise underappreciates the benefits of eliminating PAF's SO₂ emissions. Exposure to this pollutant—even in time periods as brief as five minutes—can pose significant health impacts and cause decreased lung function, aggravation of asthma, and respiratory and cardiovascular morbidity.¹⁴ EPA has determined that SO₂ exposure can also aggravate existing heart disease, leading to increased hospitalizations and premature deaths.¹⁵ Short-term SO₂ exposure is especially risky for children with asthma.¹⁶

¹³ See *id.*

¹⁴ See, e.g., Env'tl. Prot. Agency, EPA/600/R-08/047F, *Integrated Science Assessment for Sulfur Oxides—Health Criteria* ch. 5 tbls. 5-1, 5-2 (2008), available at http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=491274; *Primary National Ambient Air Quality Standard for Sulfur Dioxide*, 75 Fed. Reg. 35,520, 35,525 (June 22, 2010); EPA, *Our Nation's Air: Status and Trends Through 2008* 4 (2010) (noting that the health effects of sulfur dioxide exposure include aggravation of asthma and chest tightness), available at <http://www.epa.gov/airtrends/2010/report/fullreport.pdf>.

¹⁵ EPA, *Sulfur Dioxide - Health*, available at <http://www.epa.gov/oaqps001/sulfurdioxide/health.html>.

¹⁶ 75 Fed. Reg. at 35,525.

Moreover, SO₂ is associated with particulate matter (“PM”) pollution, regional haze, and acid rain—none of which the Draft EA analyzes (for SO₂ or any other pollutant), yet all of which harm the natural environment. In particular, impairment of our national parks by criteria pollution is a critical issue for park resources including visibility, ecosystems and wildlife. National Parks like Mammoth Cave are negatively impacted by emissions from the facility. Retiring PAF would lead to a cessation of these emissions, as TVA acknowledges.¹⁷

Also of great importance are the GHG emissions that could be reduced substantially by retiring PAF. PAF emits colossal quantities of CO₂, yet the Draft EA is largely silent on the climate change implications of these emissions.¹⁸ This is unfortunate, as the elimination of millions of tons of CO₂ emissions annually would confer enormous environmental benefits. For example, even using a relatively low estimate of the harm caused by GHG emissions such as the \$42 per ton social cost of carbon,¹⁹ PAF’s 2017 CO₂ emissions alone caused approximately \$131 million worth of harm, in a single year. Over the next ten years, such a pattern of emissions would mean well over a *billion* dollars’ worth of harm, even if PAF operated at a relatively low capacity factor. As the Fourth National Climate Assessment (among a trove of other reputable authorities) has noted, the dire prospects of climate change, induced largely by anthropogenic GHG emissions, “are already being felt in communities across the country”:

More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities. Future climate change is expected to further disrupt many areas of life, exacerbating existing challenges to prosperity posed by aging and deteriorating infrastructure, stressed ecosystems, and economic inequality. Impacts within and across regions will not be distributed equally. **People who are already vulnerable, including lower-income and other marginalized communities, have lower capacity to prepare for and cope with extreme weather and climate-related events and are expected to experience greater impacts.** (emphases added)²⁰

¹⁷ The Draft EA also indefensibly fails to acknowledge, let alone and assess and weigh the advantages of, the prospective elimination of emissions of the various non-criteria-pollutant air toxins, such as mercury, that PAF emits at notable levels.

¹⁸ TVA does tersely acknowledge that CO₂ “is implicated in climate change,” Draft EA at 15, which is an unfortunate understatement that falls far short of the requisite “hard look” at the issue.

¹⁹ See https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html.

²⁰ USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], *available at* https://nca2018.globalchange.gov/downloads/NCA4_2018_FullReport.pdf.

These kinds of dire effects—increased frequency and severity of extreme weather; destruction of infrastructure, ecosystems, and social systems; and disparate impacts on environmental justice communities, among other dynamics—are exactly the sorts of things TVA should be assessing as part of its requisite “hard look” under NEPA. This is especially so in light of the extremely significant role that the electricity sector (including utilities like TVA) plays in the United States’ GHG emission profile, as well as the outsized part that coal plays in generating those emissions. As such, the Draft EA should have included a *meaningful* assessment of the GHG reductions and corresponding climate benefits that follow from Alternative B.²¹ Given the critical need to reduce emissions, retirement of PAF (particularly when coupled with replacement by zero-carbon renewable resources such as wind and solar generation) would confer enormous environmental benefits.

The Draft EA downplays the gravity of PAF’s emissions by characterizing the boiler’s emissions as merely “a small portion” of regional and global emissions, thereby purporting to justify the Draft EA’s “primarily qualitative” assessment of their impacts and the corresponding benefits of their elimination. Draft EA at 15; *see also id.* at 18. Respectfully, if a 1150 MW coal-fired boiler does not satisfy the threshold of significance in scale to warrant more serious consideration, in TVA’s mind, it is hard to imagine what would. Given the staggeringly vast quantities of respective air emissions around the region, nation, and globe, it will practically always be true that emissions from any one source or project will comprise what we typically view as a “small portion,” expressed as a percentage or fraction in many everyday situations. Such a-contextual analysis fails to recognize the significant real-world health impacts of criteria pollutants, particularly local spikes thereof, as discussed above. This kind of superficial framing must not functionally neuter NEPA obligations. Agencies may not simply categorize individual projects as insignificant in the vast scheme of things—even projects that, by any commonsense measure, are quite obviously not “small” (such as a 1150 MW coal-fired power plant)—and thereby escape their statutory duty ever to take a “hard look” at impacts on undisputedly pertinent, important topics like air pollution and climate change.

In sum, while the Draft EA is correct to note that retiring PAF would provide air quality and climate benefits, the Draft EA pays improperly short shrift to those benefits in its analysis. PAF’s retirement would, in fact, be far more beneficial than the Draft EA suggests, and TVA should take note accordingly.

²¹ The Draft EA does recognize that, “In terms of GHG emissions, shut down of the plant would eliminate a relatively large source of CO₂ emissions,” but that given that replacement electricity generation would be supplied regionally but other sources that include other coal-fired or gas-powered plants, TVA projects a 4.4% systemwide reduction (or 2,143,000 tons) in CO₂ emissions in the decade following retirement. Draft EA at 19. Respectfully, the Conservation Groups believe that such projection is too low, and that TVA is under-anticipating the proportion of clean renewable generation and energy efficiency gains, in both the short run and beyond. TVA does acknowledge that possibility, but does not robustly assess it. *See is.* (“The decrease in CO₂ emissions would be greater if a larger proportion of the replacement generation was from other non-emitting and low-emitting sources, such as natural gas and renewable generation.”).

III. Conclusion

It is high time for TVA to do right by its customers' pocketbooks while at the same time securing tremendous benefits for public health and the environment. TVA should select Alternative B of the Draft EA and retire PAF's old, inefficient, uneconomical Unit 3. This is the only economically or environmentally sensible choice, for the reasons discussed by the Draft EA as well as those developed further in the foregoing comments. The Conservation Groups strongly urge TVA to finalize the EA as appropriate and to timely retire PAF, while making a concerted effort to provide workers and local communities with just transitions.²² PAF's retirement will allow TVA and the Tennessee Valley as a whole to continue evolving towards low-cost, clean, renewable energy—to the benefit of ratepayers, TVA itself, and the environment.

The Conservation Groups appreciate this opportunity to comment, and thank TVA in advance for its consideration. Please do not hesitate to contact us regarding this or other matters.

Sincerely,

/s/ Matthew E. Miller

Matthew E. Miller, Esq.

Staff Attorney

Sierra Club

[REDACTED]

Stephanie Kodish

Senior Director & Counsel, Clean Air Program

National Parks Conservation Association

[REDACTED]

²² In working for just transitions, TVA will need to consider the workers and businesses that depend on Paradise and will be affected in the near term by a decision to retire these plants. With a retirement decision, it would make sense for TVA to follow what has worked in the past and begin immediately working with local leaders and the public to create fair and equitable transition plans in Kentucky communities. As a part of this planning, TVA should explore potential options for re-using the site to bring economic opportunities to the region in the form of new jobs and tax revenues. Those options should include industrial and non-energy uses, as well as renewable energy resources that would leverage the existing infrastructure but would not contribute to additional pollution to the region.

Humphreys-Rowe, Abbey

From: Board of Directors
Sent: Monday, December 10, 2018 4:56 PM
To: Pilakowski, Ashley Anne
Cc: Campbell, Laura J; Tudor, Andrew J; Hydas, James Hunter; Tolene, Rebecca Chunn
Subject: FW: Paradise Unit 3 Study

Follow Up Flag: Flag for follow up
Flag Status: Flagged

FYI.

As these come in, I will forward them to you.

Thanks. Mary Margaret

From: gary southerland [REDACTED]
Sent: Monday, December 03, 2018 10:44 AM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Unit 3 Study

TVA External Message. Please use caution when opening.

Paradise Unit 3 is equipped with the best Employees and the latest environmental equipment available. TVA has been aggressive in reducing the Coal Burning fleet from 60% down to 20 % in just the last 20 years. I think there should at least be a pause in further reduction of coal fired units until the future unfolds insuring that TVA doesn't lose this older proven technology. Thanks, Gary Southerland, Paradise TVARA Chapter member

Humphreys-Rowe, Abbey

From: Board of Directors
Sent: Wednesday, December 12, 2018 2:25 PM
To: Pilakowski, Ashley Anne
Cc: Campbell, Laura J; Tudor, Andrew Wade; Hydas, James Hunter
Subject: FW: Paradise Unit 3 and the recent EA

-----Original Message-----

From: Brad tudor [REDACTED]
Sent: Wednesday, December 12, 2018 11:57 AM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Unit 3 and the recent EA

TVA External Message. Please use caution when opening.

TVA board members,

My name is Brad Tudor. I am a 17 year employee at Paradise Fossil Plant. I am writing regarding the fate of Paradise Unit 3. First off, I want to thank each and every one of you for your years of support of Paradise and the areas surrounding this plant. TVA has provided opportunity for many people in this area to make a good living and to provide for their families. We, in this area, need TVA to continue to do that on the same level as it has in the past. I want you to know that I see the EA as very misleading regarding the money that will need to be spent to get the mechanical integrity and reliability here up to par. The data that this EA used to come to its conclusion is not up to date, and is not an accurate depiction of the status of Paradise. The majority of the money the EA speaks of needing to spend has already been spent. The spring of 2018 outage has showed the greatest improvement in our reliability in the 17 years I have worked here. We, right now, are very reliable, very safe, and very flexible in our ability to swing load. We were not so in the past. Paradise has made great strides in those areas lately. I would like to think that we, as a company, would want to see a return on our investment. There will be a hugely negative impact on Muhlenberg and surrounding counties if Paradise closes. Please consider the livelihood of the people who work here and the fact that we do not want to move to continue to work for TVA. We hired in right here, and want to continue to work right here. If you want or need more information regarding this, please contact me any time. [REDACTED]

Thank you so much for your time,
Brad Tudor

Humphreys-Rowe, Abbey

From: Board of Directors
Sent: Monday, December 10, 2018 4:56 PM
To: Pilakowski, Ashley Anne
Cc: Campbell, Laura J; Tudor, Andrew J; Hydass, James Hunter
Subject: FW: Paradise Plant

Follow Up Flag: Flag for follow up
Flag Status: Flagged

From: Jonathon Uzzle [REDACTED]
Sent: Wednesday, December 05, 2018 8:26 AM
To: Board of Directors <bod@tva.gov>
Subject: Paradise Plant

TVA External Message. Please use caution when opening.

Dear Board Members,

I humbly ask that you postpone the decision to discontinue burning coal at the Paradise Plant. The decision to discontinue burning coal would be devastating to Western Kentucky especially Muhlenberg County. I think it's unwise to be 100% dependent upon natural gas.

Jonathon Uzzle / Sales Manager



[REDACTED]

To all TVA Board Members:

I am a 15 year annual employee with TVA, currently working as a Maintenance Foreman at Gallatin Fossil Plant. My first 14 years were spent at Paradise Fossil Plant, until Units 1 & 2 were closed and I was directed to transfer to Gallatin or lose my job. I still live in Muhlenberg County and commute to Gallatin each day, a 2 hour drive one way. My hope was to eventually get to transfer back to Paradise, a hope dimmed by the talk of permanently closing Unit 3. My hopes aside, I want to point out some things that would affect this community and the surrounding counties. Our community is still feeling the effects of Units 1 & 2 closing over 2 years ago. If Paradise Unit 3 were to close, it would affect so many people. Immediately some 130 annual employees would lose their job, or like me be forced to transfer to keep a job. This would remove some 12 million dollars, in annual salary from this and surrounding counties. It would also cost coal miners, coal truck drivers, contractors, and school teachers, jobs lost due to a cut in money that TVA gives, in lieu of tax money. Closing Unit 3 would further devastate a county still reeling from the first 2 units closing. There is also the money that TVA has invested in Paradise to consider. Closing Paradise Unit 3 would be a vast waste and mismanagement of investments made there. A new dewatering plant is near completion, and would solve some current environmental concerns. In the fall of 2017, major upgrades were made to the turbine controls and the entire Super Heat section in the boiler was replaced. All these of an estimated 100 to 200 million dollars worth of upgrades. Any other upgrades needed to keep Unit 3 running would pale in comparison to money already spent. My hope is that you, the board members of TVA would weigh the devastation of closing Unit 3 to the gains you see and vote to keep Unit 3 running for years to come. I love this community as I know you love the community where you reside. I ask you to vote as if it were your community being affected, and if it were you and your family losing their jobs. Thank you for the opportunity to express my concerns.

Sincerely,
Thomas Wilkerson
Maintenance Foreman
Gallatin Fossil Plant

From: [REDACTED]
To: [Pilakowski, Ashley Anne](#)
Subject: Comments on Bull Run and Paradise fossil plants
Date: Wednesday, December 19, 2018 8:51:21 PM

TVA External Message. Please use caution when opening.

Hi

I'd like to offer strong support for TVA's plans to close the Bull Run and Paradise fossil plants. As I understand these are both running under capacity, and of course coal is a dirty fuel in terms of both mining and burning. I am a PhD scientist and I work in the broad field of climate science, particularly soil carbon emissions. Climate change as a result of fossil fuel burning is a serious issue as recently documented in the National Climate Assessment (NCA) and the State of the Carbon Cycle Report (the latter of which I am one of the lead editors), released on Nov 23 2018. The latter report documents dramatically decreased energy emissions in the US and North America as a result of fuel switching to renewables and natural gas, along with other improved technologies, all the while GDP continues to increase. The NCA documents climate changes that are happening NOW and are certain to get much worse, so I really applaud TVA's proposal. I encourage TVA to replace these plants with renewables and/or low carbon emitting technologies, when and if there is a need.

I also live in Oak Ridge TN. I am aware of the Oak Ridge City Council's short sighted recommendation to keep it open, even though the city claims to have a "climate action plan". Kindly ignore them.

Finally I am very concerned about the storage of fly ash and waste products on site. I am sure that steps will need to be taken to ensure safe disposal of these materials and prevent contamination of our ground and surface waters. This must be a part of the closure plan.

Thank you Dr Melanie Mayes

Last	First	Comment	Org/Agency	City	State	Zip	How Sent
Abel	Doug	It was sad when the last Blockbuster closed, but that's called progress. Coal is a technology that's centuries old. What is the point of livelihood if if air is so polluted you can't live any more? Please retire the plant.		Louisville	KY	40206	TVA Public Site
Adamek	Ann	For the long-term sake of our health and environment, I urge you to close the last coal-powered power plants.	citizen of Kentucky for 78 years	Louisville	KY	40222	TVA Public Site
Adams	Peggy	Dear PAID Federal TVA EMPLOYEES: As a 67 yr old retired professional I plead with you to listen & support all that effected By your decisions to harm our livelihood, our beautiful State, and our utilities. TVA was developed for the people - NOT BRUOCRATS OR one sided, ill-informed enviro-Mentalist who are not even affected by their decisions! I am asking you to STOP ALL ACTIONS TO HARM our people of Kentucky & those who live And support our Coal industry!	American/KENTUCKY retiree	Paducah	KY	42003	TVA Public Site
Alexander	Dorothy	I feel this is totally a stupid move on the part of TVA. 1. You just spent millions to change this plant over. 2. You would put hundreds out of jobs and destroy Muhlenberg County more than you already have. 3. This county has been good to you. 4. This country is in bad enough shape without you putting so many out of jobs. 5. I know you do not care about this little county but we sure have been good to you.	Citizen	Dunmor	KY	42339	TVA Public Site
Allgeier	Ed	FDr Paul and other individuals using their political weight to retain greenhouse gas polluting energy sources like coal powered plants are simply wrong-minded or in the pockets of fossil fuel industries. At this time these industries are threatening the very future of the planet especially when cheaper and cleaner sources of energy are available. This is madness.	Knlt	Louisville	KY	40206	TVA Public Site
Alongi	Franklin	Close the plant please.		Louisville	KY	40205	TVA Public Site
Amos	Jerry	Wrong decision since TVA plays an important role in the grid system. Muhlenberg County has been already deeply hit financially. This decision should be tabled for a few yrs. since wind power is impossible in this		Beaver Dam	KY	42320	TVA Public Site
Arnold	Jason	I have worked at Paradise for 15 1/2 yrs and I'm 45 yrs old. Paradise has provided a nice living for me and my family I sure hope it continues not just for me but all my coworkers outside business that benefit as well. Please take into consideration the employees that if asked to move to another plant that have aging parents or have grandchildren they provide for. Not everyone can uproot just like that. Just a sad situation when	PAF	Centertown	KY	42328	TVA Public Site
Arnold	Karen	There is no method to your madness in shutting down TVA----coal-fired plants are the livelihood of this community.		Greenville,	KY	42345	TVA Public Site
Atcher	Barry	I am writing the TVA Board members to politely request that the decision be made to continue the operation of Paradise Unit 3. I recently retired from TVA after 38 1/2 years. I have watched Muhlenberg county go from a region with many opportunities for good paying jobs during the era of the coal mining boom, to the more recent days of localized economic depression with few operational coal mines left and industry shuttered. The closing of Paradise's Units 1 & 2 have had detrimental effects far beyond what was forecast by the previous TVA EA drafted in preparation for their closure. The closing of the last remaining unit at the coal plant would be the nail in the coffin for Muhlenberg County and the surrounding area. Education will suffer due to the loss of In-Lieu-Of tax revenue. The loss of direct and indirect jobs will be devastating. Paradise Unit 3 is an efficient unit that has recently had hundreds of millions of dollars poured into it by the rate payers for its continued operation for 20 years plus. It would be fiscally irresponsible to waste those funds to accomplish a political agenda. If TVA is interested in transparency and making the best business decision for its generation fleet, then it should perform a completely independent study of each generating unit. TVA in years past have spent billions of dollars to construct nuclear assets that were never completed and then later scrapped for pennies on the dollar. They also missed their forecast for the construction of Watts Bar 2 by 50 percent and overran the cost estimate by 2 billion dollars. It seems to me that there is less risk to the rate payer to maintain a current operational asset than to make projections about commodity	TVA Retiree	Greenville	KY	42345	TVA Public Site
Atcher	Kari	Please consider all aspects carefully before choosing to close down TVA's units. Our community as a whole depends on that plant for so many things. It will drastically affect our community, our schools, our business and our families livelihoods. I beg you to please keep it open. Thank you for your time and consideration. Merry christmas to you and yours.		Sacramento	KY	42372	TVA Public Site
Atcher	Landon	The closure of unit 3 at TVA will have a devastating impact on the western Kentucky economy and I oppose its closure. Living and working in western Kentucky I have first hand knowledge of how the closure of 2 units has already affected this area and the jobs we have lost. It has forced people to move and/or drive several hours one way or stay out of town during the week away from their family. I can comprehend the environmental impact of both forms of energy production which both have negative impacts. Producing some of the same and some different byproducts I would urge TVA to keep Unit 3 coal unit as to have a		Central City	KY	42330	TVA Public Site
Atcher	Sherry	TVA board members. Keeping Paradise Unit 3 open is desperately needed to keep Muhlenberg and surrounding counties above water. Most of the coal mines have been closed over the years and Paradise is one of the few industrial businesses left that significantly support the school systems. The direct and indirect job loss will be an obstacle that cannot be overcome. Please stop the war on coal.	Private Citizen	Greenville	KY	42345	TVA Public Site

Last	First	Comment	Org/Agency	City	State	Zip	How Sent
Atcher	Stetson	I am writing to request the continued operation of Unit 3 at the Paradise Fossil Plant. Paradise has been a vital part of the community for a long time. The economic fallout was felt when units 1 & 2 were closed. I feel that the current EA did not adequately assess the socioeconomic impact of the potential closure of Unit 3. The loss of the last remaining coal unit would result in the direct loss of over 135 TVA full time jobs. In addition, throughout the year, many local contractors are employed for extended periods of time. I would estimate that on average at least 50 contractors are essentially employed full time throughout the year at Paradise. During unit outages which occur every year to 2 years, hundreds of contractors are on site for extended periods of time. The loss of Unit 3 would create even further employment fall out via coal & limestone trucking jobs etc. Local hotels and small businesses who provide goods and services to Paradise and its full & part time workforce would suffer and likely close, further exacerbating regional unemployment problems. I believe the most significant impact to the community would be the loss of the In-Lieu-Of tax money that provides for the local school systems. When Units 1 & 2 shut down, the Board of Education announced potential layoffs of several teaching and support positions. The closure of Unit 3 would result in the loss of millions of dollars worth of payments that are vital to support the local school system. The war on coal has battered the county with the loss of good paying coal mining positions as well as the loss of coal severance tax revenue. Muhlenberg and surrounding counties can't afford to lose any more tax revenue to support the local school system and infrastructure. I think that the EA relied on old "data" that does not adequately reflect the flexibly, reliability, and material condition of Unit 3. Recently, a new boiler SSH along with turbine controls were installed. After some final adjustments were made to those newly installed components in early May of 2018, Paradise's Unit 3 has been one of the most reliable Units in TVA's fleet. Paradise Unit 3 set its 3rd all time record run for continuous operation of approximately 144 days and has had historically low EFOR to date. This is the exact opposite of what was stated in the EA. It was also stated in the EA that Paradise Unit 3 is a single base load unit that is not flexible for the transmission system. Paradise Unit 3 can now operate at significantly lower loads than it could prior to the new SSH and turbine controls. It has repeatedly dropped from 975 MW's to 400 MW's without any forced outages or reliability issues from those load swings. A lot of the projects that would be required for the future operation of the unit are in various stages of completion with large portions of the projects cost already expended. I think that TVA should have a diversified portfolio. Coal, Gas, Renewables, Hydro, Nuclear, & Distributed energy resources all have their place in the generation mix. I think that historically, coal prices have been more stable than gas and it is impossible to forecast an accurate cost of almost any commodity. Nuclear Units or gas pipelines are more susceptible to significant fallout from a natural or major disaster / explosion. It is my opinion that TVA shouldn't put all of their eggs in one basket. The onsite fuel storage capability of a coal site allows for national grid security with a fuel source readily available to keep the power on in the event of a normal fuel supply disruption. The same cannot be said of natural gas facilities that rely on a single pipeline for their only source of fuel or a hydro / solar facility that are solely dependent on the weather. It does not make economic sense for TVA to shut down a viable asset that is profitable. I also don't understand why a utility would make a decision to shut down a single asset without performing a comprehensive assessment of all their assets. If that assessment has been done on each asset, where is that	Resident of Muhlenberg County KY	Sacramento	KY	42372	TVA Public Site
B	Ryan	If you want to de-rate units while keeping coal-fire options as peak backups, you should consider shutting down U1 or U2 at Cumberland. Mothballing U3 at PAF is short-sighted and putting all eggs in one basket for generation. You're not accounting for scenarios of Cumberland being offline during peak times due to worst-case scenario events; whether they be weather related or 25-year natural disasters. While it is understood that energy demand are decreasing with improvement in consumer technologies, it would behoove you to at-least replace the max generating MW of any unit you plan to take offline. I don't feel you have achieved this and you've been driven by leadership (Johnson) who ran your utility like a private company, lining his bonus through short-term gains. Secondly, your portfolio does not take into account the eventual rise in gas costs too run your peak units CC and CT, and that eventual cost will be passed down to the customer via "fuel surcharge". If TVA's new model is to pass down long-term fiduciary gambling to customers, then it may be time to divest the organization to private companies like Southern Company who have a better understanding of operating	Concerned Citizen	Bowling Green	KY		TVA Public Site
Baker	Brad	TVA has been income for my family for the past 17 years. TVA has also supplied for a lot of my union brothers and sisters as well. There is far more people than the employees that work at TVA that will be effected . TVA contributes a lot of money to the local schools as well as to the local economy. To whom it may concern thank you a lot for the income that TVA has supply for my family and many others in the area.	Local #37 Heat and Insulator	Beaver Dam	KY	42320	TVA Public Site
Banahan	David	Coal is a dead horse and we need to stop beating it. Natural gas, solar and wind are the future in a free market.	Citizen	Campbellsville	KY	42718	TVA Public Site
Barnard	Earl	Unit 3 Paradise is an important source of energy, has quality air pollution controls. It is also vital to the area for good paying jobs. The local economy benefits from the ripple effect of these good jobs. The school system in the county benefit from the plant in fees. In an area of the state where jobs are few that provide the pay and benefits Paradise does it is key to the local economy of the trick county area.	Operations	Hartford	KY	42347	TVA Public Site
Beckhart	David	We need to keep unit 3 open It's a good unit and a lot of families depend on it to make a Living	Boilermaker	Owensboro	KY	42303	TVA Public Site
Beeby	Michael	Dear TVA, This comments on the possible closure of the Paradise Fossil Plant Unit 3. I support closing the unit and then reinvesting to move to renewable energy. With the reduction in cost of renewable energy, it should be more economical to install renewable energy like wind and solar and to have the people retrained to provide clean energy for the future. This should not only help provide clean energy, avoid global warming and black lung and environment issues with coal mining. Let's help Muhlenberg County move toward a sustainable future that benefits them and the environment- go renewable energy.		Covington	KY	41011	TVA Public Site
Bibb	Cheryl	I am against the retirement of the Paradise Coal Plant in Kentucky. Kentuckians should decide the fate of energy plants in our state.		Louisville	KY	40228	TVA Public Site
Bilbro	Donna	As a concerned citizen of Muhlenberg Country I send this message imploring you to vote this keep TVA unit three up and running. Currently Muhlenberg County has the highest unemployment rate in our region. The jobs lost from closing unit three will further exacerbate this problem. Closing the unit will not only casuse the loss of workers at TVA but also in the trucking industry and the coal mines that supply the coal. This large loss of jobs will also result in a negative effect on our local businesses. TVA dollars also help fund our school system and we are very dependent on these dollars. In addition, residents in our communities need		Central City	KY	us, 42330	TVA Public Site
Blake	Andrea	If the Unit 3 is closed, the school campus could end up closing as well. Please keep jobs in our community.	ACT Academy	Central City	KY	42330	TVA Public Site
BLETZINGER	ERIC	Dear Board of Directors, I am writing to you today to ask that you consider keeping Unit 3 at the TVA Paradise Power Plant in Muhlenberg County running. As you may be aware, the Paradise plant is a significant employer and is essential for the survival of our county. Not only does the plant directly employ numerous people in Muhlenberg County, each job at Paradise has 2-3 ancillary jobs that support it. TVA has been a large part of our community for numerous years for which we are very grateful. TVA has become interwoven into the lives of our entire county, and our community could not sustain a mass exodus that the closure of unit 3 would produce. There would be a cascading chain of events that would be devastating to our local economy. Muhlenberg county is always looking to recruit new business that would help grow the economy, therefore the removal of unit 3 and the surrounding jobs associated with it would also deal a significant blow.	Muhlenberg County Board of Education	Powderly	KY	42345	TVA Public Site
Boguess	Pamela	I really feel that closing unit 3 is going to put many families out of work. The economy in Muhlenberg county depends on TVA It is one of the largest employers in the county.	Concerned citizen	Greenville	KY	42345	TVA Public Site
Bolen	Amy	I feel that TVA Paradise should NOT choose to shut down Unit 3 because it provides jobs for the community.	USA Debusk	Owensboro	KY	42301	TVA Public Site

Last	First	Comment	Org/Agency	City	State	Zip	How Sent
brantley	Paulena	The ACT Christian Academy could close due to the closing of unit 3. Please reconsider and do not close unit 3	ACT Christian Academy	Powderly	KY	42367	TVA Public Site
Brewer	Clarence	For the well-being if the county please keep unit 3 open. Plus as a company TVA needs diverse energy sources to make the power, now that we have leadership in the US who makes sound business decisions it will be easier to burn coal. If everyone goes to Natural Gas the supply will dwindle and the costs will spike. Thanks for your time	First State Bank	Central city	KY	42330	TVA Public Site
Brewer	Tamberly	Keep unit 3 open for our well being and for future generations.		Bowling Green	KY	42103	TVA Public Site
Brewer	Tina	My father, Jim Chappell, worked for 33 years at TVA and because of this, I was able to attend college and have been a middle school teacher for 24 years in the county. PLEASE DO NOT CLOSE DOWN UNIT 3, the last coal burning unit at our Paradise location. Our local economy and community depends on it. It would negatively impact hundreds of families in our region, which would have a trickle-down effect. It would hurt our local coal and trucking industry. It would reduce the need for local laborers and specialized personnel. It would hurt our local economy, especially locally owned businesses. Lastly, it would negatively impact	Mrs.	Central City	KY	42330	TVA Public Site
Broadwater	Ronald	The new climate change report is screaming loudly that the world needs to close our coal-fired power plants. The older the plant, the more necessary this becomes. Please don't consider that air-pollution upgrades can be made to alleviate Mercury, Sulfur Dioxide, and Carbon Dioxide levels. The Return on Investment would not happen. The US will come to its senses soon.	Mr.	LOUISVILLE	KY	40207	TVA Public Site
Brooks	Brooklin	I am a teacher at ACT Christian Academy and we have several students who have parents that work at ACT Christian Academy along with our headmasters husband. This is a huge financial help to our families and our livelihood at our school. This would also have a major impact on my husband's job who is a coal miner. The shutting down of this plant is more than just a financial help to some lofty bottom line but it is	ACT Christian Academy	Greenville	KY	42345	TVA Public Site
Brown	James	The loss of that plant would devastate muhlenberg county and many jobs would be lost Coal is the most affordable and dependable energy source for our region If you really want to make an impact on the muhlenberg county area Let people KEEP THEIR JOBS	Jeff lear trucking	Dawson springs	KY	42408	TVA Public Site
Brown	Tammy	Pretty much sums it up. https://www.marketwatch.com/story/the-lights-could-go-out-this-winter-if-we-close-all-the-coal-and-nuclear-power-plants-2018-12-04?fbclid=IwAR0vffFIkXJ5TDDO4Y2k_gLE_L6aZIKxHHLZOUi1PMmdeN5HejTtu5NJINM					TVA Public Site
Bryant	Stephanie	Please consider keeping the TVA unit 3 in Paradise open!! Our community will suffer greatly if this unit is closed! As a teacher in Muhlenberg County, I worry about the future of my students and their families!		Central City	KY	42330	TVA Public Site
Buchanan	Bryan	TVA Paradise Fossil Plant is being reviewed and by the looks of it, unit three will be closed. This will drastically affect small businesses throughout Muhlenberg County. We own Lawton Insurance in Central City, KY which has been in business since 1899 and Eaves insurance in Greenville Ky in business since 1989. A large majority of our insureds are either vendors of TVA Paradise, work at TVA Paradise or work for a coal mine or trucking company servicing TVA Paradise. Please be aware of the devastating backlash closing Unit 3 will cause to our County. The closures ripple effect will result in loss of jobs, loss of businesses, loss of revenue for our school system and our country government. Please take these items into consideration. Bryan Buchanan Executive Vice President	Lawton Insurance	Central City	KY	42330	TVA Public Site
Burkle	Marilyn T	I strongly encourage retiring the coal-fired unit referred to as the Paradise Fossil Plant. What a strange name for a dirt-producing facility. I can't think of any reason to keeping this plant up and running. Kentuckians will have cleaner air, water and soil by moving to cheaper and cleaner energy. Saving money on energy is a wonderful byproduct of this action. Senator Paul doesn't want you picking winners and losers in Kentucky's energy sectors. He wants that job kept to himself and his like-minded buddies. He is picking coal as a winner when sound business, financial, social and health practices all say otherwise.		Lexington	KY	40517	TVA Public Site
Cabbage	Blake	Many fellow Kentuckians want more energy coming from clean, renewable sources. Good-paying jobs are available in clean energy. And it can bring better health to many of us.		Lexington	KY	40517	TVA Public Site
Cabbage	Blake	closing this unit would have a horrible effect on the economy and overall life of the families in this area and surrounding areas, more than just the workers should be effected but also all of the businesses big and small in the region will ta		greenville	KY	42345	TVA Public Site
Carder	Emily	Muhlenberg County has a private school called ACT Christian Academy that has been opened for years. I have served as the Head of School since it's opening. If TVA chooses to close Unit 3, then the county private school will be forced to shut down. There are numerous factors involved in this decision that will effect many families and income. My husband works on this Unit and our family will be moved. Having our school closed because of this would be detrimental and beyond heartbreaking. Please visit our campus. Closing this Unit would close jobs, close homes, and close a school campus! PLEASE be a voice for our children, and	The ACT Christian Academy of Muhlenberg County	Greenville	KY	42345	TVA Public Site
Carder	Michael	The closure of PAF Unit 3 would be devastating to several counties economically. After the lies that were spewed from the closure of units 1&2, the economy fell there. With over 59 teacher jobs lost, mine closures, railroad jobs lost and never a mention of it. With the loss of 130 more jobs in the area would shut businesses down. And for what, just a political agenda? Yes that is what it's about!!! Bag houses were approved for 1&2 and the new regime came in without any regard for its people and changed it. How much money has Unit 3 made for you over the years and now that you are forced to put some money into it you are looking for a way out. I seen no mention of how much money Unit3 has made just only what your going to spend. Quit being one sided and be honest about your numbers. Your website says PAF 3 produces over 1,000,000	ACT Schools	Greenville	KY	42345	TVA Public Site

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Carlson	Bruce	<p>Regarding Closure of Unit 3, Paradise Fossil Plant</p> <p>Coal is the lowest cost source of electricity--as low as 8 cents per Kw/hour. It is secure, supply is abundant, energy can be stockpiled in coal piles--it is not dependent on the wind blowing, sun shining, or the just-in-time aspect of natural gas pipeline supply. It keeps our country secure. It has helped win wars in the past. Coal power plants furnish a lot of jobs--jobs that support families, keeps them strong, keeps family members away from drugs and despair. Coal jobs exist where they are needed most.</p> <p>The ONLY reason for our nation to reduce coal burning is the outright fraud of the CO2 scare. Patrick Moore, a scientist, co-founded Greenpeace.</p> <p>He woke up to the fraud of the movement he was associated with. Google Patrick Moore's October 2015 video fully debunking the CO2 alarmism, which actually makes a case for the altruistic release of CO2 (preventing CO2 from ever dropping below 180 ppm at which point all plants die). CO2 at 400 ppm is no problem whatsoever, to anybody and same with 500 ppm (which is 0.05% of the atmosphere, next to nothing!).</p> <p>When President Obama took office, coal was going strong. In the next 6 years, he managed to bankrupt 50% of the U.S. coal industry (Peabody, Arch, James River, Luminent, Alpha--the list goes on). I know because I work with this industry. But in his undeclared shame, he never held a parade to celebrate his success! I wonder why? Why was there no parade? Two reasons: He took out the coal industry but knew to admit he had killed jobs was too negative a message. Secondly, it sent so much of Eastern Kentucky and West Virginia into the opioid crisis, which was closely related to his destruction of the coal industry. In his heart, he knew about this cause and effect. Investors pulled out of coal-fired power plants during the 8 years of Obama and went heavily into natural gas. Now our customers like Bechtel who build natural gas power plant are seeing investment dry up there because Trump is trying to end the War on Coal. Investors listen to politicians. The closing of the Paradise plant is not logical or based on economics, it is political and destructive, and cuts down on energy diversity. (Even Germany is moving back towards coal plants).</p> <p>CO2 is NOT a pollutant but a major source of all life on earth, no more a pollutant than water (which actually does kill people in floods, torrential downpours leading to accidents, etc.) It is nonsense to declare CO2 a pollutant to be regulated. Plant life needs it to live and to create oxygen. Forests and the landscapes in general have been greening with the addition of CO2 to the atmosphere.</p> <p>The 'science' of global warming has been proven wrong again and again. It is associated with scandals and lies. The IPCC said Everest would soon lack snow clear to the top--anyone knowing elevation effects on temperature would understand this would require at least a 40 degree Fahrenheit increase in temperature--they were mocked and removed that prediction. All dire predictions have proven false. Global warming seems to have stopped in any case around 2000. In just the last 10 years, Antarctica set its record snow extent and snow mass total and set the coldest temperature record for the planet since 2000 (that news was suppressed). In January, 2004 as I recall, Mount Washington in NH had its coldest January ever, counting every hour of measurement, not by 0.5 degrees but by 5 whole degrees Fahrenheit. It just broke the all-time November coldest temperature of -20F by 6 degrees, recording -26F on November 22nd, 2018. Tornadoes and even hurricanes have been down recently--2017 was the first hurricane uptick in a while, and most damage was from rain. Greenland just had record snows in 2018 (highest in satellite era since 1966), causing one of the highest albedo (sun-reflecting) effects on record through the summer.</p> <p>The cowardice has to stop. the lack of fighting back has to stop. The fawning to the fraudulent Climate Lobby has to stop. Keep the coal plant open.</p>	Carlson Software	Maysville	KY	41056	TVA Public Site
Carter	Michael	<p>Keep your suggestions or edicts to area's that want them. We in Kentucky prefer to make our own decision concerning where our power comes from and how its fueled. I'm sure President Trump would agree with me!</p>	Retired	Erlanger	KY	41018	TVA Public Site
Cartwright	Lauren	<p>As a wife of a coal miner, I urge you to please reconsider shutting down the last coal burner. This will directly impact my family and possibly put my husband out of a job. We are not the only family to be affected by this, as our whole county is depended on coal. Shutting it down would start a cascade of deterioration to our county.</p>	Muhlenberg County Board of Education	Greenville	KY	42345	TVA Public Site
Cary	Sarah	<p>our community. The loss of jobs would be tremendous and would be a blow that our community would not be able to recover from. As an educator, the impact on students and education here would be extremely negative. Our rural community already struggles from unemployment and poverty, and the thought of losing more jobs is beyond belief. I implore you to reconsider the possibility of closing the unit and humbly ask you to look for other ways to accomplish your goals.</p>	MCEA	Greenville	KY	42345	TVA Public Site
Chumley	Matthew	<p>I don't live near Paradise Fossil Plant. I do work sporadically at Paradise Fossil Plant, but neither Paradise nor another generating facility staying open or closed is a determining factor of my continued employment or salary. None of my family work at Paradise Fossil Plant. Paradise Fossil Plant does not provide service to my home in Clarksville, Tennessee, but TVA does as I'm a member of Cumberland Electric Membership Co-op. I am not totally unbiased though, as I lived a stone's throw from Paradise for most of my life. As an outdoorsman, I have spent many days hunting and fishing on Peabody Wildlife Management area near Paradise. I still do. As an avid outdoorsman and a staunch liberal, I am obviously in favor of a clean environment, but I also think of the costs. I am not in favor of a possibly (at most) slightly improved environment at the expense of a community. What TVA does not consider is the will of their customers. If a poll was taken throughout the valley to ask individuals if they would be willing to pay an extra few cents on their utility bill to keep a region alive, I believe the board would be surprised. I know that individuals aren't the primary importance of TVA. It's businesses. That's the political landscape of those in power at this time. That's why you see activism like not seen since the 60s, and why we have a reality TV star president. It's because people don't care to stand up for the little man. I digress.</p> <p>TVA still provides cheap, reliable electricity. Would closing Paradise decrease cost? If it does, then what will be the value of decreased cost? Increased demand? Increased Profit? Decreased cost to the consumer? Will manufacturing be more inclined to come to the region? If not, then what is the value of decreased cost? The region is also one of the cheapest in the nation for rates. The problem is the board isn't concerned with a region. Business ethics are a different than morality. The TVA board doesn't owe anything to the people of Paradise and the surrounding counties and region. The TVA wasn't created to make a profit. (although it certainly does, and it will continue even if Paradise continues operation). TVA was created to improve lives throughout the Tennessee Valley. Greed has caused a regression. TVA's entire purpose has changed. It has gone the way of the United States: Profits over people, bonuses for a few millionaires over a coal miner, a truck driver, a small business owner, a home builder, and a Paradise Fossil Plant worker just being able to make a decent life for his or her family. My father once told a coworker when he argued with my father opposed to a minimum wage increase. He told me 'do you know what the children of parents who make minimum wage want?'...'the same things yours and mine want?'. He was speaking of safety, security, a life with opportunity, a college education. The closing TVA Paradise would have a lasting negative impact for generations: on a community, a state, and a country. Paradise is now operating at an efficiency not seen before in the past. With increased resources available to Paradise, it is an asset to TVA that will</p>	Partner Contractor	Clarksville	TN	37043	TVA Public Site
Clark	Ryan	<p>During my tenure at TVA, I spent 18 years at PAF as an Senior IM foreman. I am a native of Muhlenberg county and also worked at PAF prior to becoming annual. PAF has been a part of my family since before I was born. I have seen first hand the positive impacts that PAF has on the surrounding communities. Most citizens of these surrounding communities would strongly agree that TVA is a great place to work and has a strong community influence. My family owns a retail business in Muhlenberg county. For 40 years, our family business has served not only PAF's needs but the people of this community that rely on the employment from PAF. Once PAF 1 and 2 retired, we began to see a negative impact on the amount of revenue in our family business. There has been a trickle down effect since. Although I have transferred to PCC, in fear of the closure of Unit 3, I know all too well that PAF is a major asset to TVA. The unit has proven itself safe, reliable, and valuable in recent years. It is a realized fact that unit 3 is nearing end of life and is going to require investment to continue. With the recent upgrades and investments, there should be a warranted amount of time to recover what has been invested recently. If that is not a viable option, I would</p>	TVA-Paradise Combined cycle plant	Greenville	KY	42345	TVA Public Site
Cleveland	Chris	<p>Unit 3 at Paradise is a very valuable site for many people. The company I work for counts on TVA for quite a bit of our work.</p>	New Age Fastening	Wilton	ND	58579	TVA Public Site
Clower	Bryan	<p>This comment is in support of keeping Paradise Unit 3 open and continuing operations.</p>	Chalmers & Kubeck	Watkinsville	GA		TVA Public Site

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Coin	Brandon	<p>My wife and I are very concerned after hearing TVA's announcement that they are considering retiring Paradise's Unit 3. If Unit 3 shuts down it will have negative impacts not only on my household but also on my friends, neighbors, and the local community.</p> <p>When Units 1 & 2 shut down I was transferred to a plant 100 miles from my home but was still hopeful to return to Paradise one day. If the decision is made to close Unit 3 it would be most unlikely that I could return. I still have friends and neighbors that was fortunate enough to stay when I had to leave but would be forced to move possibly even further away than I had to move. Many of them with families that the transfer would cause them to miss important milestones in their children's lives. There are very few jobs even within driving distance comparable to the jobs we are all blessed with at TVA.</p> <p>That leads me to my concern of the negative local impact. Other jobs would be lost in our community due to the need for coal being taken away. We have friends and family that their jobs are affected by coal or work in the coal mines themselves. The money that will be taken away from our local businesses and economy will be detrimental. Our school system depends on a large sum of money each year from TVA and will suffer a great loss if Unit 3 shuts down.</p>		Greenville	KY	42345	TVA Public Site
Coin	David & Brenda	<p>To whom it may concern:</p> <p>We are writing this letter concerning the coal fired plant at TVA here in Muhlenberg County. If this plant is taken out of commission it not only will affect the employees of that plant but also the county as a whole. It will affect the revenue that goes to our schools, also the trucking company's who haul the coal to the plant. It is vitally important that the coal fired plant at TVA continue operation!</p> <p>Thank you, Brenda and David Coin Dec. 13, 2018</p>		Greenville	KY	42345	TVA Public Site
Coin	Joseph	<p>The Paradise plant has been here for as long as I have lived.. I lived most if my life with a few miles of it ,it has been a great place for people to work and raise their families. A lot of Veterans have returned from service to have a career there. The Restaurant that we own has served a lot of the workers and probably some of you on the Decision making Board. I never worked there but made a lot of friends at the Restaurant. Maybe some of you . I know you have a job and your decision is not all based on what we are sending to you in these letters ,and our Place will be hurt, as well as a lot more in this county ,especially our school system. Your decision I know will be based on a lot of what our Government has done and the EPA in the last 10 years or so. Bou if there is even a remote chance of the place staying open and running ,keep it Open for our County. I have seen the Government do a lot of crazy things in the 20 years I worked there, that they went back to the old way a few years later after spending the tax payers money and are still doing it the old way.</p>	US Air Force Retired, Buggy Shed Owner	Drakesboro	KY	42337	TVA Public Site
Coin	Kimberly	<p>Retiring TVA is just wrong!! Too many people depend on them. Our community will have absolutely nothing left in it. Our coal mines have all shut down and TVA is what keeps our county going. It was bad enough when you switched the plant from coal to the way it is today. So many lost jobs who didn't deserve it. My father worked for TVA until his retirement in 2002 and it is not only apart of our county by also our life! DO I WOULD LIKE THIS TO BE CONSIDERED, AS MENTIONED IN THE ARTICLE THAT FACTORS ATTRIBUTING TO CLOSING THE PLANT WAS MAKING WAY FOR MORE RENEWABLE ENERGY, IT APPEARS THAT WE HAVE LOST GROUND GOING FROM 5% TO 4% RENEWABLE PURCHASED IN 2018 FISCAL YEAR. AS WELL, PURCHASED POWER THE SAME YEAR, NON RENEWABLE IS AT 9% SLIGHTLY BELOW HALF OF THE TOTAL COAL FLEET WHICH WAS 19%. I WOULD THINK THAT KEEPING OUR GENERATOR PLANTS UNDER OUR CONTROL WOULD BE BOTH MORE RELIABLE, ECONOMICALLY SOUND, AND BENIFICIAL TO LOCAL ECONOMY. I WAS UNDER THE IMPRESSION WE WERE MAINTAINING A BALANCED PORTFOLIO AT AROUND 20% COAL FOR A STABLE GENERATION PORFOLIO ESPECIALLY WITH THE NATURE OF VOLATILITY IN PRICE AND AVAILABILITY WITH NATURAL GAS AT VARIOUS TIMES OF YEAR. INVESTMENTS IN UNIT 3, THE DEWATERING FACILITY THAT IS SOON TO BE IN COMISSION, AND THE RELIABILITY OF UNIT AFTER A RECENT 144 DAY RUN SUMMER 2018 (ESPECIALLY WITH SUCH A LOW STAFF NUMBERS), THIS PLANT WOULD BE CONSIDERED AS PART OF THE TVA PORTFOLIO FOR SEVERAL YEARS TO COME. I BELIEVE THAT TVA HAS MADE GREAT STRIDES TO THE ENVORONMENT IN REDUCING CARBON AND EMISSION THE PAST 6 YEARS BUT THERE SHOULD STILL BE A PLACE FOR THE REMAINING FOSSIL FLEET FOR ITS PROVEN RELIABILITY AS WELL TO MAINTAIN A BALANCE TO THE EVER CHANGING FUEL IN THE GENERATING INDUSTRY. ESPECIALLY WITH THE CURRENT COST A MAKING POWER THROGH OTHER AVENUES. SOLAR AS WELL AS WIND APPEARS TO A FEW YEARS AWAY AS A REPLACEMENT FOR THIS DUE TO HIGH FRONT END INVESTMENTS COST PER KILOWATT. I WOULD LIKE TO THANK YOU FOR THIS OPPERTUNITY TO VOICE MY OPPINION AND THANK YOU FOR YOUR TIME AND CONSIDERATION.</p>		Greenville	KY	42345	TVA Public Site
COMBS	MARK	<p>MARK COMBS</p>	FOSSIL	BEAVER DAM	KY	42320	TVA Public Site
Combs	Annie	<p>I think that this would hurt not only muhlenburg, but several surrounding counties. I have several family members and friends that are employed there in annual and contractor jobs. That is close work for our loved ones to make a living. This keeps them off the roads traveling to much further distances. I seen in the report that closing the plants decreases possible accidents on certain roadways at paradise but I did not see anything about when my husband, son in law and father has to travel to southern Indiana and even as far as Chicago for work. I think that there are several issues off the mark and this is just one aspect. The report I feel did not represent a lot of us in the are. Thank you for hearing my concerns.</p>		Beaver dam	KY	42320	TVA Public Site
Combs	Rick	<p>To Whom It May Concern:</p> <p>I would like to submit my thoughts on a small portion of the PAF3 Environmental Assessment that was posted for public review. The EA PAF3 has many inconsistencies and does not fully exhibit sufficient data to make an informed response to the open public comment portion of the evaluation. The report was to focus on the environmental impacts of the plant, however, it seems to take an opportunity to assess plant shortcomings to sway one's thoughts toward reliability and efficiency of PAF3 power production. This report is not without bias. Otherwise, more data supporting its recommendation would be present. Among the debatable statements presented in the EA PAF3 (dealing with reliability and EFOR rates, material conditions, fuel cost and replacement power), there was one particular that was mentioned that I would like to address. On page 46 of the EA in the Socioeconomics and Environmental Justice section, "While this decrease in employment represents less than 2 percent of total employment in Muhlenberg County (USBLS 2018), minor direct adverse economic impacts to the area would result." (EA Pg. 46). I would strongly disagree with that evaluation, The retirement of PAF 3 would have enormous impact on the local as well as the state economy not to mention removing a major piece of infrastructure from the North America Electrical grid. Contrary to the EA report PAF 3 is a vital part of our economy in surrounding counties. Hundreds will be directly affected, but thousands of lives will be impacted by removing this revenue stream from our local economy. If displaced workers are afforded the opportunity to travel to another TVA location, how do you put a monetary figure on folks moving out of the area that provide to the community in capacities such as: youth leaders, baseball coaches, volunteers at the community center or just being a mom, dad, uncle or neighbor? These are real people that give to a community substance that can not be measured by a dollar figure. These are reasons TVA was built, "For the People of the United States "and Western Kentucky is a part of that mission statement. I strongly encourage the TVA board to vote to keep PAF3 a viable asset in the TVA generation portfolio.</p>		Beaver Dam	KY	42320	TVA Public Site
Corlew	Jeff	<p>Please keep paradise unit 3 open. It is vital to the local economy</p>		Charleston	MO	63834	TVA Public Site

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Cornett	Saundra	Please consider carefully the economic impact of closing the Paradise Plant. We live in a rural community, coal has been our lifeblood, most of that is gone, loss of jobs has made this county a wasteland of opportunity. We have very little left for our families here. Paradise is one of those places that good jobs still exist, consider the families, consider the trickle down effect, consider the community, consider more than just the bottom line please. We need this to stay open to help support these families, this community, this lifeblood that is still left. I have family that work here, they have 3 small children, mouths to feed, bodies to clothe, house over their heads, education, they are dependent on factors beyond their control, they did not cause any of this, they were counting on a job that lasted, please re-consider any disastrous	Mrs.	Greenville	KY	42345	TVA Public Site
Cornette	Shawn	I feel that if we are to obtain an accurate assessment of a site for potential closure , then we should obtain the most current and accurate data that gives us the most accurate assessment of the site. The data that was used in the EA assessment at paradise was data from 2015 . This is not a clear representation of plant material condition, plant projects or plant performance. Paradise has had major upgrades to turbine control, boiler elements that were not considered in the EA assessment . Many of the major projects that were mentioned in the EA assessment as an expense to keep paradise as an asset are already nearing completion.	FPG	greenville	KY	42345	TVA Public Site
Cornette	Stacey	I greatly urge everyone involved to not retire Paradise Fossil Plant unit 3. PAF has been integral in the development and progress in our region. We have already sustained a major loss with the retirement of units 1 and 2. The loss of these units contributed to an approximate 2% loss in population combined with the ancillary services lost such as trucking and mining. If we take another huge loss such as closing unit 3, the community and region will see extreme negative impacts. The impacts on the community reach far and will be long lasting compared to the impacts of continued coal usage, especially with unit 3 becoming such a reliable part of the portfolio. It seems only logical that the investments made to improve environmental controls and reliability would be best honored by the continued operation rather than being completed in vain. While the nation as a whole, demands cleaner energy, it is time to educate the public on the many technologies present to make all fossil fuels, such as those implemented at PAF, cleaner, with far less emissions than ever before. While a need for renewable energy exists, so does the demand for reliable energy, which coal is known for as well as existing in ample supply for many, many years. It seems nonsensical to close a fully functional and compliant coal unit while praising the benefits of natural gas, when it, too, is a fossil fuel with many negatives not considered, such as those associated with fracking and volatility. Once again, environmental science looks at not only the ecosystem impacts but the economic impacts and it is crucial to economy of western Kentucky, to keep PAF unit 3 in full operation. Dr. Stacey Cornette	Muhlenberg County Board of Education	Greenville	KY	42345	TVA Public Site
Cotton	Jessica	Please keep Unit 3 in Muhlenberg County, Kentucky open. Our community already suffers from lack of industries. The closing of Unit 3 would have a very negative impact on our community. As an educator, I see the struggle everyday of families just trying to provide the basic needs for their children. Unit 3 not only provides jobs for those at TVA, but also for truck drivers, mechanics, etc... We need Unit 3 in Muhlenberg		Beechmont	KY	42323	TVA Public Site
Cramer	Sheba	TVA has been a major industry/power plant in Muhlenberg county for decades. Clean coal is much better than running pipelines underground, with the eventual rupture of the lines. Polluting the waters, soil and air which will kill the trees, that give up clean oxygen. I am appalled by the potential closing of the Paradise plant!	na	Belton	KY	42324	TVA Public Site
Crowley	Cris	The TVA Paradise Fossil Fuel Plant not only provides direct and indirect job opportunities for Muhlenberg County residents, but for others in the region. It has a huge impact on the local and regional economy. My other concern is total dependence on natural gas. We have an opportunity to provide our residents with secure electrical power. I can not verify but I have heard that coal was used last winter to supplement	Retired	Slaughters	KY	42456	TVA Public Site
Cundiff	Mitchell	The Environmental assessment covered economic impacts to employees and the area. I disagree with the idea there will be 'no impact' to personal and the area if U3 is retired. If you consider loosing a \$100k a year job and replacing it with a \$20k a year job 'no impact', I truly do not understand. I would like to see the persons who compiled this info sign the document and show who they talked with. TVA barely met load demand twice this year with PAF U3 on line. Is it cheaper to buy power than to produce it? It must be because TVA buys power more days to meet the demand. The entire coal fleet is aging depending on all remaining units to be on line continuously does not make sense. Him many units are on extended forced outages? Thank you.	TVA Retired	Central City	KY	42330	TVA Public Site
Daniel	Anndee	I believe that TVA Paradise is essential to the community and the surrounding areas. From the power it provides to the many jobs it provides. It would be detrimental in many ways to shut it down.	USA DeBusk	Owensboro	KY	42301	TVA Public Site
Daugherty	Casey	Keeping these coal burning units up and going is pivotal for not only the construction workers that help maintain these units but also the miners that supply the coal. Shutting this unit down would have a large impact on many families that rely on these jobs	Insulators local 37	Nortonville	KY	42442	TVA Public Site
Davis	Alison	I am a Professor of Agricultural Economics at the University of Kentucky and from a Center (CEDK Community and Economic Development Initiative of Kentucky) that provides both research and outreach to communities and regions across Kentucky. My area of expertise is economic development and I have been working in Kentucky communities for the last 13 years. I was very recently approached, by several individuals from the region where the Paradise Power Plant is located, to evaluate the TVA environmental assessment report to determine if the projected economic losses from a plant closure appear to reflect the current and future situation. This is an area where I have done considerable work in the past and have provided expert testimony in other situations thus I believe I have the ability to provide comment on the Paradise situation. I have reviewed the document and I have concluded the analysis falls quite short of a full exploration of the impact of a power plant closure. To conclude that there would only be a direct loss of 131 jobs is short-sighted. There are other factors that should be considered in the final analysis including the quality of job loss, the coal mining job loss, and truck transportation job loss. These are direct impacts. The indirect and induced impacts were also ignored including other businesses that support the production of power as well as reduced spending at grocery stores, hospitals, Walmart, etc when individuals lose their jobs. The unemployment rate in this part of the region exceeds urban areas so the likelihood that you can expect individuals to find similar work, or at least work that provides close to the same pay, is quite unlikely. This will result in households moving out of the region, or at a minimum out-commuting. While Muhlenberg County does not have an occupational tax, a population loss will still result in a reduction in the tax base, reducing the ability for the local government to provide services to its households including education, emergency services, etc. I do not know the total economic impact of this potential plant closure (there isn't enough time to determine this in the 2 week period), however, I do know that the analysis provided falls quite short of what a comprehensive economic analysis would include. I urge TVA to, at a minimum, commission a full analysis that considers the impacts of a plant closure. There are numerous methodologies to do this including comparing the outcomes in other places where plants have closed, or conducting a quasi-experimental economic analysis, to the more rudimentary economic impact analysis. But to assume the loss is a simple 131 jobs is a disservice to the region that has had a comparative advantage in power production. The region would need time to consider how to bounce back from this loss and identify regional economic development strategies to diversify their economic base.	University of Kentucky	Lexington	KY	40546	TVA Public Site
Davis	Amanda	I appreciate your time considering these comments and I would be happy to discuss further. Please do not shut down unit 3 at paradise. Thank you! Amanda Davis		Central city	KY	42330	TVA Public Site
DE GRANDIS	GERARD	Shut it down, and look to cheaper renewables with storage as an alternative.	1980	Estero	FL	33928-3262	TVA Public Site

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Dolan	Pete	<p>I, as a resident of East TN, would like to go on record as being in favor of closing the 870-megawatt (MW) Bull Run coal plant in Tennessee and the last 971-MW coal unit at the Paradise plant in Kentucky.</p> <p>As we can see with the recent litigation on the coal ash spill at Kingston, using coal is very expensive. There are cheaper, cleaner alternatives.</p> <p>Thanks, Pete Dolan</p>	Mr.	Maryville	TN	37804-5719	TVA Public Site
Dornan	Sam	<p>As a resident of Tennessee who uses power generated by TVA, I firmly believe that TVA should retire the Paradise coal plant as soon as possible. Limiting and controlling the impacts of climate change involves us reducing the amount of greenhouse gas emissions produced as soon as possible. Coal plants like Paradise are among the worst emitters of these gases. In addition to closing the plant, TVA should replace any</p>		Franklin	TN	37064-8348	TVA Public Site
Dorroh	wilford	<p>I am Wilford W. Dorroh. I am a TVA retiree with 37 years service to TVA. TVA was good to me and good for me.I spend time at John Seviere, Shawnee and Paradise. At Paradise I was there through the construction Years and was Part of the force that checked out and started up all 3 units which was a long, costly job but a rewarding job. I was familiar with all aspects of the plant since I watched it being built. I retired from tva in 1994 as plant manager at Paradise. I have grave concern about what is now happening to TVA including Paradise It is having a devastating economic impact on the different regions.</p> <p>If Paradise units are mothballed and put up as storage and not done properly or maintaine in that state properly the units will self destruct. It will take people there on the job to keep it mothballed and keep the necessary equipment available to do that. if the units are dismantled then they are through. We have 200 years of coal available and equipment now that can make it burn clean. We don't know how much gas we have but we do know we have a shortage every winter. Other things like line ruptures, strikes and just plain running short of gas would be devastating to the country. I am not just speaking of Paradise but valley wide.</p> <p>Paradise 3 units and environmental control equipment cost in excess of a billion dollars 40 years ago and took approx. 10years to build and make operational. I fear there is coming a day when we will be back in caveman days and burning wood to heat and cook. I urge u to look not just at today but the long term future for the good of our country. TVA does not belong to a select group of high priced officials.. the people own TVA. Thanks for ur consideration.</p>	retired tva employee	central city	KY	42330	TVA Public Site
Doss	Deric	<p>We here at the plant see the benefits of the money spent already that has upgraded this unit! Almost a billion dollars spent any dewatering plant almost finished for better EA!! The hard work of the men and women at paradise has been exceptional! To save unit 3 with the highest safety record in TVA! We are the only plant to receive coal by train,truck or barge if needed for fuel cost!</p> <p>Not only is it not financially smart to shut down your money maker! This shut down will devastate the community with restaurants, trucking, coal mine suppliers, Plant support contractors, revenue. It goes on!</p> <p>Please I am asking for your support on this as a Paradise TVA employee who sees all the good at this plant! Much life in the plant for years to come!!</p> <p>Thanks Deric Doss Machinists/ maintenance 20yrs TVA</p>	Paradise employee	Central city	KY	42330	TVA Public Site
Doss	Deric	<p>We here at the plant see the benefits of the money spent already that has upgraded this unit! Almost a billion dollars spent any dewatering plant almost finished for better EA!! The hard work of the men and women at paradise has been exceptional! To save unit 3 with the highest safety record in TVA! We are the only plant to receive coal by train,truck or barge if needed for fuel cost!</p> <p>Not only is it not financially smart to shut down your money maker! This shut down will devastate the community with restaurants, trucking, coal mine suppliers, Plant support contractors, revenue. It goes on!</p> <p>Please I am asking for your support on this as a Paradise TVA employee who sees all the good at this plant! Much life in the plant for years to come!!</p> <p>Thanks Deric Doss Machinists/ maintenance 20yrs TVA</p>	Tva	Bremen	KY	42325	TVA Public Site
Drake	Dianna	<p>years . This will make a huge impact on all the folks here !! My husband has been an underground coal miner since he graduated high school and he is 64 years old . Coal is our livelihood as it is so many other folks in this county and surrounding counties . So please think long and hard about the impact it will bring to our family and all the other families in this area . Sincerely Dianna Drake and Floyd J Drake</p>		Belton	KY	42324	TVA Public Site
dunn	larry	<p>The information they are sing to look at paradise is not current data that they should be looking at. And the county of Mullenburger will be hit hard with the loss of the plant and also will the employees that will haft to relocate cause of plant closing.We have done so much to make the plant run very good and our safety is top notch. If given the chance we could break more run records. Please purchase the rotors so we I am concerned that TVA is even considering shuttering Paradise Fossil Unit 3. TVA has spent \$1 billion at the Paradise site for environmental upgrades and compliance per the TVA website, and Unit 3 was slated to be a part of the TVA generation portfolio for many years to come. This was stated by Chip Pardee when Paradise 1 & 2 were announced for closure. Now, TVA is seeking to shut a plant down that has just had hundreds of millions of dollars in upgrades (Selective Catalyst Reduction, wet flue gas desulfurization scrubbers, electrostatic precipitators, brand new auxiliary boilers, new (2012) cyclones on the boiler, a brand new superheater and brand new MK VI turbine controls.) This unit is setup of for extended reliability, as can be seen by the recent top 2 record run we had. The issue at hand is whether or not to replace the turbine rotors. A decision to close Paradise 3 at this point after all of these investments in environmental compliance and reliability is tantamount to taking an old vehicle, rebuilding the engine and transmission, repainting the vehicle, and then deciding to take it to the scrap yard because the tires are bald. This makes no rational sense when looking at the big picture. Where will the 500kv transmission voltage support come from? What about all of these conservative operations alerts that we have seen this year? Where is the power going to come from? If load is projected to be flat or declining, why did TVA make and sell more power in FY 2018 than in the last 5 years? (see TVA FY 2018 10-k report to SEC for details). Why does this environmental report seem (to the average reader) to indicate that Paradise would still have to build a de-watering facility at substantial cost to remain environmentally compliant? That facility has already been built! We are training employees in its operation in December, and commissioning the operation of it in January 2019. Ratepayers do not want to fund another gas plant through rate increases, and for the sake of a balanced portfolio, we don't need any more gas plants. We need to keep the coal we have as the</p>		Owensboro	KY	42301	TVA Public Site
Durbin	John		TVA	Owensboro	KY	42301	TVA Public Site
Esposito	Ellery	<p>I am totally taken back that a goverement agency would act on its own to shut down an enty that is serving the public with out first doing an economic study on its effects on the community. I am so glad that Senator Paul brings to light this important issue.</p> <p>It sounds like they just brought it up without notice and or economic impatac study. I support the senators actions and ask not just for an enviromental study but an economic study.</p>	Esposito construction	Crestwood	KY	40014	TVA Public Site
Estes	Darin	<p>Please continue operating and providing local economic support.</p>	Local 633	Owensboro	KY	42301	TVA Public Site
Evans	William	<p>little too aggressive, resulting in a less balanced portfolio, and higher risks for consumers, should something major happen with natural gas or nuclear generation. For these reasons, I support continued operation of PAF 3.</p>		Morgantown	KY	42261	TVA Public Site

Last	First	Comment	Org/Agency	City	State	Zip	How Sent
Ewings	Dylan	I speak for my family and ask that you do not close down this unit. TVA provides cheap and reliable energy for our community. Also the economy of this area is driven by coal and the mining of it, taking this unit away would be a hard blow to our lives and our livelihoods. I ask that you take the people of our community into account before you make such a decision. Thank you for hearing my concerns.		Powderly	KY	42367	TVA Public Site
Ewings	Erica	As a resident of muhlenberg county, I strongly disagreeing with retiring this plant. It has created the best job to have in muhlenberg county. An opportunity to make good money in a town where good paying jobs are few and far between. Coal && paradise have been a part of our history and what has made us known. I hope you will change your minds.		Powderly	KY	42367	TVA Public Site
Fields	Andrew	part of the future.	Chalmers and Kubeck		GA		TVA Public Site
Fiorella	Greg	concerns.		Hopkinsville	KY	42240	TVA Public Site
Fiorella	Patty	Please allow this company to remain open due to shortage of jobs. There will be a hardship on this community and surrounding communities. The EA data shows from 2015 and older. The EA assessment does not show a billion dollar upgrades to unit 3. Thank you for you consideration.		Hopkinsville	KY	42240	TVA Public Site
FitzHugh	Burt	<p>Mark Twain once said, 'Figures often beguile me, particularly when I have the arranging of them myself; in which case the remark attributed to Disraeli would often apply with justice and force: 'There are three kinds of lies: lies, damned lies, and statistics.' Such is the case with the TVA EA of PAF3, which is similar to the FEA of PAF1&2 from 2013. Most offensive in both documents, aside from the obvious deliberate skewing and twisting of figures, is that the 2013 FEA Sections 3.19 and the current EA Section 3.11.4.3 places the ethnic makeup of Muhlenberg County in the forefront, and is a condemnation of white Americans.</p> <p>While BFN will get LP Turbine rotors, without argument, PAF3 and BRF are told that the units must be 'evaluated'. I find this curious, as TVA management sent the same person to perform an 'experiment' on PAF3 that had damaged the LPB Turbine 10 years ago; after having damaged it again, TVA sent him to BRF, where he conducted an 'expirament', and now another rotor is damaged by Chloride pitting - curious? Indeed.</p> <p>Absent from this evaluation is the OIG, who recently exonerated Bill Johnon concerning his 'aviation improvements', which senior citizens and single parents pay for through ever-increasing rates. The Board should hand this investigation over to the DOJ, and call for an outside investigation into these 'EA' studies.</p> <p>This, Ladies and Gentlemen, is an outrage; the TVA should not be engaged in corruption, but rather should be the model Federal Agency. Is it any wonder that those plants which have been closed, and the two being 'reviewed' are on the Sierra Club's Dirty Plant list from 2008? Shall Kingston be next? It made the list. Or, perhaps Kingston will be traded for Shawnee?</p> <p>The Board of Directors should, without delay, end this farce and begin repairing the damage done to this once reputable agency, as so many good and honest employees strive to do every day. Our countrymen throughout the service area deserve better than that which has been delt them over the Bill Johnson tenure.</p> <p>I have attached relevent data. I have done so because I actually care about the future of the Agency, and more importantly, the people of the Commonwealth of Kentucky, my brethren. Moreover, I care for the people of the Valley.</p>	Paradise Fossil Plant	Drakesboro	KY	42337	TVA Public Site
Fleming	Laura	You destroy a town forcing people to move from their homes to build this plant. You promise people jobs and incentive payments to the county for constructing it here. Now you're closing more down and converting to gas. This is a low income community. The cost of electric will increase with the use of natural gas. You're putting our coal miners out of jobs. We are losing the subsidy money which helped fund our		Beech Creek	KY	42321	TVA Public Site
Fletcher	Thomas	Dear Board of Directors, Please consider any decision to stop operation at the only coal fired generating unit remaining in Muhlenberg county Ky will devistating to the entire area. This remaining unit is all this area has left, that supports so many. Please keep this unit operational as long as possible. Thank you, Thomas Fletcher	Retired citizen	Greenville	KY	42345	TVA Public Site
Fletcher	Deborah	Please don't close unit 3! We have Acts Christian Academy that's not funded by the state but donations in our county for our children. If unit 3 closedown our school would not be able to stay open. A lot of the money is donated by family's that is employed at TVA. Please keep unit 3 open and our school!! Thank you for reading this. We are praying for your decision		Greenville	KY	42345	TVA Public Site
Fletcher	Deborah	Please don't close unit 3! We have Acts Christian Academy that's not funded by the state but donations in our county for our children. If unit 3 closedown our school would not be able to stay open. A lot of the money is donated by family's that is employed at TVA. Please keep unit 3 open and our school!! Thank you for reading this. We are praying for your decision		Greenville	KY	42345	TVA Public Site
Foulks	Gail	Keep Paradise Fossil Plant Unit 3 open and running kentuckians livelihood depends on coal. Thanks Gail Foulks	Resident of Ky.	Alexandria Ky.		41001	TVA Public Site
Francis	Teresa	I think it would be in the best for the County and TVA not to retire the Coal Plant too soon.		Sacramento	KY	42372	TVA Public Site
Free	Kelly	have a ripple effect covering many other companies employees that were not addressed. Second the EA appears to be very biased by using old (outdated) data to compile the assessment. Much of the money indicated as must be spent for upkeep has already been spent, so this is very misleading. Without an exact amount I know personally of almost 200 million in upgrades that have been completed that are stated as needed. I.E. the superheater header and element replacement which was 180 million, and the turbine control system which was almost 20 million just to name a few. It seems to be very wasteful to spend this and much more and then receive very little return on the investment. In closing I would like to thank you for your time and ask you to ask for updated information regarding the EA.	Paradise Employee	Greenville	KY	42345	TVA Public Site
Furgason	Thomas	Please do not retire the coal plant. It is too important to the economy and the safe abundant energy it makes is important to our energy independence		Owensboro	KY	42303	TVA Public Site
Garrett	Michael	Please do not close the coal fired plant at TVA Paradise. Our local economy is in dire straights as it is. Thank you. Pennyrlie Electric Cooperative has some major concerns about the closing of the Paradise 3 unit.		Central City	KY	42330	TVA Public Site
Gates	Alan	<p>1. Paradise unit 3 is Pennyrlie Electric's nearest base load source for our 48,000 electric consumers.</p> <p>2. The lack of data to ensure Paradise units 1&2 (NGCC) will endure long term, without extended outages and extreme maintenance costs.</p> <p>3. TVA depending on one fuel source in our region and possible voltage issues if natural gas units require down time.</p> <p>4. Possible loss of existing and future jobs in our region.</p> <p>The only way Pennyrlie Electric could support TVA in the closure of this facility is if there were extreme costs associated with keeping unit 3 operable.</p> <p>Alan Gates Pennyrlie Electric</p>	Pennyrlie Electric Co-Op	Hopkinsville	KY	42240	TVA Public Site

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GEARY	Kyle	TVA Paradise is a crucial part of the entire community in Muhlenberg county and surrounding areas. Not only the power it supplies but the jobs it indirectly impacts. Local contractors like myself, store owners, and hotels will see a dramatic decrease in business. Hundreds of families paycheck directly depends on TVA Paradise. In an area with few alternatives for decent paying jobs, the loss of the Paradise plant would cripple		Central City	KY	42330	TVA Public Site
Gibson	Brenda	This us in regards to the possibility of shutting down the unit. As a resident of Muhlenberg county I am very concerned about the impact to my community. PLEASE keep this unit operating. Thank you		Greenville	KY	42345	TVA Public Site
		As a 65 year old Kentucky born, lifetime resident and property owner in our Commonwealth of Kentucky, I WAS SHOCKED to read of TVA's proposed closing of Unit 3, the last coal-fired unit at the Paradise Fossil Plant in 'This Week in News for Senator Rand Paul - December 7, 2018'. Respectfully, I incorporate it in it's entirety herein as it accurately expresses my deep concerns. Dr. Rand Paul Blasts TVA for Proposed Closure of Western Kentucky Coal-Fired Plant For the past several months, my staff and I have actively engaged in discussions with Kentuckians, officials in Muhlenberg County, and the Tennessee Valley Authority (TVA) regarding the status of Unit 3, the last coal-fired unit at the Paradise Fossil Plant. Throughout discussions regarding TVA's entire generating fleet being placed under review, no mention of a potential retirement of Paradise Unit 3 was made. Recently, however, TVA issued a draft Environmental Assessment on the potential retirement of the Paradise Fossil Plant. I condemned the move in a statement on Tuesday and called for action to help protect Kentuckians' livelihoods from federal overreach: "It is absolutely unacceptable that unelected government bureaucrats can single-handedly decide which types of energy Kentuckians' hard-earned tax dollars should support and ultimately be allowed to determine the fate of entire local economies without any accountability. "Not only are the livelihoods of the over 130 Kentuckians employed at Unit 3 at stake, but also at risk are the trucking companies who bring coal into the plant, as well as the many related businesses and industries in Muhlenberg County. While the need to maintain a diversified energy production fleet that is efficient and profitable is understandable, the federal government has no business picking winners and losers in	US Citizen, Property Owner, Lifetime KY Resident	BURLINGTON	KY	41005	TVA Public Site
Goodridge	Laura						
Gootee	Ashley	The closing of Paradise Fossil Plant would be detrimental to the community. The EA Assessment says it only affects 2% of the community. This is inaccurate since it will affect the families that rely on the workers along with everyone in the community. In 2010 there were 450 workers and the closing of unit 1 and 2 lost 320 jobs. The community is already in a crippled state due to the closing of those units. This took approximately 35.2 million dollars out of the surrounding area. This has affected the school systems, small businesses, etc. It does not just affect the employees, it effects the small businesses that TVA does business with. These include coal miners, truck drivers, coal mine operators, coal preparation jobs, coal support jobs, etc. Coal produces almost half of our electricity. The data that has been used for the assessment does not consider the upgrades that have been made. The Nitrous Oxide Emissions has dropped about 98% compared to		Greenville	KY	42345	TVA Public Site
Gootee	John	Paradise Unit 3 provides my family and lots of other families the way to make a honest living in the community we choose to live in Kentucky . The TVAact was set up to do just that create jobs in communities like ours . With people running TVA that do not have those same interest But should ,the TVA act has not changed , period . Our plant is getting a little Tennessee home cooking , there is no reason it should be shut	Paradise TVA	Central City	KY	42330	TVA Public Site
Gordon	Michael	PLEASE KEEP PARADISE OPEN.... DO NOT CLOSE PARADISE	Direct Care Clinics	Benton	KY	42025	TVA Public Site
		I beilive TVA could be the leaders in clean coal energy and would be directly affected by this move. I encourage you to consider the jobs that would be lost if this shut down would happen.					
Gottschling	Nicholas	Nick Gottschling New Age Fastening Systems Inc	New Age Fastening Sustems Inc	Washington	NJ	8080	TVA Public Site
		I have lived in Muhlenberg County the majority of my life. I have watched as this county went through the first wave of 'environmental advocates' managed to convince industries that Muhlenberg County coal was a danger due to its high sulfur content. I watched as more 'environmentalists' came to Muhlenberg County from other parts of the state or even out of state to protest and advocate for the conversion of Paradise TVA plant to gas. I watched many good people lose their jobs or be forced to relocate because of the conversion. The closing of unit 3 is about more than the 'environment,' but about people, jobs, and the further degradation of our local economy in Muhlenberg County. There are over 100 people that work for TVA in unit 3, at least two trucking companies that haul coal to Paradise, local coal mines, and another employer, the Harsco company, that would be directly affected. Those are just the ones directly affected, many more in Muhlenberg County and the surrounding area would be affected, including county government, city government, and local school systems which all receive coal severance funds. Senator Rand Paul and Representative James Comer have both come out with public statements condemning the closure of unit 3. I have no problem with conserving energy, recycling, and other methods that help sustain the environment, but at this time, I do not believe shutting down unit 3 is beneficial to anyone in Muhlenberg County, even the environment. I feel that my opinion is how the majority of Muhlenberg		Greenville	KY	42345	TVA Public Site
Grace	Victoria						
Graiser	Suzan	I commend you for closing coal fired plants. It is not the way of the future. My children and grandchildren admire and appreciate your insightfulness and intelligence.		Horse branch	KY	42349	TVA Public Site
		We depend on workers from the plant to help us with our businesses. Loosing this plant would be a devastating to us and several other small businesses. For our small town has expanded with the plant. If we dont have this plant i know of several businesses thst would most likely be forced to cut back Or even close. For us we have the campground and a recycling business this would hit us very hard. I thank you for reviewing my comments and hope for a resolution to this issue that would benfit all involved.					
Gregory	Brenda		Gregory lake rv park	Drakesboro	KY	42337	TVA Public Site
Gunn	Robert	TVA has been my income for the past seven years , as well for a lot of my union brothers and sisters .There is far more people than the employees that work at TVA that will effected . TVA contributes a lot of money to the local schools as well as to the local economy.	Union local 37	Auburn	KY	42206	TVA Public Site
Hadley	Billie	Please consider the voices of the residents of Muhlenberg Co. To please keep the last coal burning unit into operation, they are many reasons why this unit should stay in operation. The many jogs losses will cause a domino effect, to say the least, plus a very important reason to have it as a back up in an emergency situation...I hope my request is to no avail....Thank you in advance for the right decision....Billie J.Hadley		Greenville	KY	42345	TVA Public Site
Hagan	Aaron	This unit plays a big part in our community and provide a lot of work for it's people I ask that you sincerely think about lives that you could possibly devastate in the community and to all the other construction crafts working outages to supply for there family		Greenville	KY	42345	TVA Public Site

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Halcomb	Chad	I am writing to respectfully request that before the board can make an educated decision on PAF U3’s future that a more thorough study be performed on PAF and the entire TVA generating fleet. The EA does not provide clear information on the current operating cost and future costs (both capital and O&M) of Paradise U3 as compared to the other TVA generating units. In addition, it does not appear to include the latest spend of the most recent projects that have been implemented to improve the efficiency and performance of the plant. These projects were implemented based on 10 and 20 year pay backs. If PAF U3 is idled, this invested rate payer’s money will never be recovered. Also, the latest plant performance based on these upgrades has drastically changed the performance of the unit and have not been addressed in this study as well. With the numerous TVA jobs and affected residents (school system, etc.) I believe this study should be taken much more serious and with more detail and fairness. I cannot understand how you can make a good business decision without all of the data that has been truly independently verified. This would need to include data (hard numbers) from ALL of the generating units and verified independently. Without detailed		Greenville	KY	42345	TVA Public Site
Hall	Nancy	Having lived for 18 years downwind of the Cumberland City, Tennessee, coal-powered electricity-generating plant, I fervently applaud your determination to close the Paradise Fossil Plant. Please do not cavil or waiver! I saw, firsthand, what a single winter of pollution did to the exterior of our brand new house, and what the leaves on our trees looked like by the end of a single summer: Both were coated with pollutants -- which meant we had been breathing them, too. War on coal, indeed; the 'war' is against pollutants and polluters, and the 130 employees of Paradise and all the poor truckers who will lose their jobs will find others ti replace them in the clean enegy industry, and probably at better salaries, too! Despite Senator Rand Paul's hysterical drama about government overreach, if we are to have a planet to live upon during the second half of this century, Paradise and Cumberland City and all the rest of the coal-	WATCCHINGovernme nt	Lexington	KY	40503	TVA Public Site
Hansen	Eric	I support whole heartedly your decision to shut down the coal fired unit as soon as possible. The irresponcibility and crass political opportunism of most Kentucky representatives is shameful and destructive of the entire planet. I hope for the sake of my children and grandchildren that these hacks are voted out soon.		Louisville	KY	40205	TVA Public Site
Harrod	Mariah	I commend your efforts to keep Kentucky energy safe, clean, & cheap through the proposal to close down Unit 3 at Paradise Fossil Plant. It goes without saying that the burning of coal is an outdated & environmentally (therefore economically) damaging business venture & should by all means be speedily transitioned toward renewables. However, I hope that the TVA considers the economic impact of such a closure on the community it affects & ensures that those losing their jobs are offered palatable alternative opportunities. These people deserve a just transition, & I hope you can help them find financial stability within a changing energy economy. Best, Mariah Harrod		Georgetown	KY	40324	TVA Public Site
Harrod	Mariah	To the TVA, I commend your efforts to keep Kentucky energy safe, clean, & cheap through the proposal to close down Unit 3 at Paradise Fossil Plant. It goes without saying that the burning of coal is an outdated & environmentally (therefore economically) damaging business venture & should by all means be speedily transitioned toward renewables. However, I hope that the TVA considers the economic impact of such a closure on the community it affects & ensures that those losing their jobs are offered palatable alternative opportunities. These people deserve a just transition, & I hope you can help them find financial stability within a changing energy economy. Best,		Georgetown	KY	40324	TVA Public Site
Hart	Ronny	know that Paridise Has stayed compliant with the environmental Compliance. It was bad enough when U shut down two of the most reliable Units in the TVA valley system. I Realy wish u would reconsider this thought Of bring U-3.	Retired TVA 2004	Central City	KY	42330	TVA Public Site
Hayward	Zach	Paradise fossil plant is a great place to work and provides a great wage to all tradesmen and women who are employed by TVA or work for a contractor. Not only is paradise a great place to work, it also provides the surrounding counties economy's a sustaining growth. From operations, to maintenance, to the janitor cleaning the restrooms, a percentage or their wages goes to local businesses, industries, and provides food on the table. Without this source of income and jobs this will come to a fast halt. The affects of the retirement of Unit 3 would be felt dearly to the good hardworking workers, their families, and the local economy. Please	IBEW	Lewisburg	KY	42256	TVA Public Site
Heacock	Shara	I am a former resident of Muhlenberg County KY. I am also a daughter, granddaughter, and great granddaughter of coal. I have had a front row seat for the death of the coal industry, and have seen directly how it effects families and an entire community. My father worked for Sinclair Underground, the very mine that fed coal directly to TVA Paradise. I never thought I would see the day when TVA Paradise would be operated by anything but coal. My grandfather is from Paradise, and I myself grew up in eye sight of the smoke stacks of Paradise. I agree that bureaucrats are picking winners and losers in society. I am sickened by the poverty that I see when I return home to visit Muhlenberg. I have personally witness the continuous losses to the local economy. I pray that the TVA will leave unit 3 operational for the good people of the		Littlestown	PA	17340	TVA Public Site
Heller	Deena	I applaud you for planning to close another coal plant. While I do hope that you will help the workers in Kentucky find new jobs to pivot too, we need to start turning towards other energy sources in order to preserve the health of our planet and citizens. I hope you are looking towards more forms of renewable energy!	citizen	Louisville	KY	40205	TVA Public Site
Helmick	Donna	While as a fellow Kentuckian I am in total disagreement with Paul Rands stand on this issue. He stTes 130 people will be unemployed if inacted. He does noyt mention how many have become ill or died from workingin the coal industry. I feel his time could be better spent searching for alternative traing andjobs for these people. Rather than continue polluting the air for all of us.		Louisville	KY	40242	TVA Public Site
HENDRICKS	JAMES	I strongly urge you to reconsider closing Unit #3 coal fired generator at Paradise Plant in Muhlenberg, County Ky. Over the years when things slowed down, the coal fired generators were ALWAYS there for the citizens making power. The abundance of coal is plentiful and at a low cost. It makes absolutely no sense in closing this plant. Natural gas is also abundant, but the cost per is a variable. Unlike Coal that is steady in its cost. I ask you not to cripple our community, and leave this plant open. Sincerely		LEWISBURG	KY	42256	TVA Public Site
Hill	James	The sooner the coal burning unit is shut down the better. Coal is on the way out and for the environment and health the earlier all coal burning plants are shut down the better.	none	Greenville	KY	42345	TVA Public Site
Hill	Phillip	Please decide not to close the Paradise fossil plant. I live in Muhlenberg county and so many people depend on the coal industry. Not only will the employees of that facility be affected but everyone in the area will eventually be affected. With the loss of coal support jobs to the inevitable increase in electricity prices.	None	Central City	KY	42330	TVA Public Site

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Hollander	Stacey	I applaud you for closing this coal plant. I live in central Kentucky, am a registered Republican and RAnd Paul is my representative in Congress. Polluting the air for everybody is not worth 130 coal jobs. Those 130 people can go to school and learn how to do something new; not cause my young child, and those of my neighbors to have asthma and COPD. Many people die each year from air pollution, not to mention global warming, rising sea levels, and more damaging and furious storms of every stripe. We need to take better care of our Earth - it's the only home we got. Thank you.		Carlisle	KY	40311-9656	TVA Public Site
Hooper	Jordan	TVA, Although Coal production provides many jobs to our communities, I firmly believe it is time for a change. Coal has been a huge part of our Counties history, but all good things eventually come to an end. The transport of coal to the Paradise Facility has damaged many public roadways, and it gets worse every day. Unfortunately our State Highway Department has not been able to combat these problems due to funding. Also, the major gas main that was put in place a couple of years ago was a huge leap forward towards future energy production. I firmly believe that this is the time to look towards the future and put coal production behind us. Although I do not know exact numbers, I am sure the major gas main project cost was a huge investment. Therefore, I can understand TVA wanting to utilize it to it's full potential. Therefore, I		Belton	KY	42324	TVA Public Site
Hooper	Sabrina	I am a concerned resident of Central City, KY located in Muhlenberg County. The closure of the remaining coal fired stack at Paradise Plant will be devastating to so much of our community. Not only does the loss of jobs for those employed at TVA affect this area, but the trickle down effect is also a huge concern. Many already struggle, and the loss of jobs will mean less disposable income to be spent at local businesses and		Central City	KY	42330	TVA Public Site
hopgood	Stephen	There is enough coal in Kentucky and it is cheap.What will happen if natural gas prices go up and coal is cheaper and all of your plants are burning gas where will you get your electricity.Why not keep Unit 3 operational in case that happens.	UMWA	Morganfield	KY	42437	TVA Public Site
Hudson	Carole	The closing of this planet would greatly impact the community and surrounding areas. The Ea data shows from from 2015 and older. Many new upgrades are not shown! Your consideration is greatly appreciated in this matter!		Cadiz	KY	42211	TVA Public Site
Hudson	Harry	Please keep this plant open! This community and surrounding communities will not thrive without these jobs!		Cadiz	KY	42211	TVA Public Site
Hunt	Jimmy	Paradise unit 3 is a vital part of our economic well being in Muhlenberg county and the state of Ky. Please do all you can to keep unit 3 running. thanks.	maint.	beechmont	KY	42323	TVA Public Site
Hunt	James	As a former employee of TVA, and Paradise, I strongly urge you to keep Unit 3 online. The impact of retiring Unit 3 would be extremely detrimental to Mulenburg couny and the surrounding area. As a second generation TVA employee who has worked as a resource share at TVA's nuclear plants, I can assure you that Paradises employees are no less dedicated to the continued success of TVA's generating fleet. I feel their	TVA retiree	Whitesville	KY	42378	TVA Public Site
Hutchens	Wesley	It really is alot more jobs on the line besides the 130 tva jobs . I have worked at this tva for the last 20 years as a contracted Sheetmetal worker. Along With hundreds of other fellow workers of other crafts . This county needs this plant .	Sheetmetal workers local 110	Greenville ky	KY	42345	TVA Public Site
Ingram	Daniel	I have lived in Muhlenberg county for most of my life and have been employed by TVA for almost 10 years. The economic impact to this and surrounding counties will be devastating should PAF unit 3 be shutdown. This will trickle down from the TVA employee, coal truck driver, coal miners and to the owner of the mom and pop owned stores in the area along with many others. The school system will be affected due to the in-lieu of taxes payments. There have been many environmental improvements made to this plant in the last 10-15 years and have greatly helped with the emissions. There is a sign in the front lobby of this plant that says 'Built For The People Of The United States Of America'. I honestly believe when the TVA Act was instituted it was for economy and progress. I know this was not well written but please take these thoughts into consideration when making such a tough decision.	FPG	Greenville	KY	42345	TVA Public Site
Ingram	Steve	Shutting down unit #3 at Paradise would devastate the Muhlenberg county economy. Not only because of the jobs lost directly at Paradise but the indirect jobs such as mining of coal, trucking,and suppliers of goods needed in daily operation of the plant. Also our schools would lose students and tax money that is a great help to let us provide a good education for our children. It would effect other parts of our economy like automobile dealers and retailers of all types not only in Muhlenberg county but the entire region around Paradise. Housing would also take a tremendous blow. Paradise Fossil Plant has been a tremendous	Retired	Beechmont	KY	42323	TVA Public Site
Ingram	Tina	I beg you to continue to keep Paradise open. There are very intelligent people with TVA that can come up with a solution to burn the coal cleaner and invest in the future of God-given coal. Please pray for a solution and keep lights on with coal. I'm sure the ones reading this will have their job in jeopardy. Thank you for taking time to read this. Tina Ingram		Cadiz	KY	42211	TVA Public Site
Jernigan	April	Closing down Unit 3 would most definitely hurt the economy of Muhlenberg County. The majority of the 130 families represented live, shop and spend their hard earned money in Muhlenberg County. The children of these families attend the Muhlenberg County schools as well. The school system receives a significant amount of money from TVA. Without these funds, the schools would have to cut pay and cut jobs of teachers resulting in affecting even more families and children. Many teachers had to leave the county to find other jobs when the funding from TVA was cut the last time. Class size would be increased, hurting children with any type of special need. Over all the quality of the school system would dramatically be decreased without the funding from TVA. A study needs to be conducted on HOW the closing of unit 3 would affect the entire Muhlenberg County school system. Referring to the study, the data provided was from 2015! How is dated data relevant to our economy today? Current data should be used. TVA also purchases its coal, how would the complete stopping of this hurt the economy? There are many people that work in coal, mining and transporting it to TVA that would be affected. The equipment this article talks about having to purchase to keep the unit running HAS ALREADY BEEN PURCHASED. So much of the money that needs to be spent has already been spent. This article is not factual and seems like it is only trying to support the closing of Unit 3. A study that looks at what equipment has already been purchased versus what hasn't been would be more accurate. This article seems to support the opinions of the individuals in support of the closing of Unit 3 and NOT the facts of the detriment it would cause. Old data, incorrect information on a biased study should not be able to determine the decision to close Unit 3 that would affect so many people and economies.		Greenville	KY	42345	TVA Public Site
Jones	Brian	Plz keep plant goin it trickles down so many jobs it's all we have ..does president trump know about this jus Wondering..thank u		Drakesboro	KY	42337	TVA Public Site
Jones	Jack	I believe that shutting the fossil fuel plant in Mulhenberg county, Kentucky is wrong. It will have financial impact on Kentucky communities!		Owensboro	KY	42303	TVA Public Site
Joranko	Daniel	Tennessee Interfaith Power and Light strongly supports the proposed retirement of the Paradise Fossil plant by 2020. We believe that it is a moral imperative that the Tennessee Valley Authority continue to move towards lower-carbon production. The retirement of Paradise would be an important step in this direction. Moreover, fossil plants also have higher negative health impacts than cleaner fuel alternatives. Finally,	Tennessee Interfaith Power and Light	Knoxville	TN	37912	TVA Public Site
Knight	Libby	Please do not close the Paradise Fossil plant. This being the last coal fired plant it would be devastating to our community in so many ways. Coal is and always has been a vital part of our community. I ask for your prayerful consideration before you change the life of a community.		Greenville	KY	42345	TVA Public Site

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		For your thountrtrur consideration: When we analyze the fact that Units 1 and 2 were shut down not so long ago, the following statement would stand to be true: this area has had a reduction of carbon emissions by TWO THIRDS! Can we observe that in the rest of TVA fossil plant locations, the rest of the country? Can we observe that in OTHER countries, i.e., China? From the Washington Post: '...the national boards have not set a strict nationwide standard. Beijing has adopted the most stringent European standard, limiting sulfur emissions to 10 parts per million. Shanghai, the Pearl River Delta and Jiangsu limit emissions to 50?parts per million. But the most common standard in the rest of China limits sulfur emissions to 150 parts per million — five times the U.S. limit.' FIVE times the U.S. limit - astounding. In contrast? We in the US stand condemned by the rest of the world, be it, illogically. I say, Paradise employees, and their integrated suppliers, say - ENOUGH. Should you choose to punish the residents here without regard for their jobs, their families, their survival? Muhlenberg County citizens have had enough devastation to their livelihood, truly. They deserve to be spared this travesty.					
Kutay	Sue	Thank you for taking the time to read this.		QUALITY	KY	422569651	TVA Public Site
Latham	Angela	My boss's husband works in this unit 3. If it closes out small private Christian school could be at jeopardy. Plus I love these people dearly like my family and they would have to move away. I can't even stomach that! Please keep it open or allow these people to be moved over to the gas plant!	Act Christian Academy	Greenville	KY	42345	TVA Public Site
Latham	Kelly	By closing this unit, A.C.T Christian academy would be at risk of closing. I do not feel closing this unit is in the best interest of our community.	A	Lewisburg	KY	42256-8702	TVA Public Site
Levy	David	please leave us alone. we need electric at an affordable prices. we have plenty of coal and people to work it. in the mines and in the plant.plus people who support the industry in that area.the only clean energy is nuclear and you would not build any reactors	bettyjoe farm	booneville	KY	41314	TVA Public Site
Lewis	Sherrie	I am a lifelong resident of Muhlenberg county and Felt disappointed when reading in the local paper about the possible shuddering If the coal unit.It will hurt lots of people and our County .A trickle down theory , residents , truckers , County businesses due to people having to relocate And look for other places to live to survive . Please Reconsider and keep Unit #3 coal burner .		Greenville	KY	42345	TVA Public Site
Long	Nancy	TVA As a concerned citizen of Muhlenberg county Ky where Paradise plant is located, I wish to voice my concern over the intentions that you are trying to employ upon Paradise. This counties work force has already been hit hard by miners losing jobs due to Paradise going to gas. Plus the employees of Paradise that lost their jobs, my daughter in law one of them. There's also the concern of the school tax to our county school that will be lost, it has already affected the school in that way due to the loss of employees already at Paradise. There are no other jobs available close by. Our county is suffering due to loss of taxes . And the worst part of all of this is ... you all don't give a crap !!! I drive a school bus for 23 years in this county all over it and have seen firsthand what poverty looks like in some parts of it , well now it's going to be a lot worse if your intentions go through. My grandson is 10 , I would like to see his father be able to dress him nice to go to school and go to college and buy him his first car just as we did his father. We live on a family	None	Belton	KY	42324	TVA Public Site
Luthi	Carol	I think coal should be phased out. The risk is higher than the 130 jobs that would be lost. The loss of life is of greater risk. I have a lung disease and can not go outside on high pollution days. I feel that the health of our people and the planet certainly out weighs the risk of a few jobs. It's time to move forward with jobs of the future instead of providing 'UNHEALTHY' jobs for a 130 people. Please bring Kentucky out of the dark ages and into the future with 'healthy' jobs for these miners. What mother wants their children to work underground in these unsafe and unhealthy conditions. I think the politicians are not instep with the majority of their constituents. Please		Louisville	KY	40207	TVA Public Site
Luthi	Carol	I think coal should be phased out. The risk is higher than the 130 jobs that would be lost. The loss of life is of greater risk. I have a lung disease and can not go outside on high pollution days. I feel that the health of our people and the planet certainly out weighs the risk of a few jobs. It's time to move forward with jobs of the future instead of providing 'UNHEALTHY' jobs for a 130 people. Please bring Kentucky out of the dark ages and into the future with 'healthy' jobs for these miners. What mother wants their children to work underground in these unsafe and unhealthy conditions. I think the politicians are not instep with the majority of their constituents. Please		Louisville	KY	40207	TVA Public Site
Main	Heather	Let's think about Climate Change and eliminate fossil fuel pollution. There is only ONE PLANET EARTH, no alternatives and we need to save it. We are all one species of homo sapiens around the world....let's get together and save our planet and all plant and animal species. Save the EARTH for our kids. This is not about \$money, politics or jobs this is about preserving our planet so we can all SURVIVE! CLOSE ALL COAL FIRED ENERGY PLANTS.	ErgoEquations	Efland	NC	27243	TVA Public Site
Mallicoat	Mahala	I am very concerned about the retirement of Paradise Fossil Fuel Plant and the potential detrimental effect it will have upon so many lives and livelihoods. Kentuckians should have the right as a sovereign state of the union to make our own decisions upon what types of fuel we choose and at the very least an opportunity to vote openly about such matters instead of being subjected to unknown and unelected officials from outside our state and local communities over-reaching their authority to make significant and arbitrary decisions effecting so many in our state. I object to this over-reach and am voicing my objection to this decision being foisted upon the Paradise Fossil Fuel Plant and on the lives and communities being directly affected. I'm sure that all Kentuckians lives will be impacted in some way as we again will be losing our state rights to govern ourselves. I fully support the coal industry and I fully support Kentucky's right to decide what fuels we decide are acceptable to heat our homes and generate our electricity.		Louisville	KY	40220	TVA Public Site
Marks	Ben	Please consider keeping Paradise unit 3 open. It is a reliable unit and very important to the community and the surrounding areas. And it also gives TVA more options in producing low cost power.	Projects	Owensboro	KY	42301	TVA Public Site
Martin	David	I'm posting these comments in regards to the TVA Paradise 3 plant. Personally I would hate to see this plant shut down. We live within 5 miles of it and it has made such an improvement over the last several years. At one time we tried to stay away from white or light colored vehicles. There would be a black film covering them most morning. Now with the changes you've made there no longer pollution like it used to be. Thanks for making these changes. This plant is vital to our economy not only with the jobs it has here but also the jobs from the coal industry. Once again I'm very opposed to closing this plant. I think the changes that have been made is proof that it still serves or community very well.		Morgantown	KY	42261	TVA Public Site

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Martin	Jackie	Please keep this plant open. If it closes it could mean that the ACT Christian Academy would need to close. This school is a vital part of so many families in the community.	ACT Christian Academy	Greenville	KY	42345	TVA Public Site
Martin	Javene	I feel the loss of our coal powered unit is limiting our options for alternative fuel sources in the event natural gas supplies are interrupted or become increasingly expensive.		Morgantown	KY	42261	TVA Public Site
		Considerable cost and effort have been expended in upgrading unit 3 to meet emmision standards. This expense cannot be recouped if the unit is immediately closed.					
		As a small child growing up in the 70's in the Butler County area of Kentucky, you could see the stacks of Paradise when going to my grandrather's house near Rochester. Playing barefoot in the front yard, you would come into the house with feet as black as coal. They were black as coal because they were covered with coal and ash emissions from Paradise. With the additions of numerous emission controls since then, my kids can play barefoot out in the yard and you wouldn't believe there was a coal plant less than 10 miles away.					
		I understand we need cleaner power, but Paradise 3 is providing cleaner, reliable power. Being a coal plant they are able to maintain a 30 day plus fuel supply on site. In this area of the country we are in the danger zone for the New Madrid fault line. The last major earthquake along this fault line caused the Mississippi river to actually flow backwards in the early 1800's. The quake was so strong, church bells rang in the Northeast. Luckily at that time the area was sparsely populated, there were definitely no high rise buildings, and we had no reliance on electricity. When the fault shifts again, it will be devastating for our region. Gas lines will rupture and shutoff supplies to Combined Cycle and Combustion Turbine plants. Paradise will be vital in securing and re-establishing our electric grid.					
Martin	Randal	Businesses are already shutting down due to the loss of Units 1 and 2 at Paradise. 200+ high paying jobs were lost to this area. There are very few manufacturing jobs in this area, and none pay like TVA. This doesn't just affect the TVA employees. I know the ones that are willing to relocate will have a job somewhere, but what about the restaurant up the road that supplies the plant with meals? What about the new car dealership that heavily relies on sales to Paradise employees? There are several RV camping areas that are specifically designed and built to accomadate outage workers. This is how these people make a living. The		Morgantown	KY	42261	TVA Public Site
		I was a coal truck driver for several different companies for over twenty years . i and several of drivers relied on TVA coal haul to feed our families and I am sure that they are still a lot of drivers after me that still does .. I'm sure that the ones that run the burner relies on this job to also feed their families and not to mention that if I understand how this plant does it hiring practice there will be a lot of military veterans lose their jobs as well. it seems that when the country just starts getting back on track to put people back to work someone somewhere decides to add to the exsiting problem . I just wish that people would look at how					
Matthews	Michael		Concerned citizen	Beaver Dam	KY	42320	TVA Public Site
		I have family working at TVA. If his job is gone he will have to move to find work!					
		Closing Unit 3 will hurt our County economically and hurt our Coal miners and the truck drivers who haul the coal!					
		I am proud that TVA has helped our County!					
		I think if this shuts down people will give up!					
		This is one of their hopes that YOU will chose to keep it going!!!					
Mayhugh	Wendy	My family has lost a lot- you see most of the people that lived in Paradise! PLEASE don't cause us more loss!!! Thank you for your time!!!		Central City	KY	42330	TVA Public Site
		In regard to shuttering Paradise unit 3					
		In view of the volatility of the natural gas market I do not believe the shuttering of Paradise Unit 3 would be a wise decision at this time. It should not be taken lightly that once shut down it will be impossible to reverse the decision.					
		My fear is that short term events are being given too much consideration in decisions that will have detrimental consequences for TVA ratepayers for decades to come. Basing future gas prices and availability on a couple of mild winters in succession and the current high production rate of the largely unregulated shale oil gas industry which I feel certain is going to be subjected to further regulation in the future doesn't seem to be in the best interest of considering the long term goal of providing the most economical power to the ratepayers of the Tennessee Valley service area. Ratepayers will be subjected to the whims of the natural gas market with no alternative once the coal plants are shut down.					
		The original intention of the TVA act was for flood control, navigation, cheap electric power and to promote economic development and opportunity, which included employment for the citizens of the Tennessee Valley. I do not feel the decision to close a productive plant with devastating consequences to the local and regional economy is in the spirit of the original goals set forth by congress.					
		No, TVA Paradise unit 3 should not be shuttered. I do not believe the shuttering of Paradise unit 3 would be in the best interest of TVA, it's ratepayers, or the region.					
McClellan	Darrel	Thank you for your consideration Darrel McClellan 501 Ferry Street PO Box 116 Rochester Kentucky 42273		Rochester	KY	42273	TVA Public Site
Mcconnell	Donald	TVA needs to rethink their decision to shut down unit 3 at the Paradise plant. Doing this will put too many people out of work and adversely affect the local Muhlenberg County economy.	private citizen	Henderson	KY	42420	TVA Public Site
		Dear TVA Board, I am writing to express my concern about the potential closing of a coal burning unit at Paradise Steam plant in Drakesboro, KY. Muhlenberg County has been struggling economically and I fear that if this unit is closed, our struggles will be greatly intensified.					
		As a sheriff I have personally witnessed the havoc created in our community due to a lack of jobs. Not only would we lose many jobs at our plant but I feel that many of our trade jobs would also suffer. The unit closing would also bring hardships to our community including but not limited to our educational system and retail market.					
		I appreciate your service and I know decisions like this can be very difficult but I respectfully ask you to please consider our families in Muhlenberg County while making this decision.					
		Thank you very much.					
McGehee	Curtis	Curtis McGehee Muhlenberg County Sheriff	Muhlenberg County Sheriff's Office	Greenville	KY		TVA Public Site

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McIntosh	JoAnn	<p>I appreciate your forward-thinking in considering the closures of the Paradise and Bull Run coal plants. Since your analyses shows that these two plants aren't necessary in meeting energy demands, and that the plants are in fact costly and inefficient to run and maintain, it follows that the closure of these plants would be in the best economic (as well as environmental) interest of TVA and its customers.</p> <p>It is my hope that, in addition to closing the plants, TVA is developing a plan for transitioning those sites to cleaner, more energy-efficient technologies that have a greater potential for economic growth and job creation in the surrounding communities.</p>		Clarksville	TN	37043	TVA Public Site
McKinney	Christopher	<p>The coal unit should not be displaced.. If anything perhaps revamp the old units and unit 3 to make them more environmentally friendly. I designed a new type of gasification unit that has 0 emissions and uses less fuel. And you can still burn coal or whatever ..If you're interested in talking about ideas let's hook up and go green. I'm a problem solving idea creator. And boilermaker fabrication expert. I can make things work. Although a long-term strategy for sustained renewable energy should always be on-going, the most beneficial approach to the life-span of this plant would be to set new standards for clean coal production. Mulenburg station could be a state-of-the-art energy campus using modern technology to produce cleaner, baseload electricity for thousands of customers. If that does not happen, the ripple effect will outweigh the short-term gains.</p> <p>I am opposed to putting this community in harms way by laying off workers, negatively impacting the economy of the surrounding communities and not considering the long-term effects of this closure.</p>	Boilermakers	Greenville	KY	42345	TVA Public Site
McKittrick	Mary	<p>I have worked at Paradise for the past 12 years and it is being run better now than any time in the past.</p> <p>It should remain open for many years to come.</p>	None	Campbellsville	KY	42718	TVA Public Site
McNeily	Jason	<p>I am in support of keeping TVA coal run unit. It is very important to the economy of Muhlenberg County. If it is converted to gas like others most workers will be transferred elsewhere leaving Muhlenberg County in worse shape financially than it is now. I know I am just one person but I ask you to leave coal run unit open.</p> <p>Dear TVA Representative,</p> <p>I just want to say 'Thank you!' for looking to close the last coal fired power plant at Paradise. This is the right move for Kentuckians and all those downwind and downstream of this plant. Coal fired plants are expensive for electricity production as well as producers of toxins that are spewed into the air, land and water.</p> <p>Moving away from fossil fuels is the economical and moral choice.</p> <p>Renewables employ 5 times as many workers as coal. They are good paying jobs that provide long term employment. I hope you are looking to invest more in renewables and totally divest from toxic coal.</p> <p>Sincerely, Melodie Metje</p>		Bowling Green	KY	42103	TVA Public Site
McPherson	Mary	<p>I am in support of keeping TVA coal run unit. It is very important to the economy of Muhlenberg County. If it is converted to gas like others most workers will be transferred elsewhere leaving Muhlenberg County in worse shape financially than it is now. I know I am just one person but I ask you to leave coal run unit open.</p> <p>Dear TVA Representative,</p> <p>I just want to say 'Thank you!' for looking to close the last coal fired power plant at Paradise. This is the right move for Kentuckians and all those downwind and downstream of this plant. Coal fired plants are expensive for electricity production as well as producers of toxins that are spewed into the air, land and water.</p> <p>Moving away from fossil fuels is the economical and moral choice.</p> <p>Renewables employ 5 times as many workers as coal. They are good paying jobs that provide long term employment. I hope you are looking to invest more in renewables and totally divest from toxic coal.</p> <p>Sincerely, Melodie Metje</p>		Greenville	KY	42346	TVA Public Site
Metje	Melodie	<p>I have worked at Paradise for the past 12 years and it is being run better now than any time in the past.</p> <p>It should remain open for many years to come.</p>	Citizen	Kuttawa	KY	42055	TVA Public Site
Milker	Stacy	<p>Closing this unit will be catastrophic for our county. It seems to me that this needs to be put off until the epa rules are changed. The rules need to be fought to be changed. Surely with the change in administration to Trump the laws pushed by Obama can be overturned. Coal is vital to our county and its success. We need to find a way to keep this unit from shutting down.</p> <p>Closing this unit will be catastrophic for our county. It seems to me that this needs to be put off until the epa rules are changed. The rules need to be fought to be changed. Surely with the change in administration to Trump the laws pushed by Obama can be overturned. Coal is vital to our county and its success. We need to find a way to keep this unit from shutting down.</p>		Bremen	KY	42325	TVA Public Site
Miller	Stacy	<p>Closing this unit will be catastrophic for our county. It seems to me that this needs to be put off until the epa rules are changed. The rules need to be fought to be changed. Surely with the change in administration to Trump the laws pushed by Obama can be overturned. Coal is vital to our county and its success. We need to find a way to keep this unit from shutting down.</p> <p>Closing this unit will be catastrophic for our county. It seems to me that this needs to be put off until the epa rules are changed. The rules need to be fought to be changed. Surely with the change in administration to Trump the laws pushed by Obama can be overturned. Coal is vital to our county and its success. We need to find a way to keep this unit from shutting down.</p>		Bremen	KY	42325	TVA Public Site
Mills	Chad	<p>*no comments*</p> <p>TVA Board of Directors:</p> <p>The principle in play is simple: “We are throwing away reliable “installed, permitted and paid-for-power-plants” in favor of new power plants that aren’t.The result is higher-cost electricity. “</p> <p>TRI and CastleLight Energy Corp have proposed Re-Engineering programs for existing coal-fired power plants; to bring them into the 21st century. TRI provides equipment and processes that significantly improve the plant’s efficiency.</p> <p>CastleLight's field demonstrated technology, to safely and quickly (about one second) to DRY the coal before firing, coupled with the Clean Combustion System (CCS) provide your coal-fired plants competitive dispatch for another twenty years... and meet EPAs call for efficiency and stringent Air Quality sulfur-dioxide (SO2) and nitrogen-oxides (NOx) regulations. Please see our paper attached and visit www.Castle-Light.com</p> <p>Regards,</p> <p>Keith Moore President Castle Light Energy Corp</p>	Local 633	Owensboro	KY	42303	TVA Public Site
Moore	Keith	<p>TVA should continue to phase out dependence on coal-fired energy-producing plants, even in the face of certain political pressures. The evolution from coal to natural gas and non-fossil fuel sources is a process that is only logical in the face of economic, environmental and health concerns. The criticism of Ky lawmakers, Kentucky State Rep. Melinda Gibbons Prunty and Kentucky US Senator Rand Paul that government 'over-reach' by phasing out coal-fired plants should not be impacting the lives of citizens of the area is laughable, when recognizing that TVA 'over-reach' has been impacting the citizens of the area they serve for generations by providing the lowest-cost power in the country. Now that TVA is phasing over to more economically- and environmentally-responsive energy-producing practices, Republican politicians want to engineer policy on coal-dependent power production. But, we cannot be surprised; it is natural for conservative politicians to react in the short-sighted manner to try to prop-up jobs (and votes) in the region. They continue to support 1960's technology in the face of evidence on the immediate and long-term impact of coal on the environment, not to mention the health of workers in the coal industry. While growing up in Ky, two close friends of mine lost their fathers before age of 50 due to lung problems from their strip-mining jobs in Muhlenberg County. Furthermore, the strip-mining coal industry has resulted in environmental</p>	CastleLight Energy Corp	oxnard	CA	93035	TVA Public Site
Moore	Edward	<p>TVA should continue to phase out dependence on coal-fired energy-producing plants, even in the face of certain political pressures. The evolution from coal to natural gas and non-fossil fuel sources is a process that is only logical in the face of economic, environmental and health concerns. The criticism of Ky lawmakers, Kentucky State Rep. Melinda Gibbons Prunty and Kentucky US Senator Rand Paul that government 'over-reach' by phasing out coal-fired plants should not be impacting the lives of citizens of the area is laughable, when recognizing that TVA 'over-reach' has been impacting the citizens of the area they serve for generations by providing the lowest-cost power in the country. Now that TVA is phasing over to more economically- and environmentally-responsive energy-producing practices, Republican politicians want to engineer policy on coal-dependent power production. But, we cannot be surprised; it is natural for conservative politicians to react in the short-sighted manner to try to prop-up jobs (and votes) in the region. They continue to support 1960's technology in the face of evidence on the immediate and long-term impact of coal on the environment, not to mention the health of workers in the coal industry. While growing up in Ky, two close friends of mine lost their fathers before age of 50 due to lung problems from their strip-mining jobs in Muhlenberg County. Furthermore, the strip-mining coal industry has resulted in environmental</p>	citizen	Murray	KY	42017	TVA Public Site
Moore	Jerrold	<p>To whom it may concern,</p> <p>Shutting down Unit 3 of the TVA Paradise Fossil Plant would be a devastation to the the local economy, not to mention those families of the people who work there. I know that the severance in lieu of taxes has declined for Muhlenberg County over the last several years, but there's more than just that. Local businesses benefit from the operations of PAF Unit 3. How does TVA propose to offset that loss? How does TVA propose to help those employees that would lose their job when you shut down PAF unit 3? Will the Combined Cycle Plant be able to handle the load it will have to carry when the last coal fired unit at PAF is taken</p>	Local community	Beechmont	KY	42323	TVA Public Site

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Moore	Billy	<p>I thanks for having this form available for comments. By having this available it shows that TVA respects the concerns and needs of our community. I have lived in Muhlenberg county all of my years (55) and have seen and experienced the outcome of the coal mining industry that once dominated the good paying jobs in our community. The benefits to our schools and education rose above the normal lifestyle's of Kentucky. Businesses grew and thrived, the economy improved unemployment was nonexistent, family's where growing and new families moving in to for new job opportunities and the hope that when they were through raising their family the children would stay and marry and raise their family as well. But as big government advanced and politically correct decisions were made that our coal was not clean enough the downward spiral for our community and the great jobs started to dwindle due to the coal mines having to shut down because they no longer could afford to mine the now expensive deeper coal. There was one glimmer of hope left in our community though. Still good paying skilled jobs were available at the power plants TVA AND KENTUCKY UTILITIES and as long as we had them and they needed coal to power there plants there was a hope that the coal mines would come back and the economy would take off again, and it did. Coal mines where starting to reopen, families where making decent wages again, things where looking up. Then we got the news, KU was shutting down operations at their Muhlenberg county plant . Next we heard that TVA was going to natural gas to power there plant and you could see in the faces of many in our community that knew what the impact would be. With no need for coal in not just one power plant in our community but two the outcome would be devastating. The next announcement of some three hundred outstanding paying jobs being done away with at TVA was the beginning of the downward spiral of coal mining again in our community.</p> <p>I write this letter today from concern for our schools our community our children that another decision to shut down the last remaining coal burning boiler at your TVA plant in muhlenberg county would have such Retiring PAF Unit 3 will be detrimental to the consumer citizens of the region, local/regional vendors, labor trade unions,TVA personnel currently employed & local schools and governments.</p> <p>The consumer citizens of the region will undoubtedly suffer higher utility cost to replace the needed base load of electricity supplied by PAF Unit 3. Not to mention the possibility of loosing possible industries currently located in the region or new industries location in the region due to higher utility cost.</p> <p>The county seat of Butler County (MORGANTOWN) is the 16th lowest on the current poverty scale. The surrounding county's don't fair much better.</p> <p>The possibility of higher utility cost, lost revenue to local/regional vendors, lost income for labor trade unions & loss of jobs for currently employed TVA personnel will incur financial burdens for all that are mentioned above along with lost tax revenue that will be detrimental to the stability of local/regional schools and governments.</p> <p>TVA should follow through with what it is designed and implemented to do. Support the people of the region with jobs, low cost electricity and the opportunity for both current and future citizens, vendors, labor trade unions to work and raise families.</p>	Resident	Greenville	KY	42345	TVA Public Site
Moore	Michael	<p>Respectfully,</p>	Private citizen consumer	Morgantown	KY	42261	TVA Public Site
Moosbrugger	Thomas	<p>TVA has a responsibility to bring ECONOMICALLY viable and reliable power to it's customers. The recent political pressure has obviously bowed the intentions of the TVA Board to the Democratic party and their race to control power distribution. You know as well as I do that the cost of power to your consumers will drastically increase if you continue closing Coal fired plants. I promise you I will attend any public hearing and be heard and I promise you I will be a member of any suits filed to stop this insanity. You people are extremely irresponsible in your jobs as board members and should be ashamed of yourselves. There is no</p>	Wabash Woodstoves	STURGIS	KY	42459	TVA Public Site
Morris	Thomas	<p>The Kentucky Chapter of the Sierra Club fully supports your decision to shutter the Coal Fired Paradise Fossil Plant Unit #3. In addition to the waning economic viability of coal produced electricity, the environmental impacts of burning coal make it a bad choice. Please do not bow to the attempts of Rand Paul and other short sighted politicians and do the right thing for Kentucky, shut down the plant as you have planned.</p> <p>Thank You.</p>	Kentucky Sierra Club	Bowling Green	KY	42104-3232	TVA Public Site
Naron	John	<p>I would like to see unit 3 at Paradise TVA stay operational. Myself and many folks I know rely on the plant for employment. The company I work for hauls for Paradise TVA and many friends and family either work for or contract for them. Other places will be affect as well such as coal mines and Harsco will be affect. Muhlenberg County will suffer if the fossil plant will shut down. Thank you for allowing me to make a</p>			KY	42337	TVA Public Site
Nelson	Kimberly J	<p>I am asking that the Paradise Plant remain open. There are many reasons I am asking for this, but the main reason is that to close the plant would be a detriment to our school. There are staff members and students whose spouses and parents are employed there. Our headmaster, who is married to a TVA employee, desperately needs to remain in Muhlenberg County. Also, there are so many employees that are from our county that rely on jobs provided by TVA. There have been so many other jobs leave the community, and to have TVA leave would be devastating! Thank you for taking the time to consider these reasons</p>	ACT Christian Academy	Greenville	KY	42345	TVA Public Site
Oates	Matt	<p>Our community has lived by coal and now we will die by coal if things are to close. The number of people unemployed from the plant, to truck drivers, down to the support and then miners themselves. TVA is our industry. You would cripple our community, the county, and the people who live here.</p>	Matt	GREENVILLE	KY	42345	TVA Public Site
Oates	Jamie	<p>I don't feel that TVA is taking in consideration the detrimental negative affect that the closure of Unitl 3 will have on Muhlenberg County. Not only the TVA workers, but the numerous truck drivers that haul the coal to the plant and the hundreds of local coal miners. With the closing of unit 3 these employees will be forced to take jobs in other counties, thus countless of students that's will likely have to transfer to other school districts. With less enrollment, we are likely looking at another teacher layoff. Have you even considered this trickle down effect on our counties schools and local economics? Muhlenberg County is already the 6th highest declining population in the state, and shutting down unit 3 will all but leave this County dry. Please reconsider your decision to close unit 3.</p> <p>Sincerely, Jamie Oates</p>	Muhlenberg County Board of Education	Powderly	KY	42367	TVA Public Site
O'Brien	Greg	<p>TVA Paradise Unit 3 is a enormous benefit to the economy of the region</p> <p>I thank you for taking initiative to retire the Paradise fossil plant, unit 3.</p>	Christy Industrial Services	Webster Groves	MO	63119	TVA Public Site
O'daniel	Kirsten	<p>It'll will truly helping protect Kentuckians' livelihood, now and in the future.</p> <p>New industries can be invited to Muhlenberg County and I'm sure with Rand Paul's engagement, he'll be able to help out.</p> <p>If possible, I would like to know if TVA has any plants to convert the coal power unit for wood?</p> <p>Enclose please find my column on the subject of global warming.</p> <p>Best regards from Kris O'Daniel The ELM House 647 Beechland Road Springfield, KY 40069 krisodaniel@ncsmail.net</p>	community sustainability committee of WC	springfield	KY	40069	TVA Public Site

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Oliver	Russell	I recommend that the coal unit at the Paradise Fossil Plant Unite 3 the last coal fired plant be closed by the tva.	concerned citizen	Hazard	KY	41701	TVA Public Site
		The United States needs to find a cleaner power source than coal.					
		There are also cheaper sources of energy than coal.					
Payne	Charles	For those who are willing to listen to my words without favoritism in any direction, I would like to voice my strong opinion on keeping Unit 3 at Paradise Ky open. I personally feel that the EA done was very misleading to the public in hand picking certain year's that had a concerning issue I that particular year. However since those year's of concern Unit 3 at Paradise has had an awesome year for 2018. The unit had its thirld longest run in its history. The Paradise Unit has the ability to utilize a closed water loop by using it's cooling towers. If the EPA was to require in the future that a plant was to require it, then money would be saved for its already in place. The Paradise Unit now has 3 large natural gas boiler's that help start the unit quicker,but also helps it sustain a load swing that the unit couldn't do before. These natural gas boilers can also supply steam to reduce the amount if coal burned. There is a dry ash facility on site that us almost complete. Scheduled to be completed in March if not earlier. The safety record at Paradise has been one if the best in the valley over the last two years. The heat rate is currently at Second. The future for surrounding coal and transportation is superious to anyone in TVA. The past closing of unit's 1&2 at Paradise has had a big impact on a already struggling poverty area, which us also due to reduction and future closing at other coal facilities outside of TVA. This has already caused electricity prices to rise. If Unit 3 was to close it would leave less control to negotiate natural gas prices for the future. This rise would then hinder our ability to provide affordable electricity for the people and business of the Valley. I would like for EA workers and others in the decision making process to consider these upgrades and the many other upgrades that was not mentioned in the EA. These are upgrades of money already spent and are in place. FYI purposes Paradise already has a scrubbers that remove SO 2 at a removal rate beyond other facilities has well as it's own Ball Mill for providing its own limestone water mixture for the removal if sulfur.	TVA	Beaver Dam	KY	42320	TVA Public Site
Payton	Kyle	I think that paradise unit 3 is a important plant for TVA to stay competitive in the power industry and is a good plant to keep around for the future of our company.		Central City	KY	42330-5649	TVA Public Site
Pendley	Denny	Being a life long Muhlenberg Countain it is very important to our County and residents. Families for generation after generation have counted on TVA for their livelihood. Jobs will be lost and families will lose their homes...the County will be devastated.		Belton	KY	42324	TVA Public Site
Pendley	Pamela	We need to keep a coal fired unit to help keep our electricity bills down! Also we do not need to be putting employees out of work. The economy is bad enough!		Drakesboro	KY	42337	TVA Public Site
Penrod	Alice	TVA receives no taxpayer funding, thus deriving virtually all of its revenues from the sales of electricity. TVA has invested 6 billion dollars to reduce nitrogen and sulphur dioxide emissions from our coal fired plants. Therefore, what's the point of closing unit 3 now after such a costly investment. Western Kentucky's economy is dependent upon TVA and unit 3. The United States also needs to continually use fossil fuel of which we are in abundance and can readily produce, instead of having to seek a source from another country. All of these reasons factor in to why unit 3 needs to stay open at Paradise, Kentucky. Please consider keeping		Drakesboro	KY	42337	TVA Public Site
Penrod	D bruce	Global warming is a political hoax meant to enshrine the power Of the elites. Stop this intrusion by allowing continued operation Of coal fired unit at Paradise.		Drakesboro	KY	42337	TVA Public Site
Penrod	D. Bruce	Screenshot of a social media post: Global warming is a farce designed to enshrine the values of globalists and elites. Unfortunately, as usual, the costs will have to be borne by those of us in places like western Kentucky where our livelihood is based on the mining of coal. Burning fossil fuel is not the cause of climate change; fossil fuel is the cause of the hysteria among the elites. Keep the coal fired unit open at Paradise.		Drakesboro	KY	42337	TVA Public Site
Perdue	Doug	Closing unit 3 would be a huge mistake. Not only would I finish crippling the economy of the local area ,it would throw away with one of the biggest producers in TVA. This plant is right in the heart of coal and easy		Brownsville	KY	42210	TVA Public Site
Perkins	Misty	<p>Ladies and Gentlemen,</p> <p>I would like to take a minute to let you know my feelings on the closing of Unit 3 at Paradise Plant in Muhlenberg County in Drakesboro. I have an invested interest both professionally and personally. If you close Unit 3, it would be detrimental to my family because my husband is employed on Unit 3. He's our sole provider for finances, healthcare, food, a roof over our heads, everything. We have 3 boys and our middle child was diagnosed with Type 1 Diabetes of January 2018. This is an awful disease for an adult, but ten times worse for a child. If it wasn't for my husband's job, we wouldn't be able to take care of our son. He could die without the medication we receive from his insurance that is provided by you, his employer. Secondly, I'm a teacher at Muhlenberg County Board of Education and closing the plant would have a very damaging affect to the school district. Due to the changes in previous years, they've lost so much and that has had a major affect on our children in this community. There will be over 100 people losing their jobs which also means that Muhlenberg County will be losing that money as well. People may lose their homes and have to move away from this amazing little town. I've grown to love this area, especially being from a big city.</p> <p>I understand that TVA is trying to reduce their costs and better manage their finances, however, I think this would be a huge mistake on your part to shut down Unit 3. So many people could lose their jobs, just not at the plant. It would have a major trickle down effect from TVA employees to truck drivers to teachers to restaurant employees. TVA is able to prevent this domino effect from happening by leaving Unit 3 functioning and running.</p> <p>Thank you for taking the time to reconsider the closing of Unit 3.</p> <p>Have a Blessed Day.</p>	Muhlenberg County School Board	Greenville	KY	42345	TVA Public Site
Perkins	James	I am writing to respectfully request the continued operation of Paradise Unit 3. Unit 3 is vital to the local economy and school system. The effects of the closure of Units 1&2 have been devastating to Muhlenberg County as well surrounding areas. Coal should continue to be a part of TVA's diversified generation mix. Gas prices have been historically volatile. In order to keep power bills affordable for lower income families and small businesses coal needs to continue to be a part of TVA's portfolio for the foreseen future.	Resident of Muhlenberg County, KY	Greenville	KY	42345	TVA Public Site
Perry	Vernon	Unit 3 Paradise is important to the welfare of the Education & to the economic of this area. It has been up dated to run at a low maggawatts it is running more efficient at a lower cost than a lot of other units they managed to have outstanding safety record in the past few years. I do not believe the environment study was done to show the last year of operation since work has been to improve the operation of this unit. I	Mechanist	Greenville	KY	42345	TVA Public Site
Peterson	Rita	I am against the closure of unit 3 of the Paradise facility. This would have a tremendous negative impact on our community. This has been one of the most productive facilities of TVA and we believe it can continue to be. I believe the coal operations should be continued.		Greenville	KY	42345	TVA Public Site

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Pierson	Marilyn	Recently TVA issued a draft Environmental Assessment on the potential retirement of the Paradise Fossil Plant.' Thank you for your willingness to shut down the Paradise Fossil Plant Retirement. I TOTALLY DISAGREE with Sen. Rand Paul re this issue. Coal is one of the dirtiest sources of energy and contributes greatly to global warming and climate change plus adding to the already over-pollution of our air and water. Stay steady in the face of pressure from Sen. Paul and I encourage you to shut down this fossil fuel plant. Thank you.		St. Catharine	KY	40061	TVA Public Site
Pittman	Jon	There is much more at stake than job loss; the welfare of the entire river system is too. Much traffic from the river creates jobs that feed the coal fired plants. Hence the welfare of these rivers and the people that operate them are too. And a strong river availability gains us more jobs in addition to helping all business that depend on these rivers for their livelihood, and recreation. Sure we need those jobs too. Thanks for listening. Jon Pittman Smithland, Ky. 42081	concerned citizen		KY	42081	TVA Public Site
Pogue	David	As a local citizen of Muhlenberg county, TVA coal powered plant has been here all of my life. Growing up my friends fathers and later my friends have all ways had a link to the coal plant. Whether as employees or miners or like myself hauled coal directly to the hoppers of the plant. I get the switch to gas was a viable and cost efficient plan. But I thought the plan was to keep unit 3 online to help supplement the gas. With the major cuts to jobs	Local citizen	Beechmont	KY	42323	TVA Public Site
Pogue	Jerry	When TVA came to Muhlenberg County in or around 1960, you came with a promise of jobs and economic developement. The coal burning units provided many jobs for our entire region. To abandon this promise is unreasonable and inhumane. Our county has always been a huge supporter of the Paradise Fossil plant. Our entire county depends on coal, trucking,and many other means of employment that are a direct result of the coal burning units at Paradise. Not only should unit three remain operational, the other two units that were retired should be put back into service. In just eight short years one administrations war on coal and the decision by the TVA board of directors to abandon the coal fired units at Paradise has caused severe hardship on the residents of Muhlenberg County. I am requesting that unit three remain operational and that units one and two be returned to service. I am confident that this request will be in agreement with the vast majority of the residents of our county. Thank you Jerry Pogue General Manager	Pogue Chevrolet Buick GMC	Greenville	KY	42345	TVA Public Site
Porter	James	Global emissions of carbon dioxide have reached the highest levels on record, scientists projected Wednesday December 05, 2018 in the latest evidence of the chasm between international goals for combating climate change and what countries are actually doing. Between 2014 and 2016, emissions remained largely flat, leading to hopes that the world was beginning to turn a corner. Those hopes have been dashed. In 2017, global emissions grew 1.6%. The rise in 2018 is projected to be 2.7%. The expected increase, which would bring fossil fuel and industrial emissions to a record high of 37.1 billion tons of carbon dioxide per year, is being driven by nearly 5% emissions growth in China and more than 6% in India, researchers estimated, along with growth in many other nations throughout the world. Emissions by the United States grew 2.5%, while emissions by the European Union declined by just under 1%. The remaining coal fired unit at the Paradise plant is old, dirty, and pollutes the environment far more than newer, cleaner combined cycle gas fired plants or even newer coal fired plants. Much is being made of the loss of jobs at Paradise and throughout the coal supply chain; Do these people not realize that we are facing an existential crisis if we do not get carbon emissions under control? It would be better to continue I am writing on behalf of the nearly 200 Greater Muhlenberg Chamber of Commerce businesses asking you to repair Paradise Coal-fired Fossil Plant Unit 3. The Tennessee Valley Authority Paradise Plant has been a great friend to Muhlenberg County for many years. Countless jobs, community investments and revenue in lieu of taxes have benefited our county, but we took a hit when Units 1 and 2 were taken off the grid in 2016. Our community is still recovering from the job displacements, lower household income levels, and lower skill trade jobs from the mothballing of Unit 1 and 2. Our community heavily relies on the Paradise Coal-fired Fossil Plant as a large employer for our area. Not only would closing the plant displace workers employed by TVA, but it would have a negative impact on other residual industries. Muhlenberg County has two large trucking companies that haul many loads of coal each day to Unit 3. These come from local coal mines which operate around the clock to supply coal to the plant. Several other industries and businesses would be very negatively impacted if Unit 3 was to close resulting in job loss. I want to encourage you to find ways to repair Unit 3 at Paradise. Thanks	Citizen	Danville	KY	40422-9783	TVA Public Site
Porter	Logan		Greater Muhlenberg Chamber of Commerce	Greenville	KY	42345	TVA Public Site
Powers	Gerald	Having been a TVA employee for 31 years working as a boilermaker at Paradise Steam Plant I realize what an important part that TVA has played in the economic well-being of this area. From providing well paying jobs to helping with the financial support of the areas schools TVA has always been a leader in these areas. I'm well aware that environmental considerations have evolved and support for coal has wavered but the		Beaver Dam	KY	42320	TVA Public Site
Powers	Linda	I am the wife of a 31 year retiree from Paradise Fossil Plant. It gave my family a comfortable living and supported the local communities. Please reconsider shutting it down. I hope the few people that are employed there now can continue working and supporting their families as well. Thanks for taking the time to read this.		Beaver Dam	KY	42320	TVA Public Site
Powers	Stephen	TVA Paradise has been a major part of our lives since I was a child. My father worked there as a boilermaker for over thirty years and supplied our household and the many communities in the surrounding areas. It would be a shame to close it down and lose the few TVA jobs we have left around here. I worked there for over five years and enjoyed being a member of a tight knit group of people that I called family. I'm sure your board members already have made their minds up about it so me and my fellow supports are probably pissing in the wind but I wanted to take a few minutes out of my day to support Unit 3 staying open and		Beaver Dam	KY	42320	TVA Public Site
Pullen	Ron	I am in favor of shutting down unit #3 at Paradise. The time has come to move from coal and on to renewables. Solar, wind and hydro power are the future. Jobs will move else where into other markets. We've done enough damage to the environment through the years and we now need to start the healing. It's actually way over due. Sincerely, Ron Pullen		Owensboro	KY	42301	TVA Public Site
Purdy	Bruce	I am sick and tired of the un-American and un-Constitutional practice of letting unelected bureaucrats make decisions, new law, that affects our citizens in any way. That is the business of elected Beyond that I do not think closing down this coal fired plant is good for the State of Kentucky and it's citizens..		Taylorsville	KY	40071	TVA Public Site

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Putman	Jamie	I am writing to ask you to please consider our community and the many families that will be negatively impacted by the decision to close Unit #3 in Muhlenberg County. A decision to close would be life-changing in many ways. TVA is a major employer for our community, and many families depend on income from these jobs. Almost every home would feel the financial crunch. TVA also provides monetary support for our county schools. I am a first grade school teacher in the county, and I can say that this money is important for the children of our area. Many families would have to move if they had to seek new employment and that would effect all businesses in our community. No child should have to be worried about what will happen if their parent loses their job. I have heard my students ask 'What will happen if my daddy loses his	LONGEST ELEMENTARY	Greenville	KY	42345-1798	TVA Public Site
Rabdolph	Terry	We need this unit. Many of my friends and family work for you. If you close it they lose their lively hoods. Not only will they lose their jobs but the will loose thier homes and possibly their families as well. It's already hard on all if us already please don't make it any harder. Please keep unit 3 working. Thank you for your time and consideration Terry Randolph	Citizen	Central City	KY	42330	TVA Public Site
Reed	Terry	For Fifty one year's of my living, TVA has always been a part of Muhlenberg County. I have had a lot of family members and friends work for this great company, and it would be a real shame if TVA were to shut down. That would be basically the end of several jobs in this county. The people of Muhlenburg and surrounding counties benefit from the plant being open. So think of these people before making a decision on the future of TVA. Thanks for the open forum. God bless keep TVA going unit 3		Beechmont	KY	42323	TVA Public Site
Renfrow	Candace	compensate for them. The ones who are not eligible for transfer will loose their jobs leaving Drakesboro a complete ghost town. I feel that even though there is other sources of power that TVA produces they will not be enough power to make up for all the fossil plants that have closed down.	William's specialty services	Gilbertsville	KY	42044	TVA Public Site
Richardson	Mary Lou	Although I am no longer a resident in Greenville,Ky., I do have many interests there, including family, friends and ownership in property. I feel that the TVA plant in Paradise is a vital life link to the people who live in and around Muhlenburg County. I feel the county, its people and its businesses would be left in dire circumstances if this plant were to be closed. I urge you all to consider this carefully. Thank you.		Murrells Inlet	SC	29576	TVA Public Site
Riggs	Martha	TVA has invested substantial capital in Paradise Unit 3 to make it environmentally compliant. It should remain in the Fleet and continue to be as asset to both TVA and Western Kentucky.	TVA Paradise, retired	HODGENVILLE	KY	42748-9533	TVA Public Site
Rigney	Jamie	of this community!	ACT Christian Academy	Beechmont	KY	42323	TVA Public Site
Robards	James	To whom it may concern, I am writing in response to the environmental assessment(EA) done on Paradise Unit 3. I am an employee at Paradise, and I have read the EA. I feel that the EA is not truly accurate of the current conditions at Paradise. The EA stated that material condition deterioration has resulted in reliability challenges and higher forced outage rates. I did not see the EA acknowledge several updates and/or replacement of major equipment and controls, that have taken place over the past few years. These improvements have greatly impacted our unplanned shutdowns and reliability in a positive way. The improvements most recently displayed in the 144 days online, resulting in the 3rd longest continuous run time for PAF3. Again, none of this mentioned. I am aware of the need for new rotors, but with everything, you have to put money into it to keep it in good shape and running good, PAF3 being no exception. The way that the EA refers to the material condition, someone not familiar with the plant, would be led to believe it is falling to the ground. The EA addresses the projected high future environmental compliance expenditures. The need to build a gypsum dewatering facility and a dry fly ash handling system. The EA made it sound like this would be a large investment if PAF3 is to continue to run, but the truth is that decision has already been made, since these projects are currently in progress. TVA is already spending that money. These are not future projects that will require a lot of money, these are being done now. The dewatering facility is nearing completion, with the commissioning of equipment in Dec 2018, and commissioning of equipment for the dry fly ash in the summer of 2019. I am disappointed in the language and reading of this assessment. In reading the EA, it was worded as if to persuade or guide those making the decisions in a particular direction. I felt it unnecessary to say that PAF3 does not fit in TVA's current portfolio needs.. I would rather have seen the assessment just state the facts found with a neutral, unbiased tone. When done in this manner, the TVA Board could evaluate the information given and make the best decision based on the data received. I seen Mrs. Jacinda Woodward say on the COO All-Hands Forum that TVA was buying 5000MWS the first week of Oct, so it does not make sense to me to get rid of a 1000MW unit. I feel certain that TVA was buying megawatts at a higher price than we can make them. Retiring PAF would also have a huge negative impact on our county financially. The decision to retire PAF would only add to the many families that were affected when TVA closed PAF 1 & 2, along with stifling our school system. Thank you for taking the time to read my	TVA	Greenville	KY	42345	TVA Public Site
Roberts	Harvey	I fully support the efforts to move Kentucky, and the rest of this nation off of the use of coal to generate electricity. The very idea that there exists a technique for using coal as a fuel that can be labeled "Clean Coal" is a clear indication that the person who uses the phrase doesn't know what clean is, or doesn't care. Yes there is economic hardship to bear during and following the transition from coal to gas or from one plant to another. But better that we bear that cost now than to choke to death trying to breathe unbreathable air. Please do not think that all Kentuckians are so simple minded as to continue to support a method	Self	LaGrange	KY	40032	TVA Public Site
Roberts	Harvey	I fully support the efforts to move Kentucky, and the rest of this nation off of the use of coal to generate electricity. The very idea that there exists a technique for using coal as a fuel that can be labeled "Clean Coal" is a clear indication that the person who uses the phrase doesn't know what clean is, or doesn't care. Yes there is economic hardship to bear during and following the transition from coal to gas or from one plant to another. But better that we bear that cost now than to choke to death trying to breathe unbreathable air. Please do not think that all Kentuckians are so simple minded as to continue to support a method	Self	LaGrange	KY	40032	TVA Public Site
Rogers	Pennye	I have lived in Muhlenberg County my entire life. I have watched over the past few years a decline in the economy in Muhlenberg, even while nation-wide, the economy is on the up-swing. We have little industry in the county and few opportunities for graduates and residents. Students are leaving after graduation to find opportunities to build a career and support families. Long-time residents who once held jobs in the mining industry are leaving the county to find employment in other areas. TVA is a very important part of our communities and provides essential monetary support for our school system. We have been told that Unit 3, the last coal-fired unit left, is scheduled to be closed in the near future. I know that it has undergone some very expensive maintenance--close to 800 million-- in recent years but it still produces more megawatts than the gas-fired units (1150 Me compared to 1100). I also know that modern technology allows for the clean burning of coal and therefore, this should not be an environmental hazard. If Unit 3 is closed, it would not only eliminate the TVA jobs but all the support personnel who truck the coal, mine the coal, and do maintenance work. This would be the final straw for economic opportunity in Muhlenberg County--once the coal capital of the world!--as more people would be forced to leave in search of jobs. Please keep Unit 3 open. The very future of our community and our school system depends on this.		Greenville	KY	42345	TVA Public Site
Rose	Chris	To whom it may concern, The impact on our community would be very dramatic in a negative way. We need the coal fire unit for the jobs it's bad enough that you have destroyed so many jobs by shutting the first two units down. My dream was to get a job at the paradise unit for many years and 2 weeks after I finally finished my associate's degree in applied science you made the announcement to shut the first two units down which crushed my chances of getting a good job in the county I live. I think it would be a horrible and sad decision to shut down our local economy the way you intend just to please the thoughts of the goverment.		Browder	KY	42326	TVA Public Site
Rose	Sally	Closing down Unit 3 at Paradise would jeopardize jobs not just at the plant but in the surrounding areas as well. The community would suffer from the lack of contributions that are now made by TVA Paradise.	USA Debusk	Owensboro	KY	42301	TVA Public Site
Rudolph	Kurt	I received an email today from Rand Paul about the Paradise Unit 3 pending closure. I can understand the reason for it from my nearly 40 years of experience at Consumers Energy. At the end of my career at Consumers, I witnessed our closure of a number of plants and I understand the reason. Natural gas combined cycle technology is much more efficient. Combined with lower fuel cost, lower direct & indirect labor cost, and less environmental clean up required this technology has revolutionized power generation. Sadly, the general public does not understand and least of all politicians.		Jackson	MI	49201	TVA Public Site
RUTHERFORD	Mark	communities around.	Shared Services	BELTON	KY	42324-3478	TVA Public Site

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Ryan	Michael	I feel that shutting down unit 3, will hurt a lot of people. People need their jobs, coal is cheaper than natural gas. I think it will effect Muhlenberg County in a bad way, I really don't think shutting the coal burner down is a good move		Madisonville	KY	42431	TVA Public Site
Schanen	Marylee	Thanks for looking at the bigger picture and doing your part to protect our environment. Maybe someday the children of Ohio and muhlenberg counties will appreciate your efforts to stop green house gases. It is time politicians look past their own need of power and support the people as a whole. Coal has been dying for half a century and yet they stoke up those fires instead of bringing education and job opportunities for		Albany	KY	42602	TVA Public Site
Schell	Richard	As someone who has seen the brownish haze from 'Paradise' when the wind has been in the right direction for years and years (and it could be seen from the higher elevations in and around Bowling Green), I would be glad to see the closing of this source of power. I do hate to see the economic effect it would have on this area, but the powers that be in this area and the state should have known that this time would		Bowling Green	KY	42103	TVA Public Site
Schmitt	Janine	As a registered voter in Kentucky I plead with you to reconsider the proposed closing of Western Kentucky's Paradise Unit 3. This facility employs approximately 130 people. They need their jobs. And so do all the supporting staff, like truck drivers who bring in the coal along with many others and businesses in the area to whom this facility is needed. My grandfather was a coal-miner in Pennsylvania and I know how hard he worked. The workers at Paradise Unit 3 are probably hard workers too and proud of the job they do. Remember.....some of the 'old ways' are still very good. 'New' does not always mean 'better'. Thank you for your time. Sincerely,		Florence	KY	41042-3500	TVA Public Site
Schulz	Judy	In the name of environmental benefit it is my belief that we move away from dirty coal.	Citizen	Louisville	KY	40207	TVA Public Site
Scott	Barbara M	I am asking you to please reconsider shutting down Unit 3 at the TVAs Paradise plant in Muhlenberg County. The impact on our economy would be Devastating. Not only will employees at TVA lose their jobs but also trucking companies will have layoffs and local businesses will suffer in turn causing more job loss. I cannot imagine the total Impact this will cause on our County. I ask that You please reconsider your decision to close the Coal unit down.	Muhlenberg County resident	Central City	KY	42330	TVA Public Site
Sharp	Eric	My name is Eric Sharp I am a member in good standing of Heat and frost insulators Local 37. I have worked several outages at Paradise and worked maintenance there for 6 years before coming to Shawnee. I ask that you please consider keeping PAF U3 in service. It's a vital instrument in that already devastated community. They can't afford much more job loss. I was a part of a lot of the work done in recent years and with the investment that has been made I feel a lot of megawatts will be left on the table that will return said investments. Thanks you for your time. Eric Sharp	Heat and frost insulators Local 37	Kuttawa	KY	42055	TVA Public Site
Shaver	Richard	Please reconsider shutting down the last coal-fired unit at the Paradise Plant in Muhlenberg County, Ky. It makes sense, to me, to keep that unit running in case there was a problem with the natural gas units. I am concerned that the gas companies will raise the price of natural gas when they get our country totally dependent on natural gas. I am also concerned about the jobs that will be lost; and the effect of lost jobs on		Central City	KY	42330	TVA Public Site
Shelton	Charles	I believe the planned closure of PAF Unit 3 and thus all coal fired generation at the Paradise Fossil Plant was planned when the board voted to shutdown Units 1 & 2. Units 1 & 2 were world record holders for runtime when the board voted to shutter those units. Unit 3 was horrible then and has been neglected by current management, including the retiring CEO, ever sense. I have yet to see a plan to evaluate all three units to be maximized together. If Units 1 & 2 have been idled correctly and could be brought back on with minimal investment compared to Unit 3 and utilize Unit 3's precipitator, scrubber, switch yard transformers and apparatuses then I think you could greatly improve your forces outage rate, you could swing load down into the 330 MW range and up to 1300+ with both units in operation. It would be more		Owensboro	KY	42301	TVA Public Site
Sherrod II	Brent	TVA Board of Directors, I along with many others in the area would hate to see the last coal unit shut down at Paradise. It will negatively effect so many businesses and families not only in Muhlenberg county but surrounding counties as well. Not only will the TVA employees jobs be at risk but also the coal miners and coal truck drivers. And that's not the only ones. If the coal unit is shit down coal mines will be shut down, coal miners will be laid off, coal trucks will be parked and the drivers laid off, along with truck tire dealers businesses slowing down if not closing, fuel suppliers losing business, parts stores losing their main business and the list keeps going on. Several local businesses depend on the coal industry to survive and if the coal burning is eliminated then our county and surrounding counties will dry up to nothing. We don't need this for our economy. I'm a local self employed truck driver and former coal truck driver that depends on several of these local businesses myself and hate to see them go away. Shutting the coal unti down is not only going to effect your employees and families but hundreds if not thousands of other families as well. I really hope you will see the effect it will have on our local economy and will reconsider shutting the coal burning unit down. Thank you for your time Sincerely, Brent Sherrod II		Greenville	KY	42345	TVA Public Site
Shoup	Richard	What have we come to as a nation when a group of unelected officials can effect decisions such as closing a vital facility. I believe that these decisions should come from or through our elected officials. It seems that to often those in authority make decisions which effect so many workers The closing of the Paradise fossil facility is not in the best interest of all of those that will affected by such an irresponsible decision. I assume that this decision was made based on the ridiculous belief in global warming.		Owensboro	KY	42303	TVA Public Site
Smith	Rita Dukes	I am urging you to keep Unit 3 at Paradise TVA open and using coal. Our energy independence is hinged on diversity. We need coal to keep the lights burning.	Muhlenberg Citizen	Sacramento	KY	42372	TVA Public Site
Southerland	Gary	Paradise Unit 3 is equipped with the best Employees and the latest environmental equipment available. TVA has been aggressive in reducing the Coal Burning fleet from 60% down to 20 % in just the last 20 years. I think there should at least be a pause in further reduction of coal fired units until the future unfolds insuring that TVA doesn't lose this older proven technology. Thanks	Paradise TVARA Chapter	Morgantown	KY	42261	TVA Public Site
Southerland	Roger	The Paradise power plant has always provided our area with competitively priced and reliable electricity for homes and industry. I remember the shortages of natural gas back in the 1980's and to think that the removal of our only coal powered unit will result in affordable energy during extremely hot or cold times of the year just doesn't make sense. Add to that the many years it would take to build a coal fired unit, I		Morgantown	KY	42261	TVA Public Site
Southwood	Pat	I am retired truck insurance agent that worked with many truckers in eastern KY when Obama made his war on coal. My heart went out to my clients as they lost their lively hoods, trucks and hope! Please can't we help find a replacement occupation before closing the only jobs some have ever known. Please listen to Dr Paul and rescue these jobs.		LOUISVILLE	KY	40228	TVA Public Site

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Spears	April	TVA Paradise is part of Muhlenberg County!!! Having once worked there and leaving at the closure of Units 1 & 2, I was personally affected. Many people rely on TVA Paradise, not only as an employer but also as a major contributor to our community. Seeing it close would have a catastrophic effect on the entire county and surrounding counties also. I now work at the coal mines and see the hard working people that also help keep the lights on. We should always have options for power and not only rely on gas, solar, or nuclear. For years coal has been the go to source and there is still plenty to be mined. Consider everyone in this	Western KY Coal Mines	Drakesboro	KY	42337	TVA Public Site
Spears	Bryson	I would like to Express my concern on your decision to possibly shut down unit #3 at the Paradise Fossil Plant. The decision to shut down units 1 and 2 have already had a negative impact on our community through the loss of jobs, both at the plant and our coal mines. It also greatly impacts our small businesses. I think that you already now the trickle down effect that happens with the loss of jobs in a community. I know that right now gas is the cheaper alternative, but we would be extremely naive to believe that it will stay that way. We need unit 3 to help support our local economy, and also keep an affordable energy balance in the wake of a gas price spike. While I think that your mind is already made up on the future of Paradise unit #3, I hope that you will greatly consider the negative impact on our local economy.		Drakesboro	KY	42337	TVA Public Site
Spicer	Dennis	Thank you		Madisonville	KY	42431	TVA Public Site
Stalls	Fred	Please keep no 3 furance going. We still need jobs in coal, trucking,etc.	Kentuckian	Almo	KY	42020	TVA Public Site
Stanley	Jessica	We Kentuckians still believe in coal power. We get our electricity from the co ops that purchase it from you guys. Your special consideration for keeping this plant going is essential to many families here in Western Kentucky. We do hope and pray that TVA will continue to be a good corporate partner with Western Kentucky. Thanks, Fred and Linda Stalls		Powderly	KY	42367	TVA Public Site
Stevenson	Willie	This review is really important to those working in the coal industry. There are new reports and technology coming out that will show that keeping this coal burning plants around is worth it. Many local jobs depend on TVA keeping this coal burning plant and it will definitely hurt the community if you discontinue it. Please reconsider shutting it down and looking at it at another date in several years. There isn't enough evidence that stopping these units will significantly count towards reducing climate change. Even with everyone following the Paris Clinate Agreement, it won't affect the changing temperatures by even .5 percent! Please choose people over this until better options are here that will actually help make a real difference without putting people on welfare.	Citizen	Hopkinsville	KY	42240	TVA Public Site
Stevenson	Willie	I would appreciate this plant being left open	Citizen	Hopkinsville	KY	42240	TVA Public Site
Stewart	Denny	The people in Muhlenberg county need their jobs!	USA Debusk	Owensboro	KY	42301	TVA Public Site
Stratton	James	I would appreciate this plant being left open	Private Citizen	Elkton	KY	42345	TVA Public Site
Summers	David	The people in Muhlenberg county need their jobs!	N/a	Chicago	IL	60630	TVA Public Site
Sweet	Cortney	I still am a property owner in Greenville KY and it would be a great loss to the people that live and work for TVA. I have always been happy with the relationship I have had with its employees. I strongly feel that keeping this company When Paradise Fossil came to be, the location was chosen based on the coal fields nearby, the ability to transport coal by truck, rail and barge and the ability to operate in a fertile environment for long-term operation. Thousands of individuals and their families, hundreds of communities, tens of schools and an untold number of businesses have enjoyed the benefit of having this facility where it is today. So much in this region has been affected in a positive way as so many have worked on the simple premise that everything done is one more step in a positive direction for reliable power for an unknown number of households, businesses and municipalities for what all thought would be 'forever'. With all the recent (last 10-15 years) improvements, additions, systems and upgrades completed...Unit 3 is operating about efficiently as the engineers could have ever dreamed of. PAF Unit 3 does need some additional work, and we all know that any money spent is re-couped every time she gets back on line...especially now that we are able to get into record running territories due to all that hard work. There is a sign on the wall in the front entrance of the office building that reads 'Built for the People of the United States of America'. As one looks at Paradise and the capabilities of Unit 3, one has to wonder if that sign still holds its meaning or will there be more bonus money dolled out with handshakes and pats on the back for shuttering communities along with this storied facility? Please keep PAF U-3 in the portfolio.	TVTLC Job Site Rep/Boilermakers Local 40/GUBMK	Princeton	KY	42445	TVA Public Site
Sweet	Cortney	When Paradise Fossil came to be, the location was chosen based on the coal fields nearby, the ability to transport coal by truck, rail and barge and the ability to operate in a fertile environment for long-term operation. Thousands of individuals and their families, hundreds of communities, tens of schools and an untold number of businesses have enjoyed the benefit of having this facility where it is today. So much in this region has been affected in a positive way as so many have worked on the simple premise that everything done is one more step in a positive direction for reliable power for an unknown number of households, businesses and municipalities for what all thought would be 'forever'. With all the recent (last 10-15 years) improvements, additions, systems and upgrades completed...Unit 3 is operating about efficiently as the engineers could have ever dreamed of. PAF Unit 3 does need some additional work, and we all know that any money spent is re-couped every time she gets back on line...especially now that we are able to get into record running territories due to all that hard work. There is a sign on the wall in the front entrance of the office building that reads 'Built for the People of the United States of America'. As one looks at Paradise and the capabilities of Unit 3, one has to wonder if that sign still holds its meaning or will there be more bonus money dolled out with handshakes and pats on the back for shuttering communities	TVTLC Job Site Rep/Boilermakers Local 40/GUBMK	Princeton	KY	42445	TVA Public Site
Thompson	Georgann	I agree with Senator Rand Paul to reconsider all ramifications related to the push to close Unit 3.		Tompkinsville	KY	42167	TVA Public Site
Thomson	David	This closure is driven by many things- I understand that, but my concern is the greatest good for the residents of my region- this closure will affect my family, friends, and neighbors in profound ways, please consider the livelihoods of the many families this will have and the dependence this region will have in the absence of this operating plant...	Concerned Area Resident	Madisonville	KY	42431	TVA Public Site
Tillman	Randy	I for one need a better understanding what TVA's motivations are, as I feel like the disclosure isn't 100% honest or accurate...		Greenville	KY	42345	TVA Public Site
Tudor	Brad	Muhlenberg Co. coal is vital to the support and sustainability of this region of Kentucky. TVA'd ability to provide great jobs to hardworking Kentuckians is unmatched. People in this county need TVA, and we can only hope TVA needs our resources. Thank you!		Greenville	KY	42345	TVA Public Site
		I am a Paradise employee and have been for 17 years. I couldn't make myself read past section 1.2 of the EA without commenting because of the misleading and inaccurate information found in it. The biggest issue I have with this EA is that it is based on data from 2015. Since 2015, TVA has invested millions of dollars replacing turbine controls, the superheat header in the boiler, and the generator exciter to name just a few. The EA speaks of Paradise 3 being unreliable. Up until spring of 2018, I would agree with that statement. Since replacing the turbine controls and the superheat header in the boiler in the spring outage of 2018, Paradise 3 has been one of, if not the most reliable coal unit in TVA. The EA also speaks of the need for significant future capital investment. The majority of that capital has already been invested. The only thing PAF 3 needs now is low pressure turbine rotors which is a 30 million dollar investment. It pales in comparison to the cost of the superheat header replacement, which has already been done. PAF 3 would easily make that 30 million back in a couple of months. Our material condition is much better than it was when the 2015 data was collected. The EA also states that there are two types of coal units that fit the TVA portfolio. The first one it lists is "Large, efficient coal unit with low operating costs, and low forced outage rates to effectively serve baseload." Paradise 3 is leading the fleet in reliability as of 11/20/2018, and is less expensive to operate than all but 3 coal unit in the valley according to the last compendium list I saw. We sit in the middle of coal country, and there are several mines around that can provide coal for PAF to burn. The decision to burn coal from mines that are miles away from us is a decision that TVA made. I can't get a convincing answer when I ask why. My biggest problem is with the use of data about the plant from 2015. This paints an inaccurate and untrue picture of the condition, reliability, and cost to operate the plant. I am asking for current data to be assessed. If after that, the decision is made to retire Paradise 3, I would		Greenville	KY	42345	TVA Public Site

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Turner	Jeanetta	Please do not shut down the remaining coal burning unit as this county survives on coal!! Please fire back up the previous two as well.. we depend on it!!	Compliance officer	Beechmont	KY	42323	TVA Public Site
Van Hoorn	Craig	It is my opinion that this country cannot afford to loose anymore coal fired power plants especially one of this size. There is a balance right now of Coal, Hydro power, Solar, Wind and Gas with Coal being the highest mega watt output of all. Closing down these plants would only force America to bring in more electricity from Canada and flood our great states with solar fields. Loosing your unit 3 boiler would certainly force many layoffs and even possible bankruptcy for moderate size companies like ours. Thank you for your consideration. Sincerely, Craig Van Hoorn	New Age Fastening Systems, Inc,	Sewell	NJ	8080	TVA Public Site
Vincent	Brian	**no comments**	Paradise maintainece	Greenville	KY	42345	TVA Public Site
Vinson	Rick	RE: Proposed Retirement of PAF Unit 3 Steam Plant I will state up front that I am employed both by TVA and specifically by the Paradise site. I have enough time and seniority from a represented position that I am not in danger of losing my position at TVA (somewhere) pending this decision. Also, as an engineer and only one of 3 remaining Principal Engineers (non-nuclear) I believe I have a particular insight into the history of Paradise Unit 3 and both it's state of condition and viable future as a generating asset. When I arrived in 1992, the Paradise site had 692 employees. Today that number sits around 130. There was little attention given to safety, fiscal discipline or unit performance. Today, Paradise has as good or better a safety record as any generating site. This is a well documented fact. Fiscal discipline is no longer an option for any of the sites. As for performance, the improvements I've witnessed especially since 2007 have made this unit both reliable and dependable. Paradise Unit 3 just completed it's 3rd longest record run across the summer peak season in 2018. In fact, it was only shut down for a scheduled outage. Since 2012, the Paradise site has experienced not 1 but 2 world record runs on Unit 2, a 3 Unit record run for the site and the aforementioned Unit 3 run during summer 2018. Close to a billion dollars has been spent on Paradise Unit 3 adding (among other projects) an SCR, a Scrubber and most recently a boiler superheat header replacement and new main turbine controls. It seems unimaginable that the cost poured into Unit 3 would be jettisoned in favor of shutdown. This unit is more than capable of producing power for at least the next decade. Reality is in direct conflict with what is insinuated and presented as fact in the PAF Unit Environmental Assessment (EA). The EA paints a deliberate and pre-conceived picture of virtually every aspect of the Paradise plant. As an engineer I know intimately the process of data manipulation and the ability to create a desired result. There is zero doubt in my mind that the EA represents the very worst of this kind of intention. The desired outcome was undeniably the starting point from which the EA then worked backwards towards the answer. The EA's most egregious failure is it's dismissal of the regional economic impact of the shutdown of Unit 3. One would think the people of Western Kentucky barely rate as human much less as a consideration in the decision making process of the omniscient TVA. Among the 130 plus employees at Paradise Fossil Plant are a multitude of job titles including craft trade specialty, engineering and technical, and management/supervisory that are rare in the western Kentucky geographical area. These jobs cannot be 'gone down the street' to replace for the employees currently at PAF. They are jobs both in salary and benefits that won't be absorbed by the surrounding area and will surely result in the exodus of many qualified and skilled employees. In addition, the PAF payroll contributes to the local economy it serves (as do all the TVA sites) in lieu of taxes payments providing much needed support to schools and communities in many rural areas with not much industry to draw from. The closure of PAF Units 1&2 has already seen an extreme effect on the local economy and closure of PAF Unit 3 would be another devastating blow to an area already struggling to recover from the previous closures. TVA continues to use misleading and inappropriate valuation methods with respect to PAF (other sites as well). Delivered cost of coal is averaged across all the sites when that cost is notably lower for the two Kentucky plants which are situated basically at the mouth of the mines. Use of the actual delivered cost would be beneficial to PAF and detrimental to TVA managements stated goal of shutdown. Similarly TVA uses	TVA	Hopkinsville	KY	42240	TVA Public Site
Wall	Wesley	**no comments**	Chalmers & Kubeck	Watkinsville	GA	30677	TVA Public Site
Walley	James	I'm writing to encourage the board to keep Paradise Unit 3 running. I don't think there's any way to truly estimate the cost of shutting down this unit. The closing of this unit will have a devastating effect on not only the employees at the plant and their families, but on the coal and trucking industry in Muhlenberg and surrounding counties, and also local retail businesses, schools and service providers. The closing of this unit will cause hundreds of families to loose income and health insurance. Not only the people working directly for the plant, but all of the families that support the plant through construction projects, maintenance partners, and services. The people of this region have proudly supported this plant for many years and believe that it can still be a valuable asset to the TVA fleet. The environmental improvements ongoing at the plant should make it even more valuable as a provider of clean coal energy as well.		Bremen	KY	42325	TVA Public Site
Walley	Phillip	I am in support of keeping TVA paradise steam plant in operation.	Plumbers & Pipefitters local 633	Central City	KY	42330	TVA Public Site
Watkins	Kim	Please keep Paradise plant unit 3 open					TVA Public Site
Waxler	Wyatt	It matters a great deal if the persons making the final ruling are elected or not. Its not right for an unelected individual to be able to take away the livelihood of hundreds of fellow AMERICANS, let Congress have the final say, please. Sincerely, Wyatt Waxler		Winchester	KY	40391	TVA Public Site
Wells	Morris	I strongly urge and emphasize that Paradise Fossil Plant Unit 3 not be shut down. This plant provides a livelihood for approximately 136 employees. This plant is vital not only to those it employs, but to Muhlenberg County, Kentucky as well. It is my understanding that many facts and figures have been distorted relative to this issue. Please stop, take a close look, and weigh the facts before making such a detrimental decision.	TVA	Greenville		42345	TVA Public Site
Werner	Cheryl	Coal Keeps The Lights On. Keep it that way. Kentucky coal is affordable and there is an abundance of it.		Bowling Green	KY	42101	TVA Public Site
Wheeler	Gary	I agree with Rand Paul		Warsaw	KY	41095	TVA Public Site

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White	Kimberly	<p>We never know what the future will hold. We appreciate and recognize that Tennessee Valley Authority is making decisions that effect our not only our entire community but our environment. We realize that this is a big discussion but we must have our voices heard because we cannot know what will happen tomorrow. Our community needs the support of TVA with jobs for PAF Unit 3 and we need to recognize that closure would have a negative effect on the education system in the area. Please keep PAF Unit 3 open and running.</p> <p>It is not wise to close PAF Unit 3. This is because of the many unknown variables in the future of power supply it would be a good idea for Tennessee Valley Authority to maintain and support PAF Unit 3 in Muhlenberg County. Coal is recognized as an essential part of the fuel mix, as stated by Commissioner Neil Chatterjee, of the Federal Energy Regulatory Commission. With his words we know that it would be premature to close PAF Unit 3. The demand for power may overwhelm generating capacity in the future resulting in brownouts and blackouts in many parts of the county. We must keep the lights on. We implore you to keep PAF Unit 3 open.</p> <p>Sincerely,</p> <p>Kimberly McClellan White Teacher / Muhlenberg County Schools 270-820-8488</p>	Muhlenberg County Schools	Powderly	KY	42367	TVA Public Site
White	Brittany	<p>Closing down this company will destroy this county.</p>		Beechmont	KY	42323	TVA Public Site
Wilkerson	Anita	<p>I am writing to ask that you would keep Unit 3 running. I have lived in Muhlenberg County for 56 years and this county desperately needs TVA Coal Plant. It will hurt this county tremendously if you choose to shut it down. Too many of our children have to leave and go away to find jobs as it is already. My husband and one son-in-law works for TVA. They loved working at Paradise. Our oldest grandson is taking maintenance classes because he wanted to one day follow in his grandfather's footsteps and work at TVA Paradise Fossil Plant.</p> <p>Our other other son-in-law is principal at Muhlenberg South Middle School and my sister-in-law is guidance counselor at Muhlenberg South Elementary School. If Unit 3 is shut down it will affect so many not only in my own family but also in our community. Our schools will suffer and we have already lost friends who had to leave when Units 1 & 2 shut down. I beg you to think if it was your hometown. A town needs working families to survive. I ask that you will please pray about your decision.</p>		Greenville	KY	42345	TVA Public Site
Wilkerson	Thomas	<p>I am a 15 year annual employee with TVA, currently working as a Maintenance Foreman at Gallatin Fossil Plant. My first 14 years were spent at Paradise Fossil Plant, until Units 1 & 2 were closed and I was directed to transfer to Gallatin or lose my job. I still live in Muhlenberg County and commute to Gallatin each day, a 2 hour drive one way. My hope was to eventually get to transfer back to Paradise, a hope dimmed by the talk of permanently closing Unit 3. My hopes aside, I want to point out some things that would affect this community and the surrounding counties. Our community is still feeling the effects of Units 1 & 2 closing over 2 years ago. If Paradise Unit 3 were to close, it would affect so many people. Immediately some 130 annual employees would lose their job, or like me be forced to transfer to keep a job. This would remove some 12 million dollars, in annual salary from this and surrounding counties.</p> <p>It would also cost coal miners, coal truck drivers, contractors, and school teachers, jobs lost due to a cut in money that TVA gives, in lieu of tax money. Closing Unit 3 would further devastate a county still reeling from the first 2 units closing.</p>		Greenville	KY	42345	TVA Public Site
Williams	Alex	<p>Unit 3 at TVA paradise fossil plant has been one of the best fossil facilities I've worked at , the organization from the employees has been more than we can ask for as a contractor, each and every one of them has went out of there way to help us time and time again. Honestly I believe unit 3 has many years under her belt. And may I add the past fall outage was incredible they money spent to keep this unit going was</p>	Chalmers and Kubeck	Chickamauga	GA	30707	TVA Public Site
Williams	Jarred	<p>To TVA Board</p> <p>I personally witnessed the closing of units 1 & 2 at Paradise. As a member of the community that it is located in, I am concerned about the suronding economy and people. This is the last big industry in this area. The job loos would be unrecoverable for this area. The loss of revinue for the area would trickle down all the way to local mom and pop businesses. You keep bringing up this new gas plant that you built as being a replacement. Not only was it way over budget to build, it only needs a fraction of the people to run. The loss of jobs due to replacing Units 1 & 2 where great and will never be recovered.</p> <p>As a rate payer, due to my power coming from TVA I am very concerned about my electric rates. As already stated above you went way over budget on the gas unit at Paradise. I believe you where at least 1/2 billion over atleast. I guess I will have to help pay for that now along with some of the other things that has been bought in the last few years (jets and helicopter bought buy the CEO). I under stand that things wear out and will need to be replaced, and budgets need to be cut to make ends meet. When you have a CEO that cuts the operating budget only to give himself a raise and buy unneeded luxury items, and calls it progress, It looks bad to the public and rate payers. Not to mention that if you keep removing coal plants from service how dependable will our power grid be. A coal plant is the only true power plant that can store energy in case of a large natural desaster. If the large earth quake ever happens your pipe lines wills be damaged, your nuclear plant will trip off, and some of your dams may be damaged beyond use.</p>		White Plains	KY	42464	TVA Public Site
Willis	Katie	<p>I am a very concerned citizen and teacher of Muhlenberg County, KY. I am concerned that if you close unit 3, it will GREATLY affect our community and families of your employees. TVA not only provides jobs to our community. It also helps our school district provide a better education for our students. The students in this community will be affected tremendously if you close unit 3. Please do not close unit 3. Thank you!</p>		Central City	KY	42330	TVA Public Site
Wilson	Robert	<p>This place supports more then just Drakesboro. But where I live Morton's gap Ky. This power house is needed and I hope it stayes here for much longer</p>	Union local 633	White Plains	KY	42464	TVA Public Site
Wilson	Vickie	<p>TVA is a vital partner in our economic growth of our community. The loss of coal mining jobs has hurt the areas economy. I've seen this with our parent involvement at schools. Mom's that helped with PTA has dropped drastically due to having to find jobs to help support the family. If we lose TVA it's just going to hurt this area even worse. If people don't have money then businesses don't have costumers to buy their products. We've got to do something to keep industry here and not in foreign countries. Help keep Kentucky working, businesses here and families off welfare.</p>	Retired from Hopkins Co. Bd of Ed	White Plains	KY	42464	TVA Public Site
Young	Becky	<p>The closing of unit 3 at paradise fossil plant is a loss to our family, community, and state. The closing not only effects my family personally, because my husband is employed there, but to the school my children will attend, and the life my family has built in the last 10 years, as my husband has been employed there. I know, first hand, of the improvements being made the construction that continues to go on out there even</p>		Dunmor	KY	42339	TVA Public Site
Young	Chandler	<p>I am not representing any organization. I am writing as a concerned Kentucky citizen. Do not close the Paradise Fossil Plant. This would displace the jobs of 130 Kentuckians in Muhlenberg County, Kentucky. As a Kentuckian, I support the coal industry, as it provides us a cheap source of energy and employs many hardworking men and women.</p>		Bardstown	KY	40004	TVA Public Site

Comments Submitted through TVA's Online Comment Management System							
Last	First	Comment	Org/Agency	City	State	Zip	How Sent
Young	Jerad	<p>to whom this may concern,</p> <p>I am writing you to please keep U3 Paradise Fossil Plant Open. Here are the positive and true benefits:</p> <ul style="list-style-type: none">• Coal is vital to the economics of this area.• You can stock pile coal as compared to natural gas.• U3 Powers Logan Aluminum and Warren County.• U3 is now a FLEXIBLE unit swinging load.• U3 has capability of receiving coal by barge, truck, and train.• U3 has performed excellent with the recent upgrades.• Paradise Fossil Plant employees has set world record runs.• The plant currently has an excellent Safety Record.• Employees have had significant Performance improvement.• Coal is still a competitive option compared to nuclear and gas. <p>Thank you for reading. Nothing is impossible with God.</p> <p>Merry Christmas.</p>		Dunmor	KY	42339	TVA Public Site
Yunker	Mary	The Paradise Fossil Plant should be retired. We need to use less fossil fuel to help solve climate change.		Radcliff	KY	40160	TVA Public Site
Zoeller	Stefanie	I applaud your decision to close the coal-fired plant. Maintaining a safe, healthy environment is essential to the growth of our state and country.		Shelbyville	KY	40065	TVA Public Site
		Shutting down Unit 3 would be detrimental to the economy of our county. Muhlenberg County has already taken a very hard hit from shutting down units 1 and 2. TVA employees are not the only people affected by these decisions, every person in our area is. TVA being operational gives jobs to not only employees at TVA but also helps supports our county's economy by bringing income to restaurants, hotels, banks, stores, etc. Closing the Paradise plant would absolutely kill our county. Not to mention, the fact that rates have already gone up tremendously on our power. What you all said we wouldn't noticed, has been noticed.		Beechmont	KY	42323	TVA Public Site
		I am most certain someone more versed could do a better job at this and that most likely my attempts will be futile, but it is worth a shot at the least. As a Muhlenberg County native, who returned home after college to work in our school system, I felt the need to comment on behalf of my students, friends, and community that live here. There are many things I love about Muhlenberg County and many reasons I want to see its success. It is not a place one decides to live in for the amenities, but rather the sense of community is fosters. Very few tight-knit communities continue to exist in America today and Muhlenberg County is one of them. It seems that one-by-one these small communities continue to be destroyed. I often question my decision to return home to an area whose economy continues to erode. It makes raising a small child here feel hopeless. As I watch my students, many of which are living in poverty at the moment, it pains me to think about the loss of yet more jobs in this area. I am then thankful that I have the funds and ability to leave if need be; however, I will not be doing so. I am very much indebted to those who are economically and geographically isolated from the rest of the world. I am aware that our workforce in this area is not highly educated, which I am told prevents industry from locating in this area. Our community has instilled work ready programs for what seems to only prepare our citizens to continue the cycle of leaving due to the inability to find work here. TVA was a beacon of hope for this small community and one of the best paying employers. I know that the closure of Unit 3 will have strong negative impacts and rippling effect on small business here. I would also like to state that I understand and am in agreement with the EPA and need for cleaner sources of energy; however, Unit 3 as it appears in the study presented poses only 'minor' pollutants. I am also aware that the most significant factor in its closing is simple economics. From a business stand-point, I agree this makes sense and is understandable. The need for coal burning units to diversify our energy when gas shortages occur is also very necessary. I would just ask that you please consider the community that has worked diligently to bring in revenue to the company and keep this plant alive for so long. Your study states only 'minor' socioeconomic impacts to the area; however, for the 130 people employed at PAF, coal truck drivers, our schools, and small businesses these jobs are MAJOR income suppliers. I guess my main objective of this lengthy post is to simply ask for our community to not be forgotten. I have heard rumor that another gas unit may be built in another location. I would just ask that you consider reinvesting back into Muhlenberg County with these efforts as a way to combat a small portion of the lost jobs and revenue. Better yet, keep PAF running as we look to new sources to diversify our economy for the future. Help us to become a leader in clean energy, technology for the years that we have supported and helped you successfully burn coal. Help us to see past coal, as needed, and into the future. Thanks for your years of investment and opportunity provided to Muhlenberg County and please don't leave us forgotten!		Greenville	KY	42345	TVA Public Site
	Scott	I think its timed for unit 3 to shut down.		Greenville	KY	42345	TVA Public Site

Comments Submitted through the Sierra Club

First Name	Last Name	City	State	Postal Code	Personal Message
David Blane	Newberry	Clarksville	TN	37043	As a member of CEMC I want you to be constantly planning and moving toward cleaner and greener energy. Thank you for all you
Linda	Myers	Knoxville	TN	37938	Climate change is the number one threat to our world today. We have a very small window of time to slow, mitigate or even reverse that threat. We are already suffering the devastating effects; they are coming quicker than anticipated. Retiring these two coal units and transitioning to clean energy is a major step to protecting our local environment, which, of course, contributes to the world environment. I encourage TVA, with all my heart and soul, to stay the course, make the transition to clean energy happen and happen quickly. Retraining of TVA employees and the workers of the affected communities for jobs in the clean energy industry should be part of this package. Please see to their immediate welfare, as well. Thank you for taking this significant and positive step for all of us.
Dorothy	Swann	Columbia	TN	38401	Yippee! thank you for being responsible and acting to protect our future.
Thomas	Morris	Bowling Green	KY	42104	As the threat of climate change becomes more urgent by the day, please do the responsible thing for all of our children and grandchildren, and accellerate the move to renewable, green energy sources. Tom Morris
David	Riall	Chattanooga	TN	37412	This is just common sense!
Dennie	Kirtley	Nashville	TN	37211	In many ways, Tennessee is a paradise full of natural wonders. The more we can do to lessen our footprint on the environment, the better things will be for children and grandchildren. Retiring these coal units should also be accompanied by a real effort to provide a just transition to TVA employees and the surrounding communities, so that all will benefit as we move to clean, reliable, low-cost energy in the Tennessee Valley. Thank you for your consideration of my comments. Sincerely,
Jennifer	Powers	Kingsport	TN	37660	Let's do what is right to make everyone, including the environment, healthier.
James	Butler	Smyrna	TN	37167	Coal is the past, it is dirty, hazardous to obtain and leaves lasting damage. Move to sustainable, clean energy for our sake and the children's sake
Linda	Sammataro	Knoxville	TN	37919	Please listen to the many millions of Americans who abhor using dirty fossil fuels in this time, when it is abundantly obvious that they are poisoning our air and water. Renewable power is necessary immediately.
Edward	Jepson	Knoxville	TN	37923	Please, instead of being an obstace, I beseech you to act as a leader in this crucial period of transition away from fossil fuels. Not only are we, as a society, depending on you, but so is TVA itself, as renewables are the future.
Gloria	Cash-Procell	Huntsville	AL	35803	Move away from fossil fuels.
Nancy	Neilsen	Maryville	TN	37803	Living in the Knoxville area these last 30 years, I have noticed a distinct improvement in the air quality, especially in the summer. We must make decisions to continue to improve the air we breathe. It is economically in our favor to do this.

Comments Submitted through the Sierra Club

Laura	Humphrey	Knoxville	TN	37901	In addition, I prefer cleaner options to replace any needed generation from coal plant closures, such as solar or wind. I would like to see TVA adopt some options for hydro-solar projects considering all of the hydro production in its service territory. Or further demand-side management by providing more options for energy efficiency projects could help lower TVA costs and need for additional generation. These types of innovative projects should be what TVA is known for rather than legacy wastes from coal damaging our communities in the southeast. These options are also highly preferable to me instead of further gas plants. Although the legacy wastes aren't an issue with gas, the damages to the environment from fracking cannot be ignored. To me, "natural gas" is anything but "natural."
Lara	Miller	Knoxville	TN	37923	Move forward, not back.
Thomas	Haehn	Nashville	TN	37216	Even if Energy becomes more expensive, we need to understand that we can't continue to pollute the planet and expect to live on it. There will be a price to pay, and I rather pay with money now, than with human life later.
Todd	Waterman	Clinton	TN	37716	I believe we have a responsibility to future generations to protect them from the devastating environmental and economic impacts of CO2-intensive coal. I live a couple miles from Bull Run, and I also worry about the soot I often see coming from its scrubber and the coal ash sitting in the middle of Melton Lake. It is cheaper already to build a new solar installation than to run antiquated coal plants like Bull Run and Paradise. Thank you!
Sylvia	Percy	Columbia	TN	38401	Coal is just too dirty to burn especially in large quantities.
Bethany	Harrell	Unicoi	TN	37692	I want people to be able to breath cleaner air and drink cleaner water. I want our area to be ahead of the curve on renewable energy to remain competitive in the energy market.
Mary	Landrum	Franklin	KY	42134	This is long past due and very needed, thank you.
Dodd	Gaslbreath	Nashville	TN	37204	I am particularly concerned about our region's inability to compete with cleaner regions of the world and country. Future citizens and investors will move to clean energy regions. Lets get started now by retiring these dirty plants and adding clean, local systems that are not fossil fuels nor vulnerable to Earth quakes and 1000's of years of nuclear decay as are small modular nuclear plants.
Scott	Banbury	Memphis	TN	38107	We want clean energy now!
Andrea	White	Smyrna	TN	37167	I am a kayaker. Kayakers and folks who enjoy water sports have a particularly poignant appreciation of water quality since we end up having inadvertent out-of-boat experiences and end up consuming that water. Coal ash is the enemy of clean water.
Steve	Perkins	Huntsville	AL	35803	I would LOVE to see TVA take on a LEADERSHIP role in phasing out all Fossil Fuel Plants and systematically replacing them with sustainable green energy sources! I know this cannot magically happen overnight, but with a well planned approach, TVA could proudly show the rest of the Nation how to transition to green energy over a reasonable timeframe! The time has come for ACTION!
Michael	Pardee	Knoxville	TN	37919	As a KUB customer and resident of Knoxville, I urge you to make every effort to transition to more use of sustainable, non-polluting and environmentally friendly energy sources including wind, sun and water.
Jerry & Debbie	Brown	Lewisburg	TN	37091	We should catch up with rest of the country and most of the world. Let's invest in clean energy.
Alicia	Portillo	Dyersburg	TN	38024	We need cleaner air.
Richard	Heinsohn	Nashville	TN	37206	As Tennesseans, I say, Let's be part of the solution to climate change and move quickly to clean up our state, rather than dragging on as part of the problem when clean jobs and energy are an absolute imperative for our future. Climate change already poses dire consequences for everyone on Earth, but we can make a difference if we act now. Shut it down! Coal is a major part of the problem! Thank you, Richard heinsohn

Comments Submitted through the Sierra Club

Liane	Russell	Oak Ridge	TN	37830	I live close to the Bull Run coal-fired plant, and would love to see it retired as soon as possible -- the huge coal pile gone, coal ash no longer a problem, and, best of all, knowing that a major part of the power TVA supplies will be generated by clean technologies (which generate jobs) in lieu of adding to the greenhouse gases that spell doom to life on our wondrous planet.
Edith	Chapman	Huntsville	AL	35805	Please make our air cleaner and our water safety a priority in getting rid of dirty coal. If you retire the Bull Run and Paradise power plants that you will help the people that lose their jobs to retrain for new jobs as well. Thank you for considering this. Mrs. Edith Chapman
Charles	Gee	Brentwood	TN	37027	I lived in Oak Ridge for almost 10 years between exposure to radiation in DOE plants and spewing of harmful particulates from Kingston and Bull Run steam plants it is no wonder that the rate of cancer cases in the region was far above the National norm. Clean up the Tennessee Valley with cleaner forms of energy now!
Brian	Inzer	Owens Cross Roads	AL	35763	A SHIFT TO RENEWABLE POWER IS NOT AN OPTION.. FAILURE TO MODERNIZE OUR POWER SYSTEMS WILL MEAN A FAILURE OF THIS COUNTRY TO COMPETE ON THE WORLD STAGE...
Cyd	Hamilton	Sevierville	TN	37876	This would be an economically more viable choice in the short- and long-term for TVA. Saving money in reduced future environmental mitigation settlement costs, savings in terms of potential future CAA violations (under a different administration) are two examples that readily come to mind.
Jacob	Doss	Good Hope	AL	35057	Since childhood, it has been my understanding and impression of TVA that you work to produce power in harmony with and with the least potential negative impact to our local environments. Thank you for taking the initial steps to improve upon these antiquated and highly inefficient production systems, but please continue to address current and future issues with the same commitment to science and our environment that guided the earliest decisions of TVA founders.
Colleen	Sheppard	Nashville	TN	37203	This is so important. Please don't ignore the importance of your following through pulling away from coal.
Sharon	Holmes	Elizabethton	TN	37643	I am a fourth generation East Tennessean who has dealt with TVA. My life and certainly my ancestors lives have been both improved and greatly diminished by the work of TVA in East Tennessee. While the family land that I should have inherited sits under a lake, I realize that TVA did bring electricity to my area. At such a cost to the poor families of our area. Please don't do this again. Please be the forerunner in your industry to bring the best energy possible to all of the world. I want to write a letter to my children that will finally praise TVA for correcting the horrific errors they made generations ago. Please do the right thing. There is no more beautiful place than East Tennessee. Your actions will keep the Eagles flying, the Herons fishing in the rivers and the air clean for breathing. Thank You
Art	Collier	Big Sandy	TN	38221	When the Johnsonville, TN unit was retired decades of pollution that came down on my parents who lived there finally stopped. No more did the finish on their cars rust out early and clothes could be hung out to dry without dingy yellowing. With natural gas at historic lows it is time.
Carol	Helms	Morristown	TN	37814	There is no future in coal. Solar can provide jobs and safe for the environment.
Kent	Gardner	Elizabethton	TN	37643	Coal is an obsolete energy source, time to switch to renewable forms of energy that don't make hazardous waste like coal does.
Robin	Happel	Bronx	TN	37604	Phasing out coal plants will help improve air quality and make our communities healthier and more resilient. Renewables typically come back online much faster than coal after major storms, which is a major issue for me after watching my family and friends weather Florence this past fall!
Kimberly	Barnes	Ringgold	GA	30736	The Tennessee Valley is one of the most beautiful places and as a healthcare provider, I see people every day that have suffered the long range consequences of decades of pollution. It's time to invest in the environment and our communities to make the clean and health!
Lindy	Kewatt	Huntsville	AL	35816	Please think about going clean so your great grandchildren can still breath good air.
Barbara	Hollis	Bristol	TN	37620	Because I am a mother and grandmother, I am concerned with the environmental issues involved with coal. I would like a cleaner enviornment for my family than we have now and phasing out coal would be a step towards that goal. We can't just live in the present; we need to plan for the future.
Dianne	Doochin	Nashville	TN	37215	Fossil fuels are in the same category as their source, fossils, as they are dead and no longer useful. Wind and sun are the clean, reliable, low-cost fuel sources of the present and future.

Comments Submitted through the Sierra Club

Thomas	Hanks	Franklin	TN	37067	Please continue to be leader in nation's utility industry for innovative practices and the advancement of electricity generation in the 21st century by eliminating coal-fired plants. It will help stop much of the TVA's water and air pollution problem and lower our region's contribution to CO2 production and global warming.
Christopher	Brooks	Knoxville	TN	37919	The recent revelation of how toxic coal ash is to workers and the leakage of toxic chemicals into groundwater near the coal ash site in Kingston are excellent reasons to retire this dirty and outdated technology.
Diana	Page	Nashville	TN	37221	Coal should be left in the ground. Every step of coal use is expensive to people and to the the environment. There are dramatic and quiet examples of these costs. The sooner we move away from coal use, the better for all.
Andrew	Gay	Hohenwald	TN	38462	There are a limited amount of natural resources. I know it will impact negatively in the short term, but it will be worth it in the long term.
John	Guenst	Franklin	TN	37069	It would help my breathing along with patients I treat if we can close these plants. Thanks for considering all the positive outcomes along the monetary savings by stop burning expensive coal
Rickey	Westbrooks	Hohenwald	TN	38462	STOP THE FOOLISHNESS!!!
Ray	Buttram	Mc Donald	TN	37353	We must all be responsible for our environment as producers and consumers. Our children and grandchildren are counting on us to be mindful of our legacy and to instill in them an appreciation for innovative and proactive conservation.
Margaret	Mann	Clarksville	TN	37043	The Ash spill in Kingston and deaths, illness caused by it and cleanup,,,not good! Now ash from New Johnsonville being added to Cumberland City...what about the health of citizens in the area in Alabama where the ash from Kingston dumped.
Stephen	Best	Tellico Plains	TN	37385	Coal and it's waste is an environmental disaster. Please shut your coal plants down And focus on clean energy and I do not mean Nuclear energy.
Stephen	Verran	Oak Ridge	TN	37830	Honestly, in view of the recent climate report, how can you not end fossil fuels? People actually have been and are dying from lung, heart and allergies. Not to mention black lung. People are dying from climate change! WE ALL have to make hard decisions and make changes to save lives!
Rebekah	Gienapp	Memphis	TN	38104	As a Tennessee resident I'm concerned about pollution in our state.
Genie And Bob	Mccombs	Kingston	TN	37763	After living through the largest coal ash industrial spill in History in 2008, we believe it is time to move away from coal plants. Please give this serious thought. Thank you.
Gregory	Lane	Memphis	TN	38115	Explore wind, solar and geothermal solutions ... well before any fossil solutions!
Adrian	Parker	Lenoir City	TN	37772	CLOSE OLD COAL PLANTS !!!
Harriet	Elder	Nashville	TN	37221	And like many others I have asthma which is increased with dirty air like coal. Please retire old coal
Kent	Gardner	Elizabethton	TN	37643	Coal makes a hazardous waste in the air and the burnt byproduct. Time to use renewable energy as a primary source of energy.
Michael	Hollis	Huntsville	AL	35803	The time to do,something is now! And closing these two plants is the right thing to do.
Donald	Keyser	Johnson City	TN	37604	I totally support the retirement of dirty, inefficient coal plants.
Barbara	Kelly	Chattanooga	TN	37412	While closing these costly plants will make a difference to us as rate-payers, I want to point out the savings that will also come to us from better health from less air pollution. Less hospital visits and their bills from asthma, less money spent on medicines, etc. etc. It makes such sense to close them and move to clean energy, which is cheaper and reliable.
Lee	Radford	Birchwood	TN	37308	We will be adding solar to our house to help!
Margaret	King	Cunningham	TN	37052	Not only are you helping Climate Change; you could be saving someone's health, starting with your Employees and the people that live nearest to your plants. Thank-you again for Seriously considering these shut downs. Sincerely; Margaret B King

Comments Submitted through the Sierra Club

Laura	Thurman	Oak Ridge	TN	37830	My childhood home was exactly one mile from the Kingston Steam Plant, now known for the horrific coal ash spill. We need clean energy now! We have the technology for wind and solar energy now. We need to overcome the gross ignorance of those who insist on jeopardizing the environment we have to live in with the continuance of dirty coal fossil fuel energy!
Tina	Tine'	Knoxville	TN	37919	Our future depends on renewable energy, and the time to switch is NOW!
Mary Lou	Durham	Nashville	TN	37204	Coal is the wave of an expedient and ultimately dangerous past. It is time to move beyond coal into energy, and less of it for all of us, that is less destructive to the environment as it is gathered and utilized and the waste of which is itself much less toxic.
Ede	Pyle	Nashville	TN	37201	Coal is not the answer to our energy needs! We have cleaner alternatives.
Sonja	Hunter	Lebanon	TN	37090	We need to switch to clean energy. This is a health issue as much as an environmental issue!
Mary Ann	Crowe	Crossville	TN	38571	Procuring the coal is the first assault on the land, and burning it is the second. TVA can be on the right side of history by moving forward, never looking back, and doing the right thing for the health of the Earth and humankind.
Richard	Tittle	Kingsport	TN	37663	I live it, breathe it. Get rid of the coal. Tennessee Eastman Chemical Plant did in Kingsport, Tennessee. They converted to Natural Gas, cleaner AND less expensive!
Shelia	Mulroy	Louisville	TN	37777	As a mother and grandmother I want to see clean energy being used to protect the environment for our future.
Larry	Dunn	Cleveland	TN	37312	My own COPD compels me to request more effort by TVA, my employer in the 80's, to rapidly add clean, renewable fuels and drastically reduce coal-burning.
Ross	Dawson	Franklin	TN	37064	This is an issue that our family cares deeply about. I became a father this year and it's time we started thinking more seriously about the future of our children. Please help make Tennessee an even better place to live! Thank you
Harry	Bryant	Dandridge	TN	37725	With climate change finally being accepted by most thinking people it is high time that we take positive action to accelerate the transition to clean energy away from carbon based energy. TVA is in a position to make this happen.
Susan	O'Connor	Cookeville	TN	38506	We have opted to pay extra each month for energy generated by wind. My husband and I are committed to supporting clean energy.
Phillip	Huber	Cookeville	TN	38506	Despite the many attempts to politicize the issue of global warming, it is a threat that has become all too clear in the past few years. We all need to band together to save the future of this planet and I hope the TVA will recognize the dire need to do all they can in switching to clean reliable energy sources. I live in the beautiful state of Tennessee and would love to see this beauty preserved for the next generations.
curt	rookard	Oak Ridge	TN	37830	my family heritage is coal mining for 5 generations, and i want paradise shutdown, and bull run kept at minimum load for grid emergency. i have installed 3.4kw solar and am installing another 6.6kw on the roof of home. tva should get smart and start building solar farms with tesla power banks, additionally have tesla power banks at every single 24000 to 2400 substation in your entire grid, the future is solar, wind and hybrid vehicles, get prepared for it, all of america will be like hawaii's grid, get ready its coming whether you like it or not
Pam	Wallace	Greeneville	TN	37743	Our planet is suffering and needs our help!
Lorene	Nelson	Lenoir City	TN	37771	Killing our environment please stop
J Paul	Moore	Nashville	TN	37221	We must take action to retire coal units. Clean Green energy is the way!
Glynnna	White	Harriman	TN	37748	My concern is to protect the environment and produce lower cost of energy
Chet	Hunt	Knoxville	TN	37922	Please lead us to a clean energy future.
Ron	Shrieves	Knoxville	TN	37938	It's imperative that we move away from fossil fuels as rapidly as possible. Not to do so just invites greater disaster levels as climate change accelerates.
Michael	Jones	Kingston Springs	TN	37082	I need to see that even though the federal government is accepting NO responsibility in dealing with climate change it is my hope that local businesses governments and yes, TVA, are ready to do whatever is necessary to deal with this critical problem. In other words, CLOSE BOTH PLANTS!
Sarah	Rowe	Nashville	TN	37215	Please help the Tennessee Valley shift to cleaner energy, such as solar or something else, before it's too late!

Comments Submitted through the Sierra Club

Alice	Crocker	Ringgold	GA	30736	As someone who was born in West VA I know no such thing as clean coal. It fouls the air and water.
Kenneth	Bivin	Chattanooga	TN	37405	I feel the pollution issue is one of the most important today, especially for my children. We need to begin acting positively now to ensure the future of our planet.
Gloria	Griffith	Mountain City	TN	37683	Please decide to retire either or, better yet, both of these coal plants.
Hugh	Thomforde	Crossville	TN	38571	The recent 4.4 earthquake centered near Spring City and only a couple of miles from a TVA nuclear power plant prompts me to urge TVA to shift away from both coal AND nuclear power. Despite Trump and other climate change deniers, we must act responsibly in the face of dire consequences for future generations.
John & Pamela	Piccirillo	Huntsville	AL	35801	The message above says everything I feel better than I could express it in other words. Please retire the Paradise and Bull Run coal units!
Linda	Hardy	Nashville	TN	37221	As a mother and hopefully soon-to-be grandmother, I am deeply concerned about the health of the planet we are leaving for our children and grandchildren. Closing these plants would be a step towards providing a healthier earth for them, which I see as an act of love for future generations. Thank you.
Sherry	Knowles	Signal Mountain	TN	37377	Do it TVA! Make us proud. We cannot turn a blind eye to the consequences of unclean air and a carbon glutted climate.
JoAnn	McIntosh	Clarksville	TN	37043	Thank you for moving forward on these plant closures. In light of the latest IPCC report, your leadership in environmental stewardship is vital and much appreciated.
T	Komp	Nashville	TN	37215	You can do the right thing here.
Barbara	Snell	Gallatin	TN	37066	and Gallatin by ?????
Leslie	Forbes	Huntsville	AL	35801	The recent results of climate change reports have put before us a very grim future for our children. Please don't ignore the scientific results! This is your chance to try and ensure a future for the human race!
Margaret	Beehan	Nashville	TN	37212	Please clean up our environment.
Dana	Stevens	Sevierville	TN	37862	It is time to end reliance on coal plants. For the health of our environment and human beings.
Cindy	Hintz	Johnson City	TN	37604	We need to be serious about slowing and reversing climate change, and a big part of that requires replacing dirty fossil fuels with clean sources. While clean air and clean water are good for all of us, we need to move the workers in the dirty fossil fuel jobs to new jobs as well. They should not be punished as we move toward cleaner energy.
Cassie	Whited	Wartburg	TN	37887	We need to focus on the long term effects coal burning does to our environment. Our world needs you to make the right decision
Cassandra	Gronendyke	Cookeville	TN	38506	I am proud that such a large percentage of the energy I purchase through TVA is from nuclear or renewable sources, but it is not enough. TVA must be a leader in the transition away from fossil fuels, and phasing out old, dirty, and expensive coal plants is a common-sense way to progress.
Gordon	Schaeffer	White Bluff	TN	37187	The United States needs to focus on cleaner, renewable energy sources.
Carol Michler	Detmer	Murfreesboro	TN	37130	As someone who is extremely sensitive to chemicals and air quality, transitioning to clean energy has a significant impact on my quality of life, as well as length of life. And there are many children and adults who share my sensitivities. In addition, I believe we owe our children and grandchildren a sustainable world. Solar and wind are sustainable, but coal and oil are not over time. Movement to sustainables allows for creation of jobs in the clean energy sector. With training, many can move from unhealthy to healthy jobs.
William	R.	Huntsville	AL	35814	Please switch to cleaner energy.
Carol	Martin	Nashville	TN	37220	We need cleaner air for our grandchildren. I hope other resources like wind can supply energy.
Tristian	Reaves	Athens	AL	35611	It would be a great step in the right direction. Coal is a finite resource that you have to search for by environmentally harmful means. Sun and wind can be found daily without much effort, and without destroying an entire ecosystem.
Cathy	Probst-Walker	Crossville	TN	38572	We need to stop coal production as it is extremely detrimental to environment. We need to embrace green energy and put our focus on that. As evidenced by coal miners getting black lung, it is not "clean" or SAFE. We must try everything to stop contributing to global warming as there will be a point of no return.

Comments Submitted through the Sierra Club

Roberta	Stahl	Readyville	TN	37149	<p>Dear TVA Directors,</p> <p>I am the great-grandmother of three. I worry every day about the quality of air that they breath and how bad will it get by the time they are grown. Shutting down Bull Run and Paradise will be a big step in the quest for clean energy. If you have children, grandchildren and maybe even great-grandchildren and you care about them as much as I do mine, there would be no question as to wheather these mines should be shut down.</p> <p>Thank you, Roberta Stahl</p>
David	Kalb	Bristol	TN	37620	Please dump coal as a fuel source. There are many better and greener options. MAKE it work.
Megan	Spooner	Chickamauga	GA	30707	<p>The climate crisis is here and the TVA must innovate and make responsible for choices because it is a public entity. Do the right thing and be a vanguard for the future. PLEASE!</p> <p>--Megan Spooner Chattanooga, TN</p>
Katherine	Sewell	Madison	AL	35758	As an environmental scientist, outdoor enthusiast, and parent, I urge you to protect our air and water quality by phasing out these dirty, expensive power plants and bring the TVA into a better future. We don't need another Kingston. We don't need kids missing more days of school due to asthma or more adults suffering from cardiac events due to air pollution. We don't need to risk our surface and groundwater. Better solutions are ready to deploy, and I urge you to move forward with clean energy.
Sandra	Pulley-Chapman	Millington	TN	38053	We need clean air! Let go of fossil fuels and embrace sustainable energy!
Janice	Kemp	Townsend	TN	37882	As a resident of East Tennessee, a grandparent, and an ardent fan of the GSMNP, I can not help being concerned about air & water quality, as well as, climate change, and their effects on national treasures such as the GSMNP and the health of future generations. We need to face these issues and take immediate action to mitigate these issues by closing old and inefficient and polluting power plants!
Cris	Corley	Lebanon	TN	37087	I personally have a cabin downstream from the Gallatin Steam plant. A lot of my neighbors are concerned about the massive coal ash ponds that are leaking into the Cumberland River. We hope this plant will be closed in the near future.
Marilyn	Finley	Maryville	TN	37803	Isn't it about time Tennessee showed true leadership in clean energy? It has a proud history of being an energy leader.
Trish	Marshall	Nashville	TN	37214	TVA should adapt to using clean energy and stop taking carbon from the ground. Unnecessary!
John	Crittenden	Sevierville	TN	37876	There is no such thing as "clean coal". Coal ash is toxic and people are dying from exposure to it. Carbon dioxide emissions are bringing the planet to the verge of catastrophe. We must reduce fossil fuel use before it is too late.
Steph	Gunnoe	Knoxville	TN	37920	As a Palliative Care professional in the TN Valley, I am familiar with the morbidity and mortality of the Kingston Coal Ash spill clean-up workers. I support TVA in their endeavors to move away from fossil fuels and hope they can lead the way to a healthier energy future for the USA. Thank you for your important work in this tough issue.
Mary	Moore	Clarksville	TN	37043	Clean energy will have great benefits for our citizens (less exposure to air and water pollution) and for our workers - good new jobs in a growing industry. Many coal miners in the Appalachians have serious respiratory diseases resulting from their work exposure. I encourage TVA to close the old coal powered plants and look to the future.
Justin	Higgs	Nolensville	TN	37135	Decommissioning the Bull Run and Paradise coal units is an important first step in TVA's transition to modern, sustainable energy to power Tennessee and Kentucky through the 21st century. In a world where energy has become politicized by special interest groups, we have forgotten that the TVA brought low cost energy and economic development to the south following the Great Depression. Unfortunately, we are still relying on the same 1960s era power plants and missing out on a revolution in clean power generation. It's time for the TVA to lead the power industry again by replacing aging and inefficient assets with newer, cleaner alternatives. As a professional engineer and TVA ratepayer, I fully support the on-going decommissioning of coal fired facilities.
Sally	Brown	Oak Ridge	TN	37830	In addition to the environmental pollution aspects of coal, it makes no economic sense to continue using coal when there are less expensive new energy options available.

Comments Submitted through the Sierra Club

Jennifer	Ellis	Clarksville	TN	37043	I travel frequently and I am always thankful for the beauty of this state. It has been my home for decades, and I want us to do everything we can to keep it beautiful and inviting for both Tennessee residents and tourists!
Joe	Schiller	Clarksville	TN	37040	I urge TVA to expand its efforts to transition away from coal completely by adding more renewable energy and redoubling its energy efficiency efforts.
Sue	Williams	Memphis	TN	38112	Solar means jobs.
Joshua	White	Ocoee	TN	37361	Please make the smart choice for your rate payers and our environment and transition away from these inefficient, expensive, and outdated coal plants to smarter nuclear baseload and renewable energy production.
Patricia	Papachristou	Memphis	TN	38111	I wish you would speed up their retirement and hasten the day for TVA to earn the title of renewable energy champion in the US, instead of the champions of dirty coal. In Memphis TVA continued to burn coal for as long as possible before turning to building a natural gas plant, even though a solar plant would have been much cheaper in the short run and long run. Let's hope TVA doesn't make the same mistake again ! Pat Papachristou, Memphis, TN 38111
Laura	Lopez Heckhausen	Knoxville	TN	37919	TVA can be a beacon to the state and country that says it has a consciousness about keeping our state green and beautiful. TVA can be formidable as an entity that supports climate change and is working toward saving our environment.
Deanna	Bowden	Brentwood	TN	37027	You have a responsibility to begin to really move our power generation away from fossil fuels. I've attended TVA board meetings and heard board members and high ranking employees say explicitly that coal is becoming more expensive all the time over time, and renewables are becoming more efficient and affordable. The TN valley should not be LAST in energy development.
Lisa	Stalnaker	Knoxville	TN	37932	As a citizen of West Knoxville, I urge you to go through with the closing of Bull Run. The world is moving on from coal, and we need to move with it. The time is now to address the real threats of climate change and take actions to stop its progression.
Dale	Visser	Oak Ridge	TN	37830	I would ideally like to see renewable investment, or nuclear, in order to greatly reduce CO2 emissions.
Rachel	Swinney	Knoxville	TN	37920	I want to be using clean energy...not fake clean coal that removes our mountaintops. Further, we need you to be educating and creating incentives for energy users/the public to want to use less energy. Clean energy sources won't replace all the dirty ones we use...because we use too much. We use more than our share in this country. It is past time, to cut our consumption.
Mark	Bishop	Clinton	TN	37716	As a retired TVA employee, I am grateful for what TVA has done for me and everyone in the Tennessee valley. I had an office at the Bull Run plant, and was very proud to work at one of the most efficient coal plants in the world. But we are now on the steep curve of the exponential advance of climate change. We must rapidly get away from fossil fuels for our electricity. There will likely be some extra initial costs in moving to clean sustainable fuels, but in the long run, it will put TVA in a very competitive position. Please choose to embrace sustainable, clean energy as soon as possible. Thanks for your years of good service.
Joel	Fairstein	Oak Ridge	TN	37830	Please, Let's get rid of coal-fired plants, for our children's health.
Audrey	Williams	Knoxville	TN	37932	Hi, My family has been in coal mining in the past but I know that it is not the sustainable solution we need for our always increasing energy needs. The best thing TVA can do for its service area is increase clean energy and be a leader in sustainable options and reducing energy demand with efficiencies.
Chet	Hunt	Knoxville	TN	37922	Please do not invest anymore in obsolete energy production. The age of fossil fuel is wanning and we must position ourselves for the inevitable transition to clean energy. More solar, wind and non carbon sources is what we need to invest in.
LYDIA	PULSIPHER	Knoxville	TN	37914	I am the widow of a one-time TVA chief economist. He was always concerned about TVA's lack of attention to pollution responsibilities. Please see if you can't clean up TVA's record, now.
Carol	Montgomery	Concord	TN	37934	Clean energy is so important to our health in E TN. And will make money for TVA in the long run. Please take notice of this.
Ron	Buck	Memphis	TN	38117	Go solar. Clean and reliable.

Comments Submitted through the Sierra Club

Alice	Feldman	Oak Ridge	TN	37830	It is shameful how regressive TVA has been in manufacturing clean energy for so many years. Even aside from the disastrous coal ash spill, coal mining continues to cause black lung disease and to endanger the employees. Coal burning pollutes our beautiful valley with fly ash and to harm the residents of the area. It is long since past time that we discontinue the mining and use of coal to produce energy. Coal mining companies should already be well on their way to developing clean and renewable sources of energy for the residents of the Tennessee Valley. I applaud TVA's decision to retire these coal units, and I urge you to continue on this course without further delay. The people of the Tennessee Valley deserve a clean environment and clean energy.
Maureen	Lorenzen	Rocky Top	TN	37769	As a member of the health care profession I also believe that the cost to workers' health is too high. Jobs are healthier and competitive in renewable energy and the long term cost would be lower than that of caring for disabled mine workers.
Neranza	Blount	Knoxville	TN	37931	I see the constant smoke billowing out from Bull Run every day as I live near by. It's time to display an effort in helping us live on a clean planet. It starts here at home. Be praised for your example and lead the way to encourage others. Our children, grandchildren and future generations require it. Thank you!
Melanie	Harless	Oak Ridge	TN	37830	We need to do this for our children and grandchildren.
Jeremy	Cifaldi	Memphis	TN	38112	Sustainable, carbon-free energy is the future. Please close Bull Run and convert to renewables.
Carol	Smith		TN	37849	I agree that we have to move toward cleaner energy. We are destroying our planet, and scientist are making this clear...change has to happen.
Todd	Waterman	Clinton	TN	37716	It's ironic that Oak Ridge, the home of world-leading research on climate and renewable energy, must still be powered by antiquated coal, the most polluting energy source of all. We and TVA are responsible for Bull Run's annual 2,993,904 tons of CO2 - an irrevokable environmental and economic curse on ourselves and every human to come, as this recent cost-benefit analysis in Nature makes starkly clear: https://www.nature.com/articles/d41586-018-05219-5
Cheryl	Myers	Clinton	TN	37716	Living near Bull Run my whole life has been a sad window into the reality that our world is not clean. Make a difference. Do better because you know better. Because the educated scientists among us know the reality.
Debbie	Painter	Powell	TN	37849	When I used to travel to West Tennessee as a state employee, I was always discouraged when I returned east and began to see the darker sky about the time I reached Kingston. As a person with allergies and breathing issues, I would love to see our air as pure and clear as possible. That could add years to my life.
Allison	Wolf	Oak Ridge	TN	37830	I live right near the Bull Run power plant, and worry about the air around here. My husband is asthmatic, and his asthma has worsened since we moved here. I'm also concerned about the possibility of coal ash spills. We have so much pollution here in Oak Ridge from power production and from the Manhattan Project! I'd love to see us move towards cleaner power sources, and there's a lot of enthusiasm for cleaner power here in Oak Ridge proper.
Sue	Chard	Portland	TN	37148	To end the fossil fuel industry is to finally step out of the past and into the future.
Tanner	Jessel	Knoxville	TN	37917	We need to move away from coal. The sooner the better. Please invest in renewables. China is testing floating solar panels. Seems like a good fit for TVA with its many reservoirs.
Barbara	Bridges	Knoxville	TN	37918	We only have a limited time to act if we are to prevent the worst impacts of climate change within our region and globally. We MUST divest completely from Fossil fuels NOW. Keep it in the ground!
Laurel	Bowen	Powell	TN	37849	As a grandparent, I feel it is my job to provide a safe, healthy, resilient world for my grandchildren. We need to sacrifice now for their future. But I also feel that jobs in the new clean energy industries are what we need now to grow our economy and provide for our young people.
Leigh	Garrett	Powell	TN	37849	It is time for clean energy! Please close Bull Run and Paradise coal units. It is the responsible and right action to take!
Randal	Graham	Knoxville	TN	37932	I am particularly concerned about the coal ash storage problem, in view of what has happened before. I am also in favor of breathing clean air, and not having our mountain views fouled by coal fired power plants.
Jill	Salmen	Oak Ridge	TN	37830	Clean energy is the future.
Gerry	Moll	Knoxville	TN	37917	Any nuclear plants that we could shut down along the way would also be welcomed.
Mary	Headrick	Maynardville	TN	37807	Coal is dangerous to our health and to our planet. I am leashed with the proposal to retire these two plants.

Comments Submitted through the Sierra Club

Hope	McAtee	Oak Ridge	TN	37830	I am a resident of Oak Ridge one town over from Clinton. With a teenage daughter and our use of Melton Lake and Clinch River with our kayaks we are extremely aware of the possible environmental impact that Bull Run does and could have in the future on our local area. I would like to look for more innovative and clean energy options. As a resident of the Secret City I believe there are better options available long term to protect the beautiful outdoors, our water table, lakes and rivers. Green energy is the future and we need to be a part of ours growth in our area. Please take our future into consideration. Hope McAtee
Connie	Myers	Oak Ridge	TN	37830	We need clean energy.
Will	Kidd	Knoxville	TN	37923	Please stop using coal
Joni	Pinker	Knoxville	TN	37909	Sooner is better, for all of us.
Sam	Dornan	Franklin	TN	37064	Climate change is very important to me. As a Tennessee resident who receives power generated by TVA, I want the power I use to be renewable and not affect our climate.
Sarah	Wilson	Somerville	TN	38068	Sarah Wilson
Patti	Oliver-Moseley	Lancaster	TN	38569	Let's step into the future like other countries have to protect our natural resources with clean energy.
Katie	Herzig	Nashville	TN	37212	We have so little time to phase out fossil fuels in order to save this planet from catastrophic climate change. The only time to start is now and I am so encouraged that TVA is going to possibly phase out coal. Other states have shown us they are committed to clean energy and we must rise with them. Anything less than 100% clean is not enough in my opinion. thank you.
Garry	Ballard	Nashville	TN	37210	Planning for a true 21st century energy system should only include green sustainable energy production technologies.
Tommi	Stephenson	Nashville	TN	37218	If there is danger in the waste, that is not a viable energy source. It's time to stop punishing solar and start serious incentive programs. It's time to invest in wind and hydro. Tennesseeans deserve better.
Amber	Lee	Brentwood	TN	37027	I want my children to be able to grow up and breathe clean air. I want there to be a healthy planet in 50, 100, 1000 years from now.
Beverly	Morris	Chattanooga	TN	37419	Please make Tennessee a leader for clean energy. Many solar plants are starting to pop up, and I am in favor of this source.
Joe	Alegre	Chattanooga	TN	37411	As a person who lives in TVA country and has worked for TVA in the past ...I want TVA to be a beacon of clean energy initiate going forward and the removal of two coal powered plants is a good opportunity to shine.
Ruth	Songer	Fairview	TN	37062	Our children are in need of clean energy!! Even yours!
Mary	Jenkins Kline	Smyrna	TN	37167	We need to have clean energy it's available now Geothermal and solar panels and in some areas Wind Mills. I own a building in Nashville and have had all of the above with exception of the windmills. We have saved so much money and energy All you have to do is decide now is time for Change
Patrick	Ferrell	Nashville	TN	37204	Coal is not only no longer economically viable, but we have a moral obligation to transition to clean energy as soon as possible for our children
Mayme	Siders	Clarksville	TN	37043	In light of the most recent reports on climate change I believe it is IMPERATIVE that coal plants be phased out as soon as possible. Please vote for future generations by shutting these down now -
Brian	Paddock	Cookeville	TN	38501	Actually sooner would be better. The costs and dangers of coal ash landfill isolation and the clean up of legacy ponds is already in the Billions. The sooner TVA stops making this toxic ash to more we will save. If TVA would encourage more small scale solar installations, which are paid for by home owners & small businesses, the quicker we get to energy that is free of fuel costs & dangerous wastes.
Janice	Saylors	Rock Island	TN	38581	We moved to Tennessee because we love the beauty of this rural area. Preserving this beauty and a healthy environment for the next generations should be a primary objective of the TVA.
Sharon	Lyons	Allardt	TN	38504	We need clean in our home stay!!!!

Comments Submitted through the Sierra Club

Brandon	Powell	Nashville	TN	37214	Clean Energy should be just plain common sense by now. But you guys already know all that. And you guys already know what the "Power" companies are all about. And you guys already know we could've been on clean free energy my entire life. So since you already know please do your best to do what's in your power to push back against power in support of your people and your planet. Illusory profits at the expense of people and planet is SIN and you'll go thru hell because of it. Do your best. Thanks.
James	Bland	Millington	TN	38053	Please realize that countless people being served by TVA and other utilities live and die with COPD and countless other diseases. Let's get serious about giving cleaner air and water for future generations. Thank you for considering healthy and economical answers for all our futures.
Laura	Bledsoe	Bartlett	TN	38134	Dear TVA, my brother in law is Paul Harris from Tennessee he is a former vp for mlgw and past pres of Chickasaw electric. He has a great plan for turning garbage into fuel. Sludge plant. I hate coal!!!!!!!!!! Use our intellect to create better energy now
Jack	Bishop	Bartlett	TN	38133	Coal fired plants are killing workers and Americans who live in the path of the byproduct of this poison. People have been burning coal for thousands of years. We have a hi- tech society but are still dependent on killer coal. The question isn't why but who is profiting. Follow the money is still the best way to expose those that ignore the facts and continue to Murder coal workers and their families?
Kyle	Howe	Knoxville	TN	37917	Please invest in clean air for our communities future!
Jill	Empey	Knoxville	TN	37932	Please! For the love of god and all that is good the this world , Clean Energy Now! Our children?s children will be so thankful.
Neva	Stephens	Clarksville	TN	37040	We must get real about our impact on the environment we must deal with this issue in real ways. I have children grandchildren and great grand child they are inheriting our garbage our mistakes think of the futur generations. We must be mindful of what we produce as waste please we can do better. The time is now not tomorrow or we may not have that many tomorrow?s I do all I can to limit my foot print but I am just one person it takes a global village and you could be part of the solution. Thank you I am praying for solutions sincerely Neva Stephens
Sharon	Bowers		TN	37644	Having taught for 32 years, I've seen the effects of air pollution on generations of children. Watching an innocent child gasp for breath and turn blue as you scramble for their meds is a life-altering event. It is one that should NEVER happen. Please consider this when making your decisions. Thank you for reading. Sharon L. Bowers
Nancy	Pryor	Knoxville	TN	37902	I hope we can focus on clean energy in East Tennessee to keep our area beautiful for us and our children to enjoy and treasure.
Sharon	Vaughn	Sale Creek	TN	37373	Retirement of all these coal plants is overdue. Even as a TVA retiree I support the closure of all the old plants. They have long outlived their life expectancies and coal ash is an additional threat to our environment as Kingston spill showed.
Barbara	Sherrill	Crossville	TN	38572	We need to keep our atmosphere as clean as possible especially for our future generations of grandchildren & great grandchildren
Charles	Baggarly	Owensboro	KY	42303	Thank you. We will all breath better.
Jennifer	Kaminski	Owensboro	KY	42301	Clean energy is required for the future health of our people and our planet. Kentucky can be a leader in the transition. Help our residents transition to clean energy power and clean energy jobs.
Kay	Clark	Bowling Green	KY	42103	Since Trump has drastically cut what the EPA should be doing to protect us from our environment, I feel like the proposed change regarding coal would be a great benefit to our environment and health.
Sam	Webb	Knoxville	TN	37921	Its already done so much enviromental damage its a hell hole for workers. Environmental damage is devastating from fossil fuels yet or leaders still insist its fake news. Hope itz not to late for to little.
Deborah	Stevens	Bowling Green	KY	42101	When you stop using coal and go to a clean energy source you will help slow the global warming. I personally will be greatfull.
Jill	Alliman	Sweetwater	TN	37874	Clean alternative energy is the direction TVA should be going in. It will create more jobs and protect our environment for oyr children' children. Support Green power now! In a big transformative way! Thank you.
Daniel	Swink	Memphis	TN	38117	I care very deeply about the world that we are passing on to our children. Clean air and clean water are extremely important and, as adults, we have a responsibility to preserve our environment right now and in the future. Thank-you.

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Elena	Williams	Memphis	TN	38107	Please support clean air by shutting down these dirty coal plants!
Bonita	Ladich	Maryville	TN	37803	In addition to the environmental impact of coal production has been the human cost to coal miners whose health and well-being seem to have been of no consequence.
Richard	Davis	Memphis	TN	38104	I think the use of clean energy without using coal is a wonderful thing.
Forrest	Brown	Nashville	TN	37209	Tennessee needs to transition to renewable energy and more nuclear energy as soon as possible. If we don't act now, future generations won't be able to enjoy Tennessee as we do now. For that matter, WE won't be able to enjoy Tennessee as we do now. The climate is in crisis, and I do not want to see environmental catastrophe and the collapse of civilization within my lifetime.
Ann	Bishop	Millington	TN	38053	It is my wish to leave our children & families with the best environment possible. Doing everything we can to improve our air quality will work towards that end. It is a known fact that coal is detrimental to clean air.
Chandra	Summitt	Knoxville	TN	37901	Look at Bangladesh from satellite view, then get back with me.
Bobbi	Stout	Knoxville	TN	37922	This is about all our futures! What will history say of us , if we even make it another 100 years . Do the right thing !
Clay	Holdford	Lakeland	TN	38002	It's time to rid Tennessee of coal an its polluting byproducts. Keep our air, waters and aquifers clean for our present and future generations.
Rebecca	McMurtry	Hendersonville	TN	37075	Moving to clean/renewable energy sources would help keep TN beautiful, the landscapes full of life, clean air and water.
Antoinette	Olesen	Nashville	TN	37205	My dear sister died of lung cancer from pollution. She was a healthy living non smoker. Devastating our family she left two children and a grieving husband. We will save on health costs, worker productivity and create quality of life. For everyone's sake Let's have TN on the cutting edge of clean air and water. Clean renewable energy will create jobs and attract businesses and increase tourism. Let's make the news for our forward movement in creating a clean, healthy beautiful environment. Thank you for your support in closing these antiquated coal plants. Antoinette Olesen, home owner/ voter
Joan	Laney	Memphis	TN	38112	Our children need to inherit an earth that is healing and not ravaged. Please think of the next 7 generations and act with them in mind.
Kelly	Johnson	Bulls Gap	TN	37711	Please help to ensure that our two great States do their part to help combat pollution and fight global warming. The science is clear and the time to act is now. We must put an end to carbon emissions and embrace clean energy. The switch to clean energies is a win for everyone- our health, our children's future, our economy, our wildlife and our planet will all benefit.
Kathleen	Mcintyre	Philadelphia	TN	37846	Thank you for removing a terrible health hazard!
Jan	Berry	Greenback	TN	37742	TVA demonstrates leadership with 50% clean energy supply with 48% of that clean energy coming from nuclear power. TVA can expand this leadership by shutting down coal fired power plants as soon as feasible. Recent emphasis on black lung disease, and coal ash spills add to the dire consequences and risk of coal. It is well known that carbon emissions from coal fired plants cause global warming as well as release of fine particulates, radioactivity and mercury. The International Panel on climate change clearly states that action must be taken within 12-years to mitigate the worst effects of climate change. I strongly urge you to shut down these coal fired power plants.
Cyndi	Chester	Charlotte	TN	37036	Please, shut these major climate change contributors down.
Dave	McIntyre	Philadelphia	TN	37846	I'm pleased that TVA is considering removing a health hazard and cleaning the atmosphere. This comes from one who suffers from airborne pollution.
William	Wilkin	Nashville	TN	37221	I don't want my kids to breathe dangerous air like they do in China.
James	Wasilew	Louisville	TN	37777	I'm glad TVA is getting away from coal. I only wish all the coal ash these plants have produced over the years could be put back in the mine that the coal came from. At the mines expense.
GINGER	COGGINS	Germantown	TN	38139	We want to breath better air and leave a better planet for our children. This is so important fir their future snd we all must care nice!
Lisa	Parkes	Johnson City	TN	37604	There is no such thing as clean coal. I applaud your decision to shut these down. Thank you.
Elizabeth	Minter	Murfreesboro	TN	37130	I want my grandchildren to live with clean air!

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Karen	Hardin	Greeneville	TN	37743	I support clean energy!
Patrick	Watermeier	Memphis	TN	38111	Please support the necessary transition to renewable energy. I believe the public will respect the TVA much more for doing so. Coal is not environmentally healthy, socially sound, or even economically wise. Thank you for reading and choosing responsibly.
Jane	Hudson	Memphis	TN	38128	Yay and no more ash spills.
Melina	Sierra	Nashville	TN	37210	It is imperative that we make the switch to clean energy for the health of ourselves and all species on the planet.
Jane	Hudson	Memphis	TN	38128	Yay and no more ash spills!
Patrick	Watermeier	Memphis	TN	38111	Please support the transition to renewable energy. I believe the public will admire the TVA for acting responsibly during this time. Coal is not environmentally healthy, socially sound, or even economically wise. Thank you for reading and choosing clean energy.
Mark	Vancil	Germantown	TN	38138	PLEASE get us off of non-renewable energy!!
Elizabeth	Hagan	Franklin	TN	37064	Let's move to the Future!
Kathy	Knudson	Chattanooga	TN	37403	Please help our planet remain healthy.
Michael	O'Connell	Nashville	TN	37211	Our jewel of a planet, our home, needs your help. Please phase out these two plants and replace them with clean energy sources. Thank you!
Mary	Reed	Chattanooga	TN	37411	Living here in the middle of TVA-land makes your actions to clean up the environment mean so much more personally.
Carolyn	Sheehan	Bowling Green	KY	42104	The negative impacts of coal extraction on the environment and the detrimental consequences to coal miners should also be a consideration and impetus for the timely transition away from the antiquated use of coal as an energy source.
Linda	Utley	Camden	TN	38320	Our country need to get on board with renewable energy. It will be a lot better for our planet and the inhabitants of this planet.
Jon	Watts	Brentwood	TN	37027	Tennesseans deserve clean air.
Anne	Parker	Nashville	TN	37207	Not' retiring these coal plants, actually, is not an option. There comes a time when we have to think in the bigger picture as to the impact this is having on our environment. People who have worked hard making a career in the business of coal, do need to be somehow compensated/ taken care of and Let's start by stopping and hearing an apology from those responsible for giving financial breaks to businesses as incentives and then putting it on the other hardworking and struggling individuals with whom absorb this absurd financial break given.
Paula	Ladd	Nashville	TN	37206	Anything you can do for air and water quality is crucial!
Sherry	Allen	Erin	TN	37061	I've been saying this for a long time. Just retrofit the plants to solar and wind energy. It will definitely help our planet earth in the long run.
Pat	Combs	Chattanooga	TN	37405	Please help us rid the environment of pollutanta and encourage clean energy
Sarona	Austin-Owens	Owensboro	KY	42301	We only have one home, obviously we all need to take care of it for our future generations.???
Dennis	Williams	Memphis	TN	38134	I have 2 grandchildren. They love the outdoors and are just now learning things that you can only learn by walking, swimming and bring outside. Please do your part to ensure future generations have the opportunity that I had to learn how important our environment is to all. Dennis Williams BS Biology and Grad.school Marine Biology candidate
Anna	Hogan	Memphis	TN	38112	I have grandchildren who live in Knoxville and Memphis who suffer with asthma and clean air is vital, not only for them, but every living creature. It is vital that we do everything we can to make our air cleaner so I urge you to please close down coal burning plants and pursue options that make it healthier for everyone to breathe. Thank you, Anna Hogan
Sean	Siple	Joelton	TN	37080	Let's think of the generations to come. I appreciate all you can do to help keep some clean air and water.
Elizabeth	Stein	Nashville	TN	37221	It's time to phase out coal and move to more sustainable and environmentally friendly energy sources.
Vance	Sterling	Tallassee	TN	37878	It's time to show Trump the people want clean energy not his filthy old ways.
Richard	Spry	Murfreesboro	TN	37128	Coal plants are poisoning our air and water. We can?t afford to continue using these plants. The cost to human and environmental health is too great.
Corinne	Adrian	Memphis	TN	38104	Be environmentally aware and use clean energy.

Comments Submitted through the Sierra Club

Cassie	Bell	Arlington	TN	38002	I have friends that lost parents to those coal plants. Not a good report card.
Anne	Hill	Nashville	TN	37205	Whatever you can do to alleviate environmental damage is worthwhile. I say this as a lifelong amateur ornithologist. And I hope the health of those who mine coal will be improved when coal is phased out.
Suzan	Fleischman	Memphis	TN	38107	For years during a Republican reign there is little concern for our great land. Our environment should be protected at all times. That's our TOTAL environment. It's unforgivable to continue destroying our land and our loving nature. The destruction always has consequences, be it the health of humans and creatures and more. Just Senseless.
Robert	Seyer	Cleveland	TN	37311	As a resident of Tennessee I support the move toward clean energy and finding more environmentally friendly ways to produce energy.
Ingrid	Graudins	Old Hickory	TN	37214	Our time is running out to save this planet for future generations ? please think long term and do the right thing.
Don	Owen	Murfreesboro	TN	37128	My family and I are appreciative of your efforts to make our environment cleaner, healthier and safer.
Loretta	Farmer-Brown	Memphis	TN	38104	Please be a positive force for the residents of Tennessee as well as an inspiration to others in power that could also effect positive environmental change in this country. Thank you.
Sharon	Pollis	Sale Creek	TN	37373	Clean energy is the way to go for a better America and world. We have the technology and can employ and train former coal mine workers!!! Getting rid of old coal mines is a step toward a cleaner environment, better health for workers, and a bright future for the next generations to come! Thank you!!!
Angeline	Fitzpatrick	Knoxville	TN	37917	We value clean air and water and know there are options available that are healthier for us and our planet.
Charles	Beck	Chattanooga	TN	37419	Please do your part to clean up our environment. Our health depends on it. Thank you.
Richard	Edwards	Milligan College	TN	37682	Look at Costa Rica, there's a lot to learn from their transition. I'd like to see retraining of existing employees, their involvement and input.. from teardown of existing systems, remediation of sites to building and operating Wind, Solar at those locations.
Sharon	Holmes	Elizabethton	TN	37643	East Tennessee deserves to be treated fairly. TVA did many wrongs to the people here. It is time to correct your misdeeds .
Joanne	Irvin	Rogersville	TN	37857	I am delighted that TVA has proposed a plan to close down the Paradise and Bull Run Coal plants. Coal is devastating for our fragile environment. The future is solar and wind producing energies. I'm proud of TVA.
Alexis	DeCaprio	Delano	TN	37882	The air quality decreases in the smoky mountains every year. The proposed change-over deadline is not soon enough.
Kristina	Counts	Franklin	TN	37067	I am a mom and a preschool teacher living in Franklin, Tennessee. I am very concerned about our children's future here in Tennessee and in the world. Children are especially vulnerable to mercury and chemicals and I feel the closing of these plants is in kid's best interest. Transitioning to clean energy will promote jobs and a sustainable future environmentally and economically. It will ensure our kids have a clean environment and that the climate crisis will be lessened with green energy replacing fossil fuels. Please develop green energy jobs so TVA employees can have a just transition in making this change. We all benefit from green energy environmentally and economically. Thank you.
Sally	Grady	Cumberland City	TN	37050	I live two miles from the Cumberland City TVA and I am very concerned about the quality of our air and water. Coal needs to be retired for the sake of our planet and for the health of coal miners too. My former husband is just 60 years old and is dying of black lung from his career as an underground coal miner. There are cleaner sustainable options. Please let this century be the century of change, for the good of the planet and for mankind.
Tim	Morgan	Gallatin	TN	37066	The sooner we can transition away from coal the better. I strongly support any effort such as this to close coal plants and transition our area and TVA's energy portfolio to cleaner and more economical options. The White House's push to support and revive coal isn't in our nations or the environments best interest.

Comments Submitted through the Sierra Club

Erica	Anderson	Nashville	TN	37208	Dear TVA, I am an 8th generation Tennessean. My grandmother retired from TVA/the Army Corps of engineers. I teach science in a Title I school. I have family in rural regions of East and West TN. Tennessee runs in my bones and blood and as a scientist, a Christian, and a justice advocate I believe that it is time to phase out fossil fuels and coal. It is past time and we are running out of time to act. Please move forward with the retirement of the Paradise and Bull Run coal units-- and furthermore with other fossil fuel and coal power sources. I want to make sure the TN and Southeast I know, love, and that my ancestors have shared with me is also available for future generations.
Cori	Macnaughton	Doyle	TN	38559	Yes, please and thank you, your efforts to scale back our use of coal and replace it with renewable energy is much appreciated, and long overdue. Please step up the time frame in Tennessee as much as is possible. Thank you.
Marcia	Gray	Hendersonville	TN	37075	It's an easy decision - if you think only of what's good for your grandkids!!!! Marcia Gray
Ashley	Woods	Brentwood	TN	37027	We need renewable sources of clean energy now more than ever. It matters for the air we breathe and water we drink!!! This effects everyone.
Karen	McIntyre	Nashville	TN	37217	We must move to renewable sources of energy....yhis is a no brainer!
Sarah	Foster	Germantown	TN	38138	As a young person in 2018, protecting the future for myself and my children is extremely important. I do not want to live in a polluted world nor do I want anyone that follows after me to have to deal with problems we created.
Cathy	Walsh	Elizabethton	TN	37643	I believe that clean energy is the future for energy production. It would help create more jobs and stimulate the development of new technologies in the United States, which would help us remain on the cutting edge of the global market, instead of relying on a resource that deLet's our natural resources and destroys our natural habitats through such practices as mountaintop removal. Closing these two coal units could be a first step to ensuring that future generations will be able to appreciate and enjoy the splendor of our natural world.
Priscilla	Stinson	Memphis	TN	38127	I vote for clean energy because it is essential to our health. The cleaner our air the longer we live.
Lawrence	Creech	Oak Ridge	TN	37830	CO2 emissions have to stop. Solar means distributed capacity and distributed jobs.
Marc	Tucker	Johnson City	TN	37601	We need to invest in jobs of the future and ensure communities which currently rely on coal plants are going to be ready for jobs of the future. Please invest in green jobs and clean energy production.
Stephanie	Norwood	Memphis	TN	38107	In addition the coal ash pits are a danger to TN aquifers which supply some of the purest drinking water in this country. It is time for this change: cleaner,safer, reliable, low cost. Let's do this!
Mary	Egger	Memphis	TN	38111	We are WAY past the time for getting rid of dirty energy sources !
Bradley	Mullins	Rutledge	TN	37861	I "Do Not Support" Any phasing out of power plant facility!!! Repeat I DO NOT SUPPORT ANY PHASING OUT OF ENERGY PRODUCING PLANTS, THAT BURN COAL COAL!!!
Bethany	Joy	Nashville	TN	37211	This makes me so hopeful!!!! Thank you for having long-term vision in thinking of our FUTURE and not only the present. Bless you all.
First_tennessee	Last_tennessee	Chattanooga	TN	37412	
Perry	Chapdelaine	Ashland City	TN	37015	
Henry	McKennon	Huntsville	AL	35805	
Tom	Westlake	Huntsville	AL	35810	
Suzanne	Cooper	Nashville	TN	37215	
James	garland	Knoxville	TN	37916	
Kristin	Ford	Bowling Green	KY	42101	
Destiny	Johnson	Gainesboro	TN	38562	
Bobbie	Hensley	Greeneville	TN	37743	
Amy	Zielinski	Crossville	TN	38571	
Jeff	Kulas	Murfreesboro	TN	37130	
Scott	Gaddis	Chattanooga	TN	37405	

Comments Submitted through the Sierra Club

Troy	Bidwell	Knoxville	TN	37934	
Dr. Peter L.	Corrigan	Starkville	MS	39759	
Rose	Hirschy	Hermitage	TN	37076	
Elizabeth	Floersch	GoodLet'sville	TN	37072	
Margaret	Dube	Memphis	TN	38120	
Charleen	Shelton	Crossville	TN	38572	
Craig	Drew	Chattanooga	TN	37421	
Bonnie	Swinford	Knoxville	TN	37917	
DAVID	RIALL	Chattanooga	TN	37412	
Heather	West	Kingston	TN	37763	
Vicki	Wade	Memphis	TN	38119	
Barbara	Prince	Johnson City	TN	37604	
Alyssa	Matas	Chattanooga	TN	37415	
Lynn	Ellis	Knoxville	TN	37918	
Bill	Baeder	Hendersonville	TN	37075	
Louminda	Torbett	Maryville	TN	37801	
Paulette	Walton	Butler	TN	37640	
Corey	Chatis	Nashville	TN	37206	
Melvin	Hughes	Sparta	TN	38583	
Cheryl	Dare	Memphis	TN	38104	
Linda	Newkirk	Huntsville	AL	35824	
William	Vinett	Nashville	TN	37211	
Jacki	Masar	Louisville	KY	40291	
Joyce	Grimes	Memphis	TN	38127	
Mark	Blazer	Seymour	TN	37865	
Hector	Bertin	Whiteville	TN	38075	
Jason	Smith	Knoxville	TN	37921	
Carol	White	Scottsboro	AL	35769	
Nathan	Ottinger	Greeneville	TN	37743	
William	Franks	Nashville	TN	37205	
Julia	Jardine	Lebanon	TN	37090	
Jean	Johnston	Decatur	TN	37322	
Pamela	Thompson	Memphis	TN	38128	
Linda	Inness	Philadelphia	TN	37846	
Alison	Eddy	Starkville	MS	39759	
Leonard	Wolf	Nashville	TN	37203	
Suzanne	Silva	Franklin	TN	37069	
Michelle	Phillips	Franklin	TN	37069	
Mark	Phillips	Franklin	TN	37069	
Chris	Drumright	Murfreesboro	TN	37130	
Kim	Wheetley	Chattanooga	TN	37415	
Justin	Wesche	Memphis	TN	38119	
Betty	Anderson	Bowling Green	KY	42103	
Kendall	Wimberley	Knoxville	TN	37920	
Alice	Hudson	Lakeland	TN	38002	
Ann	Douglas Tycer	Brentwood	TN	37027	
Robert	Winkler	Oxford	MS	38655	
John	Noel	Nashville	TN	37215	
Robert	Benson	Lebanon	TN	37090	

Comments Submitted through the Sierra Club

Julie	Richardson	Memphis	TN	38112	
Charlie	Palmgren	Franklin	TN	37064	
Lynn	Hardiman	Smithville	TN	37166	
Catherine	Kalinowski	Hixson	TN	37343	
Shelby	Hood	Franklin	TN	37064	
Kristina	Baker	Southaven	MS	38671	
Aaron	Meier	Nashville	TN	37209	
Sue	Umbarger	Summertown	TN	38483	
David	Butler	Hermitage	TN	37076	
Tonda	Bailey	Knoxville	TN	37931	
Steven	Morris	Sevierville	TN	37862	
Larry	Wenger	Cleveland	TN	37311	
Darrel	Easter	Bartlett	TN	38135	
Susan	Schuchard	Nolensville	TN	37135	
Mace	Clarridge	Hixson	TN	37343	
Frances	Paris	Woodbury	TN	37190	
Linda	Tift	Chapel Hill	TN	37034	
Linda	Kaplan	Germantown	TN	38138	
Louise	Palazola	Memphis	TN	38117	
Joshua	Castle	Clarksville	TN	37042	
James	Thoman	Hermitage	TN	37076	
Connie	Stapleton	Chuckey	TN	37641	
Calvin	Schmid	Johnson City	TN	37615	
Alan And Andree	Lequire	Nashville	TN	37209	
Deborah	Allison	Shelbyville	TN	37160	
Chester	Mcmillin	Memphis	TN	38135	
Susan	Courtney	Andersonville	TN	37705	
John	Reid	Mountain City	TN	37683	
Betsy	Bucy	Madison	AL	35758	
Patrick	Benjamin	Corryton	TN	37721	
Eric	Hanson	Nashville	TN	37216	
Debra	Hanahan	Franklin	TN	37067	
Kathryn	Sullivan	Huntsville	AL	35811	
Barry	Medlin	Oak Ridge	TN	37830	
Mary	Bristow	Brentwood	TN	37027	
Norman	Vaden	Byhalia	MS	38611	
Helmut	Steinberg	Memphis	TN	38103	
Jonathan	Mitchell	Madison	AL	35757	
Jonathan	Holland	Crossville	TN	38571	
Jessica	Hoover	Knoxville	TN	37918	
William And Virginia	Kennedy	Jonesborough	TN	37659	
Elliott	Bales	Hixson	TN	37343	
Chris	Dacus	Bell Buckle	TN	37020	
John	Marable	Memphis	TN	38122	
Angela	Hibbitt	Milan	TN	38358	
Sharon	Lyons	Allardt	TN	38504	
Roger	Guth	Brentwood	TN	37027	
Michael	Serkownek	Maryville	TN	37801	
Cindy	Hatcher	Bumpus Mills	TN	37028	

Comments Submitted through the Sierra Club

Mary	Reed	Lancing	TN	37770	
Pete	Garland	Signal Mountain	TN	37377	
James	Marziotti	Andersonville	TN	37705	
Dan	Bourrie	Decatur	AL	35603	
Stephen	Nemecsek	Chattanooga	TN	37403	
Sharon	Turco	Germantown	TN	38138	
Ben	Sugg	Maryville	TN	37803	
Nikki	Brewster	Oak Ridge	TN	37830	
Patricia H	Williams	Nashville	TN	37209	
Eileen	Gonzales	Cleveland	TN	37323	
Michelle	Jones	Hixson	TN	37343	
Jim	Barritt	Shelbyville	TN	37160	
Connie	Myers	Oak Ridge	TN	37830	
Tina	Tine'	Knoxville	TN	37919	
James	Harrell Jr	Murfreesboro	TN	37127	
Phyllis	Golden	Memphis	TN	38108	
Sophie	Statzel	Nashville	TN	37206	
Veronica	Bourassa	Evensville	TN	37332	
Patricia	Dishman	Nashville	TN	37221	
Kenneth	Reece	Knoxville	TN	37922	
Adrienne	Frey	Franklin	TN	37069	
Nathalie	Hartert	Nashville	TN	37212	
Monica	Juma	Memphis	TN	38103	
Terry	Risner	Mount Carmel	TN	37645	
Eric	Robinson	Memphis	TN	38104	
Rhonda	Bradley	Crossville	TN	38555	
Sheila	Lott	Jonesborough	TN	37659	
Karl	Flaucher	Huntsville	AL	35811	
Barbara	Means	Murfreesboro	TN	37128	
Tracy	Pedersen	Huntsville	AL	35806	
Dexter	Craig	Oak Ridge	TN	37830	
John	Carr	Nashville	TN	37221	
J D	Cooper	Memphis	TN	38104	
Joyce	Wilding	Kingston Springs	TN	37082	
Robert	Fingerman	Monteagle	TN	37356	
Jan	Mitchell	Hendersonville	TN	37075	
Gail Marie	Noon	Ringgold	GA	30736	
Karen	Neubauer	Huntsville	AL	35801	
Barbara	Allen	Knoxville	TN	37921	
Gina	Turner	Memphis	TN	38122	
Tracy	Brown	Lenoir City	TN	37772	
Gilbert	Gallagher	Loudon	TN	37774	
Timothy	Kent	Knoxville	TN	37934	
Barbara	Addis	Knoxville	TN	37931	
Lynda	Snook	Kingsport	TN	37660	
Karoline	Novilla	Jefferson City	TN	37760	
Nancy	Beavers	Woodlawn	TN	37191	
Hiasaura	Rubenstein	Nashville	TN	37205	
Ann	Lane	Huntsville	AL	35802	

Comments Submitted through the Sierra Club

Kelly	Eagar	Goodlet'sville	TN	37072	
Nigel	Bowen	Lakeland	TN	38002	
Steven	Scheer	Germantown	TN	38138	
David	Olive	Antioch	TN	37013	
Toya	Hibbs	Clarkrange	TN	38553	
Charles & Dinah	Crow	Cumberland City	TN	37050	
Courtney	Oldendorf	Powell	TN	37849	
John	Wyatt	Tellico Plains	TN	37385	
Ronald	Whitmore	Alvaton	KY	42122	
Harry	Debauffer iii	Flintville	TN	37335	
Kathy	Tobey	Nashville	TN	37215	
Paula	Simmons	Cookeville	TN	38501	
Susan	Dean	Monteagle	TN	37356	
Buzz	Davies	Erwin	TN	37650	
Ben	Sweeton	Red Bank	TN	37415	
Carmen	Woods	Clarksville	TN	37043	
Stanford	Davis	Knoxville	TN	37914	
Rachel	Levine	Germantown	TN	38138	
Andrew	Johnson	Franklin	TN	37069	
Sarah	Park	Nolensville	TN	37135	
Catherine	Kalinowski	Hixson	TN	37343	
John	Kozub	Mount Juliet	TN	37122	
Andrea	Tatum	Martin	TN	38237	
Gene	Hughes	Johnson City	TN	37601	
Cheri	Rutherford	Oak Ridge	TN	37830	
Jennifer	Fuson	Rockford	TN	37853	
Keith	Croft	Nashville	TN	37214	
Caroline	Duley	Nashville	TN	37204	
Haylee	Schwerdt	Maryville	TN	37801	
Margaret	Franklin	Collierville	TN	38017	
Jason	Hartman	Clarksville	TN	37043	
Sarah	Raymer	Lenoir City	TN	37771	
John	Hammel	Pulaski	TN	38478	
Deb	Gochfeld	Oxford	MS	38655	
Debra	Dunson	Spring Hill	TN	37174	
Susan	Peeples	Pleasant Hill	TN	38578	
La	Armour	Nashville	TN	37205	
Adriana	Norris	Nashville	TN	37203	
William	Kornrich	Sneedville	TN	37869	
Ralph	Hubbard	Clinton	TN	37716	
Katy	Underwood	Strawberry Plains	TN	37871	
Steven	Lipson	Nashville	TN	37212	
Tiara-Lady	Wilson	Knoxville	TN	37918	
Cadee	Murray	La Vergne	TN	37086	
Scott	Banbury	Memphis	TN	38107	
Shirley	Bryant	Cordova	TN	38018	
Amy	M	Rogersville	TN	37857	
Frances	M	Rogersville	TN	37857	
Tina	Davis	Lebanon	TN	37087	

Comments Submitted through the Sierra Club

Connie	Arduini	Memphis	TN	38104	
Robert Dale	Sweeney	Columbia	TN	38401	
Amanda	Blount	Clarksville	TN	37043	
Reginald	Lowe	Clarksville	TN	37043	
Sarah	Schiller	Clarksville	TN	37040	
Karen	Reynolds	Clarksville	TN	37040	
Rob	Rich	Memphis	TN	38107	
Veronica	Cox	Greeneville	TN	37743	
Kent	Minault	Knoxville	TN	37917	
Charles	Phillips	Owensboro	KY	42301	
Steven Anthony	Jolly	Memphis	TN	38117	
Veronica	Cox	Greeneville	TN	37743	
Linda	Mathews	Kodak	TN	37764	
Sara	Oaks	Cordova	TN	38018	
Catherine	Swearingen	Memphis	TN	38111	
Gavin	Long	Knoxville	TN	37919	
Nancy	Mott	Knoxville	TN	37914	
Barbara	Allen	Knoxville	TN	37921	
Joe	Franklin	Knoxville	TN	37914	
Sue	DuBois	Walland	TN	37886	
Jon	Lindberg	Knoxville	TN	37922	
Alexander	Berta	Oak Ridge	TN	37830	
Janet	Michel	Knoxville	TN	37922	
Barbara	Snowberger	Concord	TN	37922	
Barbara	Nicodemus	Andersonville	TN	37705	
Keith	Kline	Knoxville	TN	37932	
Anne	Freres	Memphis	TN	38104	
John	Taylor Jr	Fayetteville	TN	37334	
Kathy	Chiavola	Nashville	TN	37209	
Tammy	Yarber	Kingsport	TN	37663	
Teresa	Ambrose	New Market	TN	37820	
Robert	Earls	Nashville	TN	37212	
Linda	Conard	Mountain City	TN	37683	
Kathryn	Smiley	Fall Branch	TN	37656	
Edward	Viscardi	Greeneville	TN	37745	
Rachael	Cantrell	Germantown	TN	38139	
Dale	Owens	Normandy	TN	37360	
Elizabeth	Gardner	Nashville	TN	37221	
Carolyn	Crabtree	Chattanooga	TN	37405	
Michael	Jackson	Morristown	TN	37814	
Robert	Benson	Lebanon	TN	37090	
Derrick	Allred	Chattanooga	TN	37411	
Julia	Jardine	Lebanon	TN	37090	
Patricia	Faulkner	Nashville	TN	37204	
Brady	Watson	Nashville	TN	37205	
Gregory	Arnold	Columbia	TN	38401	
Becky	Berenguer	Kingsport	TN	37664	
Selina	Webb	Kingston Springs	TN	37082	
Selina	Webb	Kingston Springs	TN	37082	

Comments Submitted through the Sierra Club

Glenn	Mellen	Signal Mountain	TN	37377	
Stacey	Schmitt	Clifton	TN	38425	
Lisa	Worley	Blountville	TN	37617	
James	Lynn	Cookeville	TN	38501	
Karen	Blanco	Harrison	TN	37341	
Grace	Stranch	Nashville	TN	37207	
Erika	Montijo	Franklin	TN	37064	
Erin	Burnap	Chattanooga	TN	37415	
Tyler	Ellison	Knoxville	TN	37912	
Cheryl	Phillips	Maryville	TN	37804	
Cheryll	Barker	Knoxville	TN	37923	
Shirley	Brown	Maryville	TN	37803	
Karen	Markum	Reliance	TN	37369	
Fran	Adler	Suwanee	GA	30024	
Andrew	Combs	Nashville	TN	37212	
Sarah	Talley	Hixson	TN	37343	
Lisa	Cravens	Crossville	TN	38572	
Abbey	Hooge	Woodburn	KY	42170	
Shanna	Moorman	Owensboro	KY	42301	
Ann	Barnes Adkins	Owensboro	KY	42303	
Linda	Sheridan	Chattanooga	TN	37409	
Cheryl	Cosby	Franklin	TN	37064	
Shawn	Zeringue-Krosnick	Cookeville	TN	38501	
Richard	Jones	Arlington	TN	38002	
Bo	Graham	Memphis	TN	38104	
Jessica	Claudio	Hixson	TN	37343	
Patricia	Davis	La Follette	TN	37766	
Tiffany	Henning	Owensboro	KY	42303	
Orin	Moe	Nolensville	TN	37135	
Ethan	Williams	Westmoreland	TN	37186	
Thomas	Wynm	Memphis	TN	38134	
Calvin	Burford	Oak Ridge	TN	37831	
Maggie	Pitt	Hermitage	TN	37076	
Mark	Blazer	Seymour	TN	37865	
Jamie	Brown	Knoxville	TN	37919	
Carol	Austein	Memphis	TN	38104	
Bryson	Hunter	Knoxville	TN	37917	
Bethanee	Burden	White House	TN	37188	
Logan	Hysen	Franklin	TN	37067	
Debbie	Williams	Manchester	TN	37355	
Rebecca	Wierschem	Knoxville	TN	37932	
Marion	Pavur	Loudon	TN	37774	
Lynn	Ellis	Knoxville	TN	37918	
Amber	Cook	Gainesville	GA	37377	
Marion	Coleman	Tullahoma	TN	37388	
Sheri	Derose	Gallatin	TN	37066	
Klemmer	Nicodemus	Hartford	KY	42347	
Christy	Hanna	Knoxville	TN	37931	
Will	Miller	Hampton	TN	37658	

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Thomas	Williams	Bowling Green	KY	42103	
Gloria	Jones	Dickson	TN	37055	
Christine	Eardley	Hendersonville	TN	37075	
Lisa	Frazier	La Vergne	TN	37086	
Mari T.	Echevarria	Knoxville	TN	37909	
Arthur	Hazel	Owensboro	KY	42303	
Cynthia	Carlton	Hendersonville	TN	37075	
Edward	Chapman	Signal Mountain	TN	37377	
Gretalynn	Carpenter	Dunlap	TN	37327	
Elizabeth	Gassel	Knoxville	TN	37919	
Yvette	Rhoton	Memphis	TN	38104	
Alicon	Lee	Nashville	TN	37208	
Joy	Markham	GoodLet'sville	TN	37072	
Janie	Pearce	Hendersonville	TN	37075	
Benji	Strobel	Knoxville	TN	37919	
Mary Kay	Christophersen	Johnson City	TN	37601	
Michelle	Martinov	Kingsport	TN	37665	
Maria	Chapman	Ashland City	TN	37015	
Patrick	Fisher	Memphis	TN	38120	
Casey	Moses	Nashville	TN	37211	
Michelle	Harris	Oak Ridge	TN	37830	
Cliff	Cockerham	Nashville	TN	37209	
David	Lindsey	Beaver Dam	KY	42320	
Trudy	Wallack	Greeneville	TN	37743	
Robert Gary	Kelly	Fayetteville	TN	37334	
Valerie	Crawford	Nashville	TN	60625	
David	Rutledge	Crossville	TN	38555	
Margaret	King	Cunningham	TN	97321	
Charlotte	Brown	Memphis	TN	38119	
Nancy	Rolfes	Ooltewah	TN	37363	
Stephen	Reed	Kingston Springs	TN	37082	
Krystal	Love	Maryville	TN	37804	
Janice	Vanderhaar	Memphis	TN	38141	
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