

**COMMONWEALTH OF KENTUCKY**  
**BEFORE THE PUBLIC SERVICE COMMISSION**

In the Matter of:

An Electronic Examination Of The	)	
Application Of The Fuel Adjustment Clause	)	
Of Kentucky Power Company From	)	Case No. 2024-00136
November 1, 2022 Through April 30, 2023	)	

**DIRECT TESTIMONY OF**  
**PAUL J. MASSIE**  
**ON BEHALF OF KENTUCKY POWER COMPANY**

**DIRECT TESTIMONY OF  
PAUL J. MASSIE ON BEHALF OF  
KENTUCKY POWER COMPANY  
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY**

**CASE NO. 2024-00136**

**TABLE OF CONTENTS**

<b><u>SECTION</u></b>	<b><u>PAGE</u></b>
I. INTRODUCTION .....	1
II. PURPOSE OF TESTIMONY .....	2
III. GENERATION PERFORMANCE DURING THE REVIEW PERIOD.....	2
IV. GENERATION PREPARATION AND PERFORMANCE DURING WINTER STORM ELLIOTT .....	3
V. CONCLUSION.....	13

**DIRECT TESTIMONY OF  
PAUL J. MASSIE ON BEHALF OF  
KENTUCKY POWER COMPANY  
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY**

**CASE NO. 2024-00136**

**I. INTRODUCTION**

1 **Q. PLEASE STATE YOUR NAME, POSITION, AND BUSINESS ADDRESS.**

2 A. My name is Paul J. Massie, and my business address is 2791 N. US Highway 231,  
3 Rockport, IN 47635. I am employed by American Electric Power Service Corporation  
4 (“AEPSC”) as Vice President Generating Assets for Kentucky Power Company  
5 (“Kentucky Power” or the “Company”) and Indiana Michigan Power Company (“I&M”).

6 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**  
7 **BACKGROUND.**

8 A. I hold a Bachelor of Science degree in Mechanical Engineering from West Virginia  
9 Institute of Technology. I have been employed with American Electric Power (“AEP”) for  
10 over 36 years. I have worked at various facilities in positions of increasing responsibility  
11 for the AEP system. My most recent positions have been Plant Manager at Kentucky  
12 Power's Big Sandy Plant and Plant Manager at Appalachian Power's John E. Amos Plant  
13 until being promoted to my current position June 22, 2024.

14 **Q. WHAT ARE YOUR PRINCIPAL AREAS OF RESPONSIBILITY WITH**  
15 **KENTUCKY POWER?**

16 A. I collaborate with Kentucky Power’s leadership, AEP’s Fossil & Hydro Generation group,  
17 AEP's Commercial Operations group, and the AEP Service Corporation organization in

1 support of the safe, reliable, efficient, and environmentally compliant operation of  
 2 Kentucky Power’s generating assets.

3 **Q. HAVE YOU PREVIOUSLY TESTIFIED IN ANY REGULATORY**  
 4 **PROCEEDINGS?**

5 A. Yes, I have previously testified before the Public Service Commission of Kentucky  
 6 ("Commission") on behalf of Kentucky Power in Case Nos. 2020-00245, 2022-00036, and  
 7 2022-00263.

**II. PURPOSE OF TESTIMONY**

8 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

9 A. The purpose of my testimony is to discuss the overall performance of the Company’s  
 10 generation fleet during the period of November 1, 2022 through April 30, 2023 (the  
 11 “Review Period”), with a focus on performance during the most significant event during  
 12 the Review Period, Winter Storm Elliot.

13 **Q. ARE YOU SPONSORING ANY EXHIBITS AS PART OF YOUR TESTIMONY?**

14 A. Yes. I am sponsoring the following exhibit attached to my testimony:

<u>EXHIBIT</u>	<u>DESCRIPTION</u>
16 Exhibit PJM-1	Kentucky Power Generating Unit Performance Data -Winter
17	Storm Elliott Period (12/23/2022-12/27/2022)

**III. GENERATION PERFORMANCE DURING THE REVIEW PERIOD**

18 **Q. DID YOU HAVE A ROLE WITH THE OPERATION OF KENTUCKY POWER’S**  
 19 **GENERATING ASSETS DURING THE REVIEW PERIOD?**

1 A. Yes. I was Plant Manager at the Big Sandy Plant from August 2017 to May 2023, which  
 2 included the Review Period.

3 **Q. PLEASE DESCRIBE THE OVERALL PERFORMANCE OF THE COMPANY’S**  
 4 **GENERATING ASSETS DURING THE REVIEW PERIOD.**

5 A. During the Review Period, Kentucky Power’s plants operated well while delivering power  
 6 safely, efficiently, and in compliance with all applicable laws and regulations. Big Sandy  
 7 Unit 1 and Mitchell Units 1 and 2 all had two Planned Outages that covered portions of the  
 8 Review Period, as can be seen in Figure PJM-1.

**Figure PJM-1: Generating Units Planned Outages**

<b>Unit Name</b>	<b>Event Start</b>	<b>Event End</b>
<b>Big Sandy 1</b>	9/10/2022 0:00	1/14/2023 11:47
<b>Big Sandy 1</b>	4/8/2023 2:25	5/13/2023 12:00
<b>Mitchell 1</b>	10/8/2022 0:00	11/19/2022 17:32
<b>Mitchell 1</b>	4/15/2023 4:31	5/12/2023 18:00
<b>Mitchell 2</b>	9/10/2022 0:00	12/16/2022 14:25
<b>Mitchell 2</b>	4/15/2023 0:00	4/30/2023 14:35

9 The Review Period touched both shoulder seasons (fall and spring) when Planned Outages  
 10 are normally scheduled because demand during those seasons is historically lower.  
 11 Planned Outages are scheduled well in advance and the start and end dates are submitted  
 12 to and require the approval of PJM.

**IV. GENERATION PREPARATION AND PERFORMANCE DURING WINTER**  
**STORM ELLIOTT**

1 **Q. PLEASE DESCRIBE WINTER STORM ELLIOTT.**

2 A. Winter Storm Elliott was a bomb cyclone<sup>1</sup> that impacted the PJM region from December  
3 23, 2022, through December 27, 2022 (the “Winter Storm Elliott Period”), causing extreme  
4 cold weather, including blizzards, high winds, and snow.

5 **Q. WERE THE COMPANY’S GENERATION ASSETS AVAILABLE AND**  
6 **OPERATING DURING THE WINTER STORM ELLIOTT PERIOD?**

7 A. Both Mitchell Unit 1 and Unit 2 (collectively, the “Mitchell Units”) were available and  
8 operating throughout the Winter Storm Elliott Period. As shown in Exhibit PJM-1, Mitchell  
9 Unit 1 had a Net Capacity Factor<sup>2</sup> (“NCF”) of 80.3% and Mitchell Unit 2 had an NCF of  
10 74.1% during the Winter Storm Elliott Period. Big Sandy Unit 1 was in a Planned Outage  
11 and was unavailable as discussed later in my testimony.

12 **Q. HOW DOES THE MITCHELL PLANT PREPARE FOR WINTER?**

13 A. The Mitchell Plant undertakes significant winter preparedness measures each year. In  
14 preparation for winter, the Mitchell Plant implements a “Winter Preparedness Plan.” In  
15 2022, the plant implemented the “Winter Preparedness Plan” starting on October 3, 2022.  
16 The standard plan included employee training, completing preventative maintenance work  
17 orders, performing equipment checks, replenishing supplies, and other winter preparedness  
18 activities. Plant personnel completed a cold weather site specific plan review on October  
19 19, 2022, and completed training on the North American Electric Reliability Council’s cold  
20 weather reliability standards by October 31, 2022. Cold Weather Preparedness and

---

<sup>1</sup> A bomb cyclone is a large, intense storm that rapidly intensifies and is defined by a sudden and significant drop in atmospheric pressure.

<sup>2</sup> Net Capacity Factor is defined as the ratio of the generating unit’s ((net actual generation) to its net maximum capacity for the number of hours in the period being reported that the unit was in the active state) x 100%.

1 Winterization checks conducted as preventative maintenance activities were completed by  
 2 November 2, 2022.

3 **Q. DID THE MITCHELL PLANT TAKE ANY ADDITIONAL PREPARATORY**  
 4 **STEPS IN ADVANCE OF WINTER STORM ELLIOTT?**

5 A. Yes. In anticipation of Winter Storm Elliott, Mitchell Plant staffing was increased to at  
 6 least one on-site member from the plant leadership team and additional plant operations  
 7 personnel and contractor support were brought on site.

8 **Q. HOW DID THE MITCHELL UNITS PERFORM DURING WINTER STORM**  
 9 **ELLIOTT?**

10 A. Both Mitchell Units performed well during the Winter Storm Elliott Period. Both Units  
 11 had a 0% Forced Outage Factor (FOF)<sup>3</sup> and 0% Maintenance Outage Factor (MOF)<sup>4</sup>,  
 12 meaning both units were available and operating throughout the Winter Storm Elliott  
 13 period.

14 **Q. WAS EITHER UNIT’S OUTPUT REDUCED (OR DERATED) DURING WINTER**  
 15 **STORM ELLIOTT?**

16 A. Yes, at times, both Mitchell Units experienced derates due to operational issues. A “derate”  
 17 is defined as a decrease in the available capacity of an electric generating unit, commonly  
 18 due to a system or equipment malfunction or environmental, operational, or reliability  
 19 considerations. As demonstrated in Exhibit PJM-1, a significant portion of the derates  
 20 experienced at both Mitchell Units were required to comply with particulate matter  
 21 emission limits and the state of West Virginia’s 10% opacity limit. The opacity-related

---

<sup>3</sup> Forced Outage Factor is the ratio of ((All hours experienced during forced outages) to the number of hours in the period being reported that the unit was in the active state) x 100%.

<sup>4</sup> Maintenance Outage Factor is the ratio of ((All hours experienced during maintenance outages) to the number of hours in the period being reported that the unit was in the active state) x 100%.

1 derates were not caused by Winter Storm Elliott’s extreme temperatures. Mitchell Unit 1  
 2 also had a small, 35 MW derate related to a slag buildup in the secondary superheater  
 3 section of the steam generator for the duration of the Winter Storm Elliott Period.

4 The remaining derates were caused by frozen coal causing the coal conveyor to trip  
 5 out, freezing of the level indicators for the reagent slurry feed tanks, and a pulverizer  
 6 damper operation issue. This group of derates lasted 7.61 hours for Mitchell Unit 1 and  
 7 12.77 hours for Mitchell Unit 2, a combined total of only 20.38 hours out of the 120 hours  
 8 of operation during the five-day Winter Storm Elliott Period. The most significant of the  
 9 weather-related derates occurred when the extreme cold temperatures caused the level  
 10 indicators on the FGD reagent slurry feed tanks to freeze. Mitchell Plant operators quickly  
 11 recognized that there was an issue and dispatched plant personnel to visually verify the  
 12 reagent levels in the tanks. The observed levels were lower than what was being indicated,  
 13 so in order to preserve enough reagent to keep the units in service, the team made the  
 14 prudent decision to temporarily derate each unit to its reliable minimum output until the  
 15 level indications were thawed and more reagent was processed.

16 As demonstrated in Figure PJM-2, the Mitchell Units’ derates did not materially  
 17 affect the Mitchell Plant’s availability during the Winter Storm Elliott Period. During  
 18 Winter Storm Elliott, Unit 1 had an equivalent availability factor<sup>5</sup> (“EAF”) of 86.3%, and  
 19 Unit 2 had an EAF of 78.4%.

20 **Q. HOW DOES THE MITCHELL PLANT’S PERFORMANCE DURING WINTER**  
 21 **STORM ELLIOTT COMPARE TO ITS HISTORICAL PERFORMANCE?**

---

<sup>5</sup> Equivalent Availability factor is the ratio of ((Available hours – equivalent planned derated hours – equivalent unplanned derated hours – equivalent seasonal derated hours) to the number of hours in the period being reported that the unit was in the active state) x 100%.



1 A. Both Mitchell Units performed favorably during Winter Storm Elliott as compared to their  
 2 historic performance, as Figure PJM-2 demonstrates. Figure PJM-2 compares each  
 3 Mitchell Unit’s performance during the Winter Storm Elliott Period to their average and  
 4 highest annual NCF and EAF over the period 2016 through 2021.

**Figure PJM-2: Mitchell Unit Performance:  
 Winter Storm Elliott Period Compared to 2016-2021**

Mitchell Unit	Winter Storm Elliott Period Net Capacity Factor (“NCF”)	Average NCF (2016-2021)	Highest NCF (2016-2021)	Winter Storm Elliott Period Average Availability Factor (“EAF”)	Average EAF (2016-2021)	Highest EAF (2016-2021)
Unit 1	80.3%	36.9%	52.0%	86.3%	57.1%	68.1%
Unit 2	74.1%	46.6%	65.8%	78.4%	69.3%	84.8%

5 As demonstrated above, Unit 1’s NCF and EAF and Unit 2’s NCF during the Winter Storm  
 6 Elliott Period were higher than their 6-year highest annual levels. Both Units’ NCF and  
 7 EAF during the storm period far exceeded their 6-year averages.

8 **Q. HOW DID THE MITCHELL UNITS PERFORM COMPARED TO THEIR PJM**  
 9 **PEERS DURING WINTER STORM ELLIOTT?**

10 A. According to the 2022 State of the Market Report for PJM, extreme cold weather on  
 11 December 23 and 24, 2022, resulted in a very high number of forced outages in PJM. The  
 12 highest levels occurred on December 24, 2022. A 192 percent increase in outage MWs  
 13 occurred during the storm event. Coal units failed to perform mainly due to equipment-  
 14 related forced outages.<sup>6</sup> In either case, the Mitchell units, as discussed above, were  
 15 available throughout the Winter Storm Elliott period and the units’ NCF and EAF far  
 16 exceeded their 6-year averages.

---

<sup>6</sup> 2022 State of the Market Report for PJM; Volume 2: Detailed Analysis; Monitoring Analytics, LLC – Independent Market Monitor for PJM; dated 3.9.2023. Section 3, page 210-211.  
[https://www.monitoringanalytics.com/reports/PJM\\_State\\_of\\_the\\_Market/2022.shtml](https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2022.shtml)

1 **Q. COULD THE COMPANY REASONABLY HAVE DONE ANYTHING DURING**  
2 **THE WINTER STORM ELLIOTT PERIOD TO INCREASE THE OUTPUT OF**  
3 **THE MITCHELL GENERATING FACILITIES?**

4 A. No. Again, it is important to reiterate that, although the Mitchell Units were at times derated  
5 during Winter Storm Elliott, at no point was either Mitchell unit unavailable to serve  
6 customers. Furthermore, the Company cannot legally operate the Mitchell Units in a  
7 manner that would violate the particulate matter emission limits and the state of West  
8 Virginia's 10% opacity limit. The remaining non-opacity related derates were short in  
9 duration but were required to allow for the necessary repairs to be made while keeping the  
10 units available. As such, when both Mitchell Units were needed during this extreme event,  
11 they were available and performed well, to the benefit of Kentucky Power customers.

12 **Q. WHAT IS A PLANNED OUTAGE?**

13 A. A Planned Outage is a generating unit outage designed to allow for planned work that  
14 requires the unit to be shut down to be completed. Planned outages are scheduled for a  
15 predetermined duration determined by the scope of work to be performed during the  
16 outage. Typically, Planned Outages only occur once or twice a year.

17 **Q. HOW ARE PLANNED OUTAGES SCHEDULED?**

18 A. Planned Outages are scheduled well in advance (months and sometimes even years) due to  
19 significant scope, equipment lead-time, engineering, and time out of operation. Such  
20 outages are planned in conjunction with PJM and with PJM's approval. The Company  
21 schedules Planned Outages during the shoulder months when the Company's peak  
22 demands are lower and attempts to avoid, to the extent practical, multiple units  
23 simultaneously in a Planned Outage.

1 **Q. WHEN A UNIT IS IN A PLANNED OUTAGE, IS IT POSSIBLE TO QUICKLY**  
2 **RETURN THE UNIT TO SERVICE IF MARKET CONDITIONS CHANGE?**

3 A. Generally, it is not. During a Planned Outage, a generating unit is often at least partly  
4 dismantled, often with pressure parts (parts that contain steam at very high pressures and  
5 temperatures when operating, such as boilers, turbines, etc.) taken apart to be inspected,  
6 maintained, and/or replaced. It is very difficult if not impossible to safely and quickly  
7 return a unit to service or deviate from the work plan for the outage, particularly when  
8 major equipment is disconnected or dismantled for repair at that time.

9 **Q. PLEASE DESCRIBE THE SCOPE OF THE PLANNED OUTAGE TO BE**  
10 **COMPLETED AT BIG SANDY DURING WINTER STORM ELLIOTT.**

11 A. Kentucky Power requested approval from PJM on March 19, 2021, for a planned outage  
12 for Big Sandy Unit 1 to occur during the period from September 10, 2022, through  
13 December 4, 2022. PJM approved the proposed planned outage on March 30, 2021.  
14 Kentucky Power originally planned to conduct this planned outage in the Spring of 2022;  
15 however, the Company changed the outage dates to take advantage of company resources  
16 that would be available in the fall to complete the turbine and generator related scope. Big  
17 Sandy Unit 1 began its Planned Outage on September 10, 2022.

18 The purpose of this Planned Outage was primarily to conduct a routine inspection  
19 and to repair plant components including the boiler, turbine valves, and cooling tower. The  
20 fall 2022 Planned Outage at Big Sandy Unit 1 also included a generator field (rotor) out  
21 inspection and a possible re-wedge of the Unit's stator. Generator field out inspections are  
22 major routine maintenance inspections that may include, but are not limited to:

- 23
- stator core tightening to correct core looseness,
  - alternating current high potential testing for stress-testing generator insulation,
- 24

- 1 • electromagnetic imperfection testing to detect stator core interlamination
- 2 imperfections that can lead to overheating and damage to the stator core, and
- 3 • stator re-wedge.

4 The need to re-wedge the stator could not be determined until after the removal of the  
5 generator rotor.

6 The generator field out inspection and testing were planned for this outage in  
7 accordance with Circular Letter EL-M-CL-027 – Generator Testing and Evaluation. The  
8 last inspection of this type on Big Sandy Unit 1 occurred in 2008.

9 While the outage was originally scheduled to be completed on December 4, 2022,  
10 it had to be extended several times through January 14, 2023. The Company extended the  
11 outage for a number of reasons including additional time required to repair the generator  
12 due to hot spots in the core identified during testing after removal of the rotor, replacement  
13 of the generator rotor collector end retaining ring due to a crack discovered during the  
14 outage, the repair of the hydrogen seal housing at the exciter due to a leak identified during  
15 testing as the generator was being reassembled, and the need to repair an unexpected  
16 condenser leak identified at start-up. The extensions to the outage were necessary to repair  
17 and/or replace generator components to prevent the risk of a catastrophic failure of the  
18 generator as well as to repair the condenser to allow the Unit to restart and avoid future  
19 forced outages. In addition, the repairs were necessary to prevent dangerous conditions,  
20 including the possible catastrophic failure of the unit, to ensure the safe operation of Big  
21 Sandy Unit 1 and to protect Kentucky Power’s employees. Each extension for the Big  
22 Sandy fall 2022 outage was approved by PJM.

1 **Q. PLEASE DESCRIBE THE TIMELINE FOR BIG SANDY'S OUTAGE**  
2 **EXTENSIONS BEYOND ITS PLANNED OUTAGE END DATE.**

3 A. In November 2022, the Company extended the Planned Outage at Big Sandy Unit 1 from  
4 December 4, 2022, to December 12, 2022, to complete a full re-wedge of the generator  
5 stator. A partial re-wedge of the generator stator was part of the original scope of work,  
6 and the need for a full generator re-wedge was identified during loop testing of the stator  
7 core during the outage. The extension was requested on November 7, 2022, and was  
8 approved by PJM that same day.

9 On November 13, 2022, the Company discovered a crack on the generator rotor  
10 collection end retaining ring and determined that the retaining ring required replacement  
11 prior to returning the Unit to service. In order to complete that repair, on December 2, 2022,  
12 the Company requested the Planned Outage at Big Sandy be extended through December  
13 30, 2022. PJM approved the extension on December 2, 2022.

14 During the reassembly of the generator on December 18, 2022, the hydrogen seal  
15 housing on the exciter end was leaking at a level beyond the manufacturer's  
16 (Westinghouse) acceptable level. The hydrogen seal leak was identified during the required  
17 air leakage test and after several unsuccessful attempts to repair the leak on site, the  
18 hydrogen seal was removed and shipped to AEP's Central Machine Shop (CMS) for repair.  
19 As a result, an extension to Planned Outage from December 30, 2022, to January 5, 2023,  
20 was requested on December 22, 2022, and approved by PJM on December 28, 2022.

1           During unit startup on January 5, 2023, Big Sandy Unit 1 was removed from service  
 2 due to water chemistry exceeding quality limitations. Exceeding water chemistry  
 3 limitations risk failures of the boiler, turbine, and condensate/feedwater components. A  
 4 corresponding condenser leak that contributed to exceeding the water chemistry limitations  
 5 was located on January 10, 2023. The extension of the Planned Outage from January 5,  
 6 2023, to January 14, 2023, was requested by Kentucky Power on January 10, 2023. PJM  
 7 approved the extension on January 11, 2023, as inspection/repairs to the condensers were  
 8 part of the original Planned Outage work scope.

9           Following repair of the main condenser leak, an additional Planned Outage  
 10 occurred between January 14, 2023, to January 16, 2023, to return the boiler water  
 11 chemistry to acceptable levels. This additional outage, from January 14, 2023, to January  
 12 16, 2023, was requested on January 12, 2023, and approved by PJM on January 14, 2023.

13           During each of the outages, the Company modified manpower schedules to include  
 14 weekends and nights, where applicable, and utilized AEP Engineering, AEP Regional  
 15 Services personnel and CMS services as part of its efforts to place Big Sandy Unit 1 back  
 16 in service as quickly as safely possible.

17 **Q. COULD THE COMPANY HAVE PLACED BIG SANDY UNIT 1 IN SERVICE**  
 18 **WITHOUT ADDRESSING THE ITEMS THAT CAUSED THE PLANNED**  
 19 **OUTAGE TO BE EXTENDED THROUGH THE WINTER STORM ELLIOTT**  
 20 **PERIOD?**

21 A. Absolutely not. First, as explained further above, extending the outage to replace the  
 22 retaining ring extended the Planned Outage through what became the Winter Storm Elliott  
 23 Period. If the Company had not replaced that retaining ring, Big Sandy Unit 1 would have

1           been at an increased risk of catastrophic failure. Therefore, the Company could not have  
 2           safely placed the Unit back in service and operated it without replacing the retaining ring.  
 3           It likewise could not have put the Unit safely back in service without fixing the hydrogen  
 4           seal and condenser leaks.

5   **Q.    WAS THERE ANY WAY FOR THE COMPANY TO HAVE KNOWN ABOUT THE**  
 6   **WINTER STORM ELLIOTT EVENT WHEN IT REQUESTED THE PLANNED**  
 7   **OUTAGE EXTENSION ON DECEMBER 2, 2022.**

8   A.    No.

9   **Q.    WERE THE COMPANY’S ACTIONS RELATED TO EXTENDING THE BIG**  
 10 **SANDY UNIT 1 OUTAGE REASONABLE?**

11 A.    Yes. Not only were the Company’s actions reasonable, they were required to ensure the  
 12 safe and continued operation the unit. The Company could not have brought Big Sandy  
 13 Unit 1 back online during Winter Storm Elliott without risking a catastrophic failure of the  
 14 Unit as all the repairs described above were required to be completed to safely operate the  
 15 Plant. Therefore, it was reasonable to extend the planned outage to ensure the Unit would  
 16 be in good working order to service customers into the future.

V.    CONCLUSION

17 **Q.    PLEASE SUMMARIZE THE PERFORMANCE OF THE COMPANY’S**  
 18 **GENERATING ASSETS DURING THE REVIEW PERIOD AND WINTER**  
 19 **STORM ELLIOT.**

20 A.    The Company managed, maintained, and operated its generating assets in a safe, prudent,  
 21 and efficient manner during the Review Period and the Winter Storm Elliot Period to the  
 22 benefit of customers.

1 Q. **DOES THIS CONCLUDE YOUR TESTIMONY?**

2 A. Yes, it does.



**Exhibit PJM-1 - Kentucky Power Generating Unit Winter Storm Elliott Period (12/23/2022-12/27/2022) Performance Data**

**KPCo Unit Performance During the 5-Day Winter Storm Elliott Period (12/23/2022 - 12/27/2022)**

<b>Plant-Unit</b>	<b>Eq Forced Outage Rate (EFOR) (%)</b>	<b>Eq Availability Ftr (EAF) (%)</b>	<b>Net Cap Ftr (NCF) (%)</b>
Big Sandy Unit 1	0.0	0.0	0.0
Mitchell Unit 1	13.7	86.3	80.3
Mitchell Unit 2	21.6	78.4	74.1

**Performance Metric Definitions<sup>1</sup>**

**Equivalent Forced Outage Factor (EFOR)** - The ratio of a generating unit's forced outage hours + derates to its forced outage hours + service hours expressed as a percentage.

**Equivalent Availability Factor (EAF)** - The ratio of a generating unit's available hours – all derate hours to the number of hours in the period as a percentage.

**Net Capacity Factor (NCF)** - The ratio of a generating unit's net generation to its maximum potential output for the period as a percentage.

<sup>1</sup> Formal definitions and equations for performance metrics can be found in the **NERC 2023 Data Reporting Instructions - Appendix F**.

Kentucky Power Generation Units Outages and Derates during Winter Storm Elliott (12/23/2023 - 12/27/2023)							
Unit Name	Event Type*	Start Date	End Date	Event Description**	Duration (Hours)	MW Reduction	MWh Loss
Big Sandy 1	PO	9/10/2022 0:00	1/14/2023 11:47	Boiler i/r, Generator Field Out inspection/possible rewedged, Turbine Valve i/r, Corrosion Fatigue i/r, Cooling Tower i/r, ReHeat Attemperator i/r, Gas valve i/r, FD Fan and Motor i/r, High Energy Piping (HEP) i/r, Flow Accelerated Corrosion (FAC) i/r, Core Loop testing.	120	295.4	35448
Mitchell 1	D3	12/22/2022 0:00	12/30/2022 0:00	Large clinker growing on North side of Boiler	120	35	4200.1
Mitchell 1	D1	12/24/2022 6:48	12/24/2022 7:06	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	0.3	465.1	139.4
Mitchell 1	D1	12/24/2022 7:06	12/24/2022 7:43	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	0.62	97.1	60.1
Mitchell 1	D1	12/24/2022 7:43	12/24/2022 8:20	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	0.62	465.1	286.5
Mitchell 1	D1	12/24/2022 8:20	12/24/2022 12:00	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	3.67	140.1	513.7
Mitchell 1	D1	12/24/2022 13:48	12/24/2022 19:34	Opacity	5.77	80.1	462.1
Mitchell 1	D1	12/24/2022 19:34	12/25/2022 9:00	Opacity	13.43	90.1	1210.6
Mitchell 1	D1	12/25/2022 10:07	12/25/2022 12:31	Frozen lumps of coal causing conveyor trip out outs	2.4	135.1	324.2
Mitchell 1	D1	12/26/2022 0:20	12/26/2022 8:29	Opacity	8.15	45.1	367.3
Mitchell 1	D1	12/26/2022 8:29	12/26/2022 8:46	Opacity	0.28	60.1	16.9
Mitchell 1	D1	12/26/2022 8:46	12/27/2022 0:00	Opacity	15.23	85.1	1296.1
Mitchell 1	D3	12/27/2022 0:00	12/27/2022 1:40	Opacity	1.67	85.1	141.7
Mitchell 1	D3	12/27/2022 1:40	12/27/2022 2:02	Opacity	0.37	135.1	49.3
Mitchell 1	D3	12/27/2022 2:02	12/27/2022 2:53	Opacity	0.85	155.1	131.7
Mitchell 1	D3	12/27/2022 2:53	12/27/2022 4:43	Opacity	1.83	185.1	339.6
Mitchell 1	D3	12/27/2022 4:43	12/27/2022 7:22	Opacity	2.65	205.1	543.7
Mitchell 1	D3	12/27/2022 7:22	12/27/2022 11:03	Opacity	3.68	235.1	865.6
Mitchell 1	D3	12/27/2022 11:03	12/28/2022 0:00	Opacity	12.95	245.1	3174.4
Mitchell 2	D1	12/23/2022 10:10	12/23/2022 10:28	25 Pulv issue	0.3	95.2	28.4
Mitchell 2	D1	12/23/2022 10:28	12/23/2022 17:44	25 Pulv issue, could not get dampers to operate	7.27	90	654.3
Mitchell 2	D1	12/23/2022 12:07	12/23/2022 13:56	Opacity	1.82	25.2	45.8
Mitchell 2	D1	12/23/2022 13:56	12/23/2022 14:53	Opacity	0.95	50	47.4
Mitchell 2	D1	12/23/2022 14:53	12/23/2022 19:22	Opacity	4.48	100	448
Mitchell 2	D1	12/23/2022 19:22	12/23/2022 21:08	Opacity	1.77	90	158.8
Mitchell 2	D1	12/23/2022 21:08	12/24/2022 2:46	Opacity	5.63	150	844.7
Mitchell 2	D1	12/24/2022 2:46	12/24/2022 4:41	Opacity	1.92	90	172.3
Mitchell 2	D1	12/24/2022 4:41	12/24/2022 14:08	Opacity	9.45	75	708.8
Mitchell 2	D1	12/24/2022 6:48	12/24/2022 7:08	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	0.33	415.2	138.3
Mitchell 2	D1	12/24/2022 7:08	12/24/2022 12:00	Reagent slurry feed tanks have frozen level indications and tanks were lower than expected	4.87	210.2	1023.3
Mitchell 2	D1	12/24/2022 14:08	12/25/2022 0:00	Opacity	9.87	90	888.2
Mitchell 2	D3	12/25/2022 0:00	12/26/2022 0:00	Anticipated opacity	24	190.2	4565
Mitchell 2	D3	12/26/2022 0:00	12/27/2022 12:38	Opacity	36.63	190.2	6968
Mitchell 2	D3	12/27/2022 12:38	12/27/2022 14:02	Opacity	1.4	210	294
Mitchell 2	D3	12/27/2022 14:02	12/27/2022 15:12	Opacity	1.17	230	268.7
Mitchell 2	D3	12/27/2022 15:12	12/27/2022 16:08	Opacity	0.93	340	317.7
Mitchell 2	D3	12/27/2022 16:08	12/28/2022 23:40	Opacity	7.87	365	2871.6

\* Event Type:

Outage

PO Planned outage

Derate

D1 Requires immediate reduction in capacity

D2 Does not require an immediate reduction in capacity, but requires a reduction within six (6) hours

D3 Can be postponed beyond six (6) hours, but requires reduction in capacity before the end of the next weekend.

\*\*Note: i/r = inspection and repair



**Massie Discovery 2024-00144 Verification Form.doc**

DocVerify ID: AFFD9833-5A14-42A2-9915-7F937FE155C5  
Created: August 21, 2024 10:08:41 -8:00  
Pages: 3  
Remote Notary: Yes / State: KY

This document is a DocVerify VeriVaulted protected version of the document named above. It was created by a notary or on the behalf of a notary, and it is also a DocVerify E-Sign document, which means this document was created for the purposes of Electronic Signatures and/or Electronic Notary. Tampered or altered documents can be easily verified and validated with the DocVerify veriCheck system. This remote online notarization involved the use of communication technology.

Go to [www.docverify.com](http://www.docverify.com) at any time to verify or validate the authenticity and integrity of this or any other DocVerify VeriVaulted document

**E-Signature Summary**

**E-Signature 1: Paul J. Massie (PJM)**  
August 22, 2024 05:33:19 -8:00 [7AEB4BE6CDE2] [167.239.221.101]  
pjmassie@aep.com (Principal) (Personally Known)

**E-Signature Notary: Marilyn Michelle Caldwell (MMC)**  
August 22, 2024 05:33:19 -8:00 [5CE7FE4ED33A] [167.239.221.104]  
mmcaldwell@aep.com  
I, Marilyn Michelle Caldwell, did witness the participants named above electronically sign this document.



DocVerify documents cannot be altered or tampered with in any way once they are protected by the DocVerify VeriVault System. Best viewed with Adobe Reader or Adobe Acrobat. All visible electronic signatures contained in this document are symbolic representations of the persons signature, and not intended to be an accurate depiction of the persons actual signature as defined by various Acts and/or Laws



