COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

The Electronic Application Of Kentucky Power	)	
Company For A Certificate Of Public Convenience	)	
And Necessity To Construct 69kV Transmission	)	Case No. 2023-00040
Lines And Associated Facilities In Pike County,	)	
Kentucky ("Belfry Area Transmission Line Project")	)	

DIRECT TESTIMONY OF

NICOLAS C. KOEHLER

ON BEHALF OF KENTUCKY POWER COMPANY

DIRECT TESTIMONY OF
NICOLAS C. KOEHLER ON BEHALF OF
KENTUCKY POWER COMPANY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

CASE NO. 2023-00040

TABLE OF CONTENTS

SECTION **PAGE**

**DIRECT TESTIMONY OF
NICOLAS C. KOEHLER ON BEHALF OF
KENTUCKY POWER COMPANY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY**

CASE NO. 2023-00040

I. INTRODUCTION

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

A. My name is Nicolas C. Koehler. My position is Director of East Transmission Planning for American Electric Power Service Corporation ("AEPSC"). AEPSC supplies engineering, financing, accounting, planning, advisory, and other services to the subsidiaries of the American Electric Power ("AEP") system, one of which is Kentucky Power Company (the "Company"). My business address is 8500 Smiths Mill Road, New Albany, Ohio 43054.

II. BACKGROUND

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE.

A. I received a Bachelor of Science – Electrical Engineering degree from Ohio Northern University in Ada, Ohio. In 2008, I joined AEP as a Planning Engineer where I advanced through increasing levels of responsibility. I received my Professional Engineer license in the state of Ohio in 2012 (license number 76967). In May 2019, I assumed my current position.

Q. WHAT ARE YOUR RESPONSIBILITIES AS DIRECTOR OF EAST TRANSMISSION PLANNING?

A. My role includes organizing and managing all activities related to assessing the adequacy of AEP's transmission network to meet the needs of its customers in a reliable, cost effective, and environmentally compatible manner. I participate in planning activities with Kentucky Power to address overall system performance.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION?

A. Yes. I previously submitted testimony in Case No. 2020-00062, Case No. 2021-00346, Case No. 2022-00118, and Case No. 2022-00236.

III. PURPOSE OF TESTIMONY

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

A. I am testifying in support of Kentucky Power's application for a Certificate of Public Convenience and Necessity authorizing Kentucky Power to retire 8.2 miles of the 46kV Sprigg – Stone 46kV Transmission Line, construct approximately 6.5 miles of the New Camp – Orinoco and Orinoco – Stone 69kV Transmission Lines, and perform related substation and other work (the "Belfry Area Transmission Line Project" or the "Project"). The Project is being constructed to allow for the retirement of 8.2 miles of 46kV transmission lines between the existing Sprigg and Stone Substations. Approximately 6.5 miles of this retirement is located in Kentucky with the remainder in West Virginia. I will provide information related to the need for the Project.

Q. ARE YOU SPONSORING ANY EXHIBITS OR ATTACHMENTS IN THIS APPLICATION?

A. Yes, I am sponsoring **EXHIBIT 17**, AEP's Guidelines for Transmission Owner Identified Needs. Additionally, I am supporting **EXHIBIT 19**, which demonstrates the potential baseline violations being addressed by the project.. Finally, I am sponsoring

EXHIBIT 22, which provides a comparison of the proposed Project solution with alternative solutions that I discuss later in this testimony.

IV. TRANSMISSION PLANNING AND EXPANSION

Q. DOES KENTUCKY POWER FOLLOW SPECIFIC GUIDELINES TO DETERMINE THE NECESSITY OF SUPPLEMENTAL PROJECTS?

A. Yes. Kentucky Power follows an established and detailed protocol to evaluate and select supplemental projects that ensures only projects that are needed are pursued. See **EXHIBIT 17**, AEP's Guidelines for Transmission Owner Identified Needs. The guidelines discuss the drivers or inputs that should be considered when evaluating transmission system needs. The guidelines ensure that all AEP-affiliated Transmission Owners are applying consistent criteria in their evaluations. Kentucky Power ultimately determines the mix of supplemental projects needed to maintain the reliability of its transmission grid within the AEP Zone. Consistent with the AEP Guidelines for Transmission Owner Identified Needs, Kentucky Power considers safety risks or concerns, asset condition, abnormal operating conditions, reliability performance, Regional Transmission Organization ("RTO") or Independent System Operator ("ISO") notices, stakeholder and customer input, state and federal standards or policies, including North American Electric Reliability Corporation ("NERC") transmission planning standards, and environmental impacts in identifying supplemental projects.

Q. WHAT DRIVERS OR INPUTS DOES KENTUCKY POWER CONSIDER IN IDENTIFYING SUPPLEMENTAL PROJECTS?

A. Consistent with the AEP Guidelines for Transmission Owner Identified Needs, the considerations include:

Equipment Condition, Performance and Risk: These are investments made to ensure the safe and reliable operation of the transmission system. The decision to pursue such projects can be based on equipment performance, obsolescence and expected life concerns, equipment condition, reliability impact, maintenance costs, environmental impact and engineering recommendations.

Operational Flexibility and Efficiency: These projects can optimize system configuration, lower equipment duty cycles, reduce the impact on and limit the exposure to customers for planned or forced outages and can facilitate improved restoration times. They also provide opportunities to bring the system up to current standards and design principles.

Infrastructure Resilience: These projects can improve system ability to anticipate, absorb, adapt to, and/or rapidly recover from disruptive natural or man-made events including severe weather, geo-magnetic disturbances, and physical and cyber security challenges.

Customer Service: These projects accommodate new, increasing, or future load so that the system can reliably address customer needs.

Other Drivers: Examples include industry recommendations, changes to standards and regulations, and state policy objectives.

Q. HOW DO PJM INTERCONNECTION, LLC ("PJM"), AEP, AND KENTUCKY POWER COORDINATE PLANNING AND OPERATION OF KENTUCKY POWER'S TRANSMISSION SYSTEM?

A. Kentucky Power's transmission system is part of the AEP eastern transmission system, which consists of the transmission facilities of eleven AEP operating or transmission companies including Kentucky Power, Appalachian Power Company, Ohio Power Company, Indiana Michigan Power Company, Wheeling Power Company, Kingsport Power Company, AEP Appalachian Transmission Company, AEP Indiana Michigan Transmission Company, AEP Kentucky Transmission Company, AEP Ohio Transmission Company, and AEP West Virginia Transmission Company. This expansive system allows the economical and reliable delivery of electric power for all AEP customers, including customers of Kentucky Power.

Planning and operation of the system is integrated through the coordinated efforts of PJM and the Grid Solutions and Energy Delivery business units of AEPSC, the former of which, among other duties, oversees the planning and design of transmission projects and the latter of which oversees the design, construction and operation of the transmission and distribution system, respectively. (For convenience I will refer to these groups collectively and singularly as "AEP Transmission").

AEP Transmission works closely with neighboring utilities, other interconnected entities, and PJM to plan and operate the transmission grid. RTOs align the transmission planning and operating requirements set out in each RTO's protocols and operating criteria, as further defined through NERC requirements. Kentucky Power has input into the RTO planning process through AEP Transmission.

Q. PLEASE DESCRIBE THE PJM RTEP PROCESS.

A. The PJM RTEP process is a 24-month planning process that identifies reliability issues over a 15-year horizon. The 24-month planning process consists of overlapping 18-month planning cycles to identify and develop shorter lead-time transmission upgrades and one 24-month planning cycle to provide sufficient time for the identification and development of longer lead-time transmission upgrades that may be required to satisfy planning criteria.

Q. WHAT TYPES OF PROJECTS RESULT FROM THE RTEP PROCESS?

A. Kentucky Power, through AEP Transmission, participates in the PJM planning process, which is guided by PJM, NERC, RFC, and AEP planning criteria. The process generally results in two categories of projects: Baseline and Supplemental. Each category is described in detail below. The first project category is Baseline Upgrades. Using the aforementioned criteria, PJM and Kentucky Power, in conjunction with AEP, develop projects to address criteria violations. Baseline projects include transmission expansions or enhancements that are required to achieve compliance with respect to PJM's system reliability, operational performance, or market efficiency criteria as determined by PJM's Office of the Interconnection, as well as projects that are needed to meet Transmission Owners' local transmission planning criteria.

Q. WHAT IS THE SECOND PROJECT CATEGORY?

A. The second project category is Supplemental Projects. Supplemental Projects include all projects that are not addressing minimum, bright-line Transmission Planning criteria. These projects are needed to maintain the existing grid as designed, connect new customers to the grid, satisfy contractual and regulatory requirements, and to meet RTO and industry standards, as set forth in the PJM Operating Agreement. Examples of Supplemental upgrades include interconnection of new retail demand, modification to existing delivery points, replacing failed equipment, proactive replacement of deteriorating assets in poor condition prior to failure, modernization and hardening of the grid, improved operational efficiency and performance, and installation and expansion of supervisory control and data acquisition.

Q. WHAT IS THE PROCESS FOR REVIEWING PJM SUPPLEMENTAL PROJECTS?

A. The process outlines the following steps and requirements:

- provide for separate stakeholder meetings to discuss:
  - models, criteria, and assumptions used to plan Supplemental Projects; (Assumptions Meeting);
  - needs underlying Supplemental Projects (Needs Meeting); and
  - proposed solutions to meet those needs (Solutions Meeting).
- post criteria, assumptions, and models at least 20 calendar days prior to the Assumptions Meeting;
- post criteria violations and drivers at least 10 days in advance of the Needs Meeting;
- post potential solutions and alternatives identified by the PJM Transmission Owners or stakeholders at least 10 days in advance of the Solutions Meeting; and
- submit comments at least 10 days before the Local Plan is integrated into the RTEP for PJM Transmission Owner review and consideration.

FERC has been very specific that the changes it required in Docket EL16-71 are prospective only. Thus, Supplemental Projects reviewed prior to the effective date of the new process were and will continue to be subject to the rules applicable when they were reviewed. It is also important to understand that Supplemental Projects that the Company presents through the PJM stakeholder process are no different from the types of projects for which the Company previously sought, and the Commission previously granted, certificates of public convenience and necessity before Kentucky Power joined PJM. This Project followed the updated requirements for Supplemental projects as outlined above.

Q. WHAT IS PJM'S ROLE IN REVIEWING SUPPLEMENTAL PROJECTS?

A. All projects affecting the topology of the grid (i.e., projects that impact the modeled structure of the grid), whether baseline or supplemental, are subject to the stakeholder process within PJM. While PJM does not "approve" Supplemental Projects, these projects are submitted to PJM and reviewed with the Transmission Expansion Advisory Committee ("TEAC") or Sub-regional Regional Transmission Expansion Plan ("RTEP") Committee Western on a regular basis (typically monthly). All TEAC and Sub-regional RTEP Committee – Western meetings are open and any transmission stakeholder can attend and participate. Any stakeholder input regarding specific projects is vetted through this PJM committee meeting process. Supplemental Projects are subject to two rounds of review, and detailed system needs and project information, including alternative solutions, are provided to stakeholders.

Q. IS THE DESIGNATION OF A PROJECT AS A BASELINE OR SUPPLEMENTAL PROJECT INDICATIVE OF WHETHER THE PROJECT IS NECESSARY, OR HOW NECESSARY IT IS?

A. No, it is not. The designation of a project as a Baseline or Supplemental Project is not indicative of the level of, or absence of, need for the project. Instead, the designations simply reflect that the project satisfies different planning requirements and parameters. The criteria for designation as a Supplemental or Baseline Project are not mutually exclusive, and a single project sometimes can be justified under either. Supplemental Projects improve or preserve the ability of a PJM Transmission Owner such as

Kentucky Power to provide reliable service to its customers, consistent with its obligation to serve, and are grounded in good utility practice.

Q. DOES PJM FACTOR THE AGE OR CONDITION OF EQUIPMENT INTO ITS FORWARD LOOKING MODELS FOR SYSTEM RELIABILITY?

A. No, it does not. The forward-looking models that PJM and Kentucky Power transmission owners employ to identify Baseline Projects assume the modeled system will perform as designed without regard to the age or actual condition of all the elements of the transmission system, including those elements constructed, upgraded, or maintained as non-baseline elements. This means that, for modeling purposes, a substation with 75-year old components that are deteriorating is assumed to function with the same reliability as a five year old substation with newer components.

Although PJM transmission planning treats load dropping as an acceptable means of mitigating potential system reliability criteria violations under certain scenarios, such a planning approach is contrary to Kentucky Power's obligation under KRS 278.030(3) to provide "adequate, efficient and reasonable service," including the safe and reliable delivery of electricity to its customers. In that regard, Baseline Projects alone would be insufficient to satisfy Kentucky Power's obligation to provide safe and reliable service to its customers.

Q. IS ALL OF THE WORK ASSOCIATED WITH A TRANSMISSION PROJECT SUBMITTED TO PJM?

A. No. There are project elements that either do not change the transmission grid's topology, or that are implicit in the description of larger projects, that are not required to be submitted to PJM for explicit review. These project elements do not affect the transmission grid analysis within the framework of PJM's FERC-approved planning process. These project elements nevertheless are essential to the larger projects submitted to PJM.

For example, when a new breaker installation project is submitted to PJM, the breaker would likely be the only major piece of equipment listed in the submission. The PJM submission would not include a listing of elements such as Coupling Capacitor Voltage Transformers ("CCVTs") and relaying required for the breaker to function properly. CCVTs are utilized for real time voltage sensing on the grid. Relays receive information from CCVTs and other instrument transformers and determine the proper course of action for the equipment to which they are tied. Without the relays and CCVTs, the breaker would not know when or how to operate.

Q. IS THERE ALSO A PROCESS FOR REVIEWING TRANSMISSION PROJECTS AT FERC?

A. Yes. In addition to the PJM stakeholder review, there is another opportunity to evaluate the prudence of transmission projects at FERC. Specifically, AEP's annual transmission formula rate filings include protocols for the review of both the annual projection and true up of the AEP formula rates.

V. <u>PROJECT NEED</u>

Q. PLEASE DESCRIBE THE NEED DRIVING THE PROJECT.

A. This Project was initially driven by Equipment Condition/Performance/Risk on the Sprigg – Stone 46kV Transmission Line. The Stone – Sprigg 46kV Transmission Line total approximately 8.2 miles in length and were originally installed in the 1940s. About 6.5 miles of line passes through Kentucky and is owned by the Company; about

1.7 miles of line is located in West Virginia and is owned by Appalachian Power Company. From 2017 to 2021, the Sprigg – Stone 46kV Transmission Line experienced 10 Momentary and 5 Permanent outages, which resulted in 880,039 customer minutes of interruption for the customers served via this line. The momentary outages were due to lightening (9) and ice/snow (1) causes. The permanent outages were due to vegetation fall-ins outside of the right of way (2), wind (1), lightening (1), and crossarm failure (1) causes.

This transmission line is comprised of 55 structures, of which 47 structures are located in Kentucky. The majority of these structures are wood structures. Inspections of the circuit indicate open conditions have been observed (open conditions being the existing and unaddressed physical conditions associated with a transmission line component) along the line. Per the most recent Condition Report, dated April 22, 2022, of the 47 structures located in Kentucky, 34 unique structures are with at least one open condition (which is 72% of the structures on this circuit in Kentucky). There are currently 112 open structural conditions consisting of poles with rot top (30), poles with rot heart (27), crossarms with rot top (10), woodpecker damaged poles (8), loose knee/vee braces (6), cracked poles (5), insect damaged poles (5), knee/vee braces with rot top (4), leaning in-line poles (2), bowed crossarms (2), broken crossarms (2), bowed X-braces (2), cracked X-braces (2), a broken pole (1), a pole with rot pocket (1), a push pole with rot heart (1), a broken X-brace (1), a disconnected X-brace (1), a bowed knee/vee brace (1), and an insect damaged knee/vee brace (1). There are currently eleven open hardware conditions consisting of loose guys (9), a broken guy (1), and a broken insulator (1). There are currently seven open forestry conditions consisting of bush clearances (6) and a hazard tree (1). There are currently three open conductor conditions consisting of broken strands (1), burnt conductor (1), and damaged conductor (1).

Subsequent to the need being presented in PJM SRRTEP meeting, in the 2020 PJM window on 2025 RTEP case, voltage drop violations were identified at New Camp 69kV Substation in the event of an N-1-1 scenario that involves the loss 138/69kV transformer at Johns Creek and loss of Inez - Sprigg 138kV Transmission Line.

Q. PLEASE PROVIDE DOCUMENTATION REGRADING THESE VOLTAGE VIOLATIONS.

A. Please see **EXHIBIT 19** for the requested information. This exhibit includes information presented at PJM supporting the need for the baseline work included in this application. The voltage violation two flow gates, AEP-VD160, and AEP-VD1161 at New Camp Substation and the baseline alternatives are displayed in the links to the PJM subregional slides.

Q. HOW MANY CUSTOMERS ARE SERVED BY THE SPRIGG-STONE 46KV TRANSMISSION LINE IN THE AREA?

A. The Sprigg – Stone 46kV Transmission Line serves the Belfry Substation. The Belfry Substation serves approximately 12.2 MVA of load and 1,547 customers.

Q. HOW MANY CUSTOMERS ARE SERVED BY THE HATFIELD-NEW CAMP 69KV TRANSMISSION LINE IN THE AREA?

A. The Hatfield – New Camp 69kV Transmission Line is the sole source for the New Camp Substation. The New Camp Substation serves approximately 13.9 MVA of load and 947 customers. New Camp Substation also serves an Appalachian Regional

Hospital facility, a water treatment plant, a wastewater treatment plant, along with police, and fire facilities.

Q. HAS THE PROJECT GONE THROUGH THE PJM PROCESS?

A. Yes. This Project need was reviewed with stakeholders at the April 20, 2020 need meeting. The Baseline portion of the Project was selected on January 15, 2021 and the Supplemental solution was presented on January 15, 2021 at the Sub-Regional RTEP-Western meetings hosted by PJM. The Baseline IDs b3288 and Supplemental ID s2446 were assigned by PJM. The Project costs in the local plan slides reflect transmission cost estimates and do not reflect distribution substation cost estimates. Any further updates to the local plan slides, including cost estimates, anticipated to occur during this proceeding will be submitted accordingly.

Q. HAS THERE BEEN LOAD GROWTH IN THIS AREA THAT FURTHER NECESSITATES THE PROJECT AFTER THE PROJECT WAS PRESENTED AT PJM?

A. Yes. Recently, the area has seen sizable load growth driven by cryptocurrency mining customers. Cyber Innovations Group LLC has a 10-year Economic Development Rider ("EDR") contract approved by this Commission (TFS2022-00073) for their Belfry Facility for 20 MW of load. Discover AI LLC has a 10-year EDR approved by this Commission (TFS2022-00249) for their Kimper facility for 15 MW in Pike County.

These new loads further aggravate the voltage drop issues stated earlier in the PJM submittal (**EXHIBIT 19**). To mitigate these potential severe voltage drop concerns, the baseline alternative must be altered to either add another 69kV source in the area or provide additional capacitor support to maintain system reliability. This Project addresses the additional load in the area, while maintaining the reliability of other customers served by these facilities. The facilities in the proposed Project, together with other interconnection upgrades that are not part of this application will allow the projected load to be serviced without the deterioration of service to other customers.

Q. DID THESE VOLTAGE DROP VIOLATIONS ARISE BECAUSE OF THE NEW LOAD DESCRIBED ABOVE?

A. No, the voltage drop violations occurred prior to the addition of the loads of Cyber Innovation Group LLC and Discover AI LLC.

Q. PLEASE DESCRIBE HOW THE PROJECT ADDRESSES THE NEEDS YOU IDENTIFY ABOVE.

A. The Project adds another 69kV source to the system which in turn solves the identified voltage violations. Additionally, this work would eliminate the need to rebuild the entire 8.2 miles of the Sprigg – Stone 46kV Transmission Line and allow retirement of this 46kV Transmission Line. In order to do so, this Project proposes to construct approximately 6.5 miles of 69kV line between New Camp and Stone Substations via Orinoco Substation, which will replace Belfry 46kV Substation.

Q. HOW WAS THE REQUIRED IN SERVICE DATE DETERMINED AND WHAT WOULD BE THE RAMIFICATION OF NOT MEETING IT?

A. As noted in the testimony of Company Witness West, the Project is schedule to go into service in the fourth quarter of 2025. The planning criteria violations were identified in 2025 Winter RTEP study case. That in-service date would mitigate the risk of voltage violations before they may occur as studied. PJM baseline projects required in-service dates are driven by FERC 715 criteria which includes various drivers such as voltage violations, thermal violation, and generation dispatch etc. In case of New Camp Loop/ Belfry Area Improvements Project, not adhering to the required in-service date could force a load drop and requirement of special operational plans to protect the system in the event of contingencies.

Q. WILL DISTRIBUTION LINE WORK BE UNDERTAKEN AT THE TIME OF THE TRANSMISSION PROJECT?

A. Yes. As part of the Project, distribution lines will be built to connect Orinoco Substation with Belfry Substation distribution lines as Belfry Substation is slated to be retired along with the Sprigg – Stone 46kV Transmission Line.

VI. PROJECT DESCRIPTION

Q. PLEASE PROVIDE AN OVERVIEW OF THE PROPOSED PROJECT.

A. The Project consists of five baseline and seven supplemental components to address the needs discussed above. Baseline components are related to greenfield work and supplemental components are mostly related to retirement work.

<u>The baseline portion of the work includes:</u>

(1) The construction of approximately 4.2 miles of 69kV transmission line from New Camp Substation to Orinoco Substation (proposed New Camp – Orinoco 69kV Transmission Line);

(2) The construction of approximately 2.3 miles of 69kV transmission line from Orinoco Substation to Stone Substation (proposed Orinoco – Stone 69kV Transmission Line);

(3) At Stone Substation, Circuit breaker A will remain in place and will be utilized as the T1 low side breaker. Circuit Breaker B will remain in place and will be utilized as the new Hatfield (via Orinoco and New Camp Substations)

69kV line breaker. A new 69kV Circuit Breaker E also will be added for the Coleman line exit. The 46kV equipment in the Stone Substation will be retired;

(4) Reconfigure the New Camp 69kV Tap through access road improvements/installation; perform temporary wire and permanent wire work; and install dead end structures; and

(5) At New Camp Substation, rebuild the 69kV bus, add 69kV MOAB W, and replace the 69kV Ground switch Z1 with a 69kV Circuit Switcher on the New Camp Transformer.

<u>The supplemental portion of the work includes:</u>

(1) Replace Belfry Substation with Orinoco Substation by installing a 69kV double box bay and 12kV rural bay to be built in the clear, southwest of existing Belfry Substation. Install 69/12kV 20 MVA transformer and three 12kV breakers;

(2) Retire Belfry 46kV Substation;

(3) Retire 46kV equipment from Stone Substation;

(4) Replace at the Hatfield Substation MOAB Y with a 69kV Circuit Breaker towards Stone Substation (via New Camp and Orinoco Substations);

(5) Retire the 46kV equipment at Sprigg Substation towards Stone Substation (via Belfry Substation);

(6) Retire all 0.75 miles of the Turkey Creek 69kV line and retire the Turkey Creek Tap; and

(7) Retirement of approximately 8.2 miles of the 46kV Sprigg – Stone 46kV Transmission Line.

Q. WHY IS THE TURKEY CREEK TAP BEING RETIRED?

A. This tap serves no load. It supported a coal mining facility that closed and was disconnected in 2012.

Q. REGARDING THE SUPPLEMENTAL RETIREMENT OF THE SPRIGG – STONE 46kV TRANSMISSION LINE, PLEASE EXPLAIN THIS

RETIREMENT FROM AN ENGINEERING AND RELIABILITY PERSPECTIVE.

A. The existing 46kV network is insufficient to serve the needs of the area and has reached a level of deterioration that requires its replacement. Rebuilding the 46kV facilities would also be insufficient as it would not solve all of the identified baseline, operational, and performance requirements in the area.

The Project proposes to build 6.5 miles of new 69kV line and allows for the retirement of 8.2 miles of 46kV line. Retiring this 46kV line does not result in any degradation of the system nor result in any new violations on the system because the new 69kV is replacing the 46kV that is being retired. The Company also notes that adding looped service at New Camp (i.e., providing two feeds into the station) will result in more reliable and resilient service to customers. Looped service will continue to be provided to existing customers served from Orinoco substation (previously Belfry).

Q. WILL THE RIGHTS OF WAY ("ROW") FOR THESE RETIRED ASSETS BE RETAINED?

A. The ROW for the Turkey Creek Tap will be relinquished. The ROW for the retired Stone-Sprigg line will be relinquished because the new lines in the proposed Project will be greenfield construction. There is a portion of the original line of approximately 0.7 miles between existing Structures K426-26 (~700 ft North of Pegs Branch) to K426-17 (~450 ft North of Right Fork Pecco Hollow) that will be retained to allow for construction of the new line on this existing ROW.

VII. ALTERNATIVE SOLUTIONS TO THE PROJECT

Q. WHAT ELECTRICAL ALTERNATIVE SOLUTIONS WERE EVALUATED BY THE COMPANY?

A. The Company evaluated two holistic alternative solutions to the proposed Project that provide similar benefits, which are further described as Alternatives 1 and 2 in **EXHIBIT 22**. Each holistic alternative solution contains the same Supplemental work but different Baseline work. The proposed Project and both alternative solutions should be considered indivisible and mutually exclusive projects.

To address Supplemental needs, both alternative solutions propose to rebuild 8.2 miles of line between Sprigg and Stone Substations to 69kV standards (operated at 46kV) and address asset needs at the existing Belfry Substation site. Additionally, both alternative solutions propose to install 3.1 miles of new 69kV line to loop New Camp Substation from Hatfield Substation.

Q. WHAT BASELINE WORK WOULD BE INVOLVED FOR EACH OF THESE ALTERNATIVE SOLUTIONS?

A. While not optimal electrically, the Baseline work on these two alternative solutions is intended to address voltage drop violations that were observed under a N-1-1 contingency loss of two 138kV sources in the area, which radializes the load and causes voltage drop. Under Alternative 1, this issue would be addressed by expanding the Hatfield Substation to install a redundant 138/69kV transformer, along with other equipment as described in the **EXHIBIT 22**, at the Hatfield Substation.

Under Alternative 2, the required Baseline work would consist of installation of 23 MVAR capacitor bank at Hatfield Substation, replacement of the 9.6 MVAR capacitor bank with a 23 MVAR capacitor bank at the Johns Creek Substation, installation of. a 11.5 MVAR capacitor bank at the Sidney Substation and installation of a 11.5 MVAR capacitor bank at the Kimper Substation. Installation of these capacitor banks would provide the needed voltage support in the area and address the identified voltage drop issue. While both Baseline alternative solutions would address the voltage violations, these alternatives are not best options on either a cost or electrical basis, when compared to the proposed Project.

Q. WHAT ARE THE SHORTCOMINGS OF THESE ALTERNATIVE SOLUTIONS COMPARED TO THE COMPANY'S PROPOSED PROJECT?

A. While these alternative solutions would address the issues around the drop in voltage and the supplemental needs on the 46kV system, it would do so at higher cost (at least approximately $15 million more than the proposed Project), and it would not address concerns regarding future load growth in the area.

Q. WERE THESE ALTERNATIVE SOLUTIONS PRESENTED TO PJM?

A. No, they were not. At the time the Project was presented at PJM, the Company presented a suitable electric alternative. The alternatives presented in this application were not developed at that time because they were not necessary under then current load conditions.

Q. PLEASE EXPLAIN WHY THE PROPOSED PROJECT IS PREFERABLE TO THESE ALTERNATIVE SOLUTIONS.

A. The benefit of the proposed Project is that it is a complete, comprehensive, and cost-effective solution; it does not require additional upgrades to accommodate expected load growth in the area and it is estimated to cost at least $15 million less than

Alternatives 1 and 2. The Company's proposed Project would upgrade an obsolete 46kV line with shorter 69kV lines. The proposed Project would also bring in a new 69kV source to New Camp Substation from Stone Substation which diversifies the 69kV sources in the area. If an alternative solution was chosen which kept the 46kV operating voltage, there would be future costs for converting the station equipment to 69kV. The proposed Project also provides looped service to New Camp Substation, which is radially fed. Radial feeds increase customer exposure to outages, for any maintenance activities or unplanned outages associated with the equipment or the line serving the customers.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Koehler Verification Form.doc

DocVerify ID:	667485E8-C070-488B-9154-8907682CDFEB
Created:	June 08, 2023 10:50:33 -8:00
Pages:	1
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 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: Nicolas C. Koehler (NCK)
June 08, 2023 13:10:33 -8:00 [AFD47CB2116A] [167.239.221.106]
nckoehler@aep.com (Principal) (Personally Known)

E-Signature Notary: Jennifer Young (JAY)
June 08, 2023 13:10:33 -8:00 [F2A38A18D55D] [161.235.221.105]
jayoung1@aep.com
I, Jennifer Young, did witness the participants named above electronically sign this document.

VERIFICATION

The undersigned, Nicolas C. Koehler, being duly sworn, deposes and says he is the Director of East Transmission Planning for American Electric Power, that he has personal knowledge of the matters set forth in the foregoing testimony and the information contained therein is true and correct to the best of his information, knowledge, and belief after reasonable inquiry.

Nicolas C. Koehler
AFD47CB2116A
Signed on 2023/06/08 13:10:33 -8:00

Nicolas C. Koehler

Commonwealth of Kentucky)
) Case No. 2023-00040
County of Boyd)

Subscribed and sworn to before me, a Notary Public in and before said County and State, by Nicolas C. Koehler, on _June 8, 2023_____.

F2A38A18D55D
Signed on 2023/06/08 13:10:33 -8:00

Notary Public

My Commission Expires _____09/21/2025___________

Notary ID Number ____KYNP31964_______________