DUKE ENERGY OHIO EXHIBIT ___

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc., for a Certificate of Environmental Compatibility and Public Need for the C314V Central Corridor Pipeline Extension Project.	)))))	Case No. 16-253-GA-BTX

DIRECT TESTIMONY OF

ADAM LONG

ON BEHALF OF

DUKE ENERGY OHIO, INC.

March 26, 2019

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ATTACHMENT:

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Adam Long and my business address is 4720 Piedmont Row Drive, Charlotte, North Carolina.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy Progress, LLC, as the General Manager of Pipeline Operations.

Q. PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from North Carolina University with a bachelor's degree in Mechanical Engineering. For the past twenty years, I have been employed by multiple pipeline companies with significant experience in the design, construction and operations of natural gas and hydrocarbon liquid facilities.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AS General Manager of Pipeline Operations.

A. I am responsible for directing an organization of 76 employees who are responsible for operating and maintaining natural gas facilities, propane facilities, liquefied natural gas facilities, pipeline control systems and control room operations located in the Duke Energy Ohio, Duke Energy Kentucky, Inc., (Duke Energy Kentucky) and Piedmont Natural Gas – Tennessee, North Carolina and South Carolina service areas. My organization engages in a variety of activities, including inspections, repairs, operations and construction. My organization is also responsible for

performing those functions necessary for regulatory compliance at those natural gas facilities, liquefied natural gas facilities and propane facilities.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE OHIO POWER SITING BOARD?

A. No.

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

A. The purpose of my testimony is to discuss the Company's propane-air peaking plants and related infrastructure and, more specifically, to explain why those facilities need to be retired. I will also discuss the concept of system planning and the role it plays in Duke Energy Ohio's provision of safe and reliable natural gas service to its more than 405,000 customers in southwest Ohio. Finally, I will address how the proposed distribution pipeline that is the subject of this proceeding will enable the Company to retire the propane peaking facilities while fulfilling its service commitments. I thus address one of the critical reasons for the need for the proposed pipeline.

II. PROPANE-AIR PEAKING PLANTS

Q. PLEASE PROVIDE THE HISTORY OF DUKE ENERGY OHIO'S PROPANE-AIR PEAKING PLANTS.

A. Duke Energy Ohio and its subsidiary, Duke Energy Kentucky, currently own two propane-air peaking plants one of which is located in Cincinnati, Ohio and the other in Erlanger, Kentucky. These plants were brought on line in the early 1960s. Initially, these plants functioned to provide a seasonal and constant source of supply

during the winter heating season. However, as the network of natural gas pipelines comprising the Company's system grew, its ability to meet seasonal demand without reliance on these plants grew. Now, the Company relies on these plants for peaking services during those periods of time when system demand is at its highest. Presently, the propane-air peaking plants contribute approximately 10 percent of the supply needed to serve our firm, heat-sensitive demand on peak days.

Q. PLEASE EXPLAIN HOW THE PROPANE-AIR PLANTS FUNCTION RELATIVE TO THE NATURAL GAS DELIVERY SYSTEM.

A. Liquid propane is first vaporized and mixed with compressed air. Thereafter, it is injected into the natural gas distribution system to maintain pressure and provide additional volume required by Duke Energy Ohio customers. Importantly, so that the plants may function properly, there must be natural gas flowing across the system with which the propane may be mixed. This is necessary because propane has different combustion dynamics than natural gas and appliances and equipment that are configured to burn natural gas cannot safely or efficiently burn a gas stream that is comprised primarily of propane.

Q. HOW IS THE PROPANE THAT IS USED IN THESE PLANTS STORED?

A. The propane is stored in mined caverns that were put in operation in the 1960s.

Q. IS STORAGE OF PROPANE IN MINED CAVERNS TYPICAL OF THE PRACTICES USED BY MOST NATURAL GAS DISTRIBUTION COMPANIES TODAY?

A. No. Indeed, this approach to propane storage is now extremely rare. Few utilities use propane at all for peaking purposes and those that do generally do not store the propane in mined caverns.

Q. ARE THE PROPANE-AIR PEAKING PLANTS SUBJECT TO ANY REGULATIONS?

A. The plants are operated and maintained consistent with National Fire Protection Association (NFPA) 59. The Erlanger cavern and associated pipeline are operated and maintained in compliance with Title 49 of the Code of Federal Regulations, Part 195 (49 CFR Part 195).

Q. HOW ARE THESE PLANTS MAINTAINED?

A. The plants are subject to annual maintenance as necessitated under NFPA 59 and 49 CFR Part 195. Although certain components of the plants are original, other components have been replaced or upgraded to enable their continued, safe operation.

Q. WHEN YOU DISCUSS THE MAINTENANCE OF THE PLANTS, DOES THAT INCLUDE MAINTENANCE OF THE CAVERNS?

A. There is no maintenance to the caverns themselves given their composition – mined limestone. However, the cavern pressure is continuously monitored. Additionally, cavern equipment, such as lines and submersible pumps, are subject to regular inspection and maintenance. In this regard, the lines will undergo corrosion inspections and, as necessary, be recoated.

Q. HAVE THE PLANTS BEEN UPGRADED SINCE THEY WERE INITIALLY PUT IN SERVICE?

A. Any plant requires maintenance and, as appropriate and necessary, upgrade. The propane-air peaking plants are no different. Thus, over the course of their operation, the plants have been upgraded through the introduction of newer technologies. For example, the original vaporizer system has been replaced with a more efficient system and automated valves have been substituted for manual valves. Further, detection equipment, chart recorders, and compressor lubrication systems have been added to the plants.

Q. HAVE THE CAVERNS BEEN UPGRADED SINCE THEY WERE INITIALLY PUT INTO SERVICE?

A. No. There is no upgrade that can be done to the caverns themselves. The subterranean caverns are natural and carved formations and are not amenable to upgrades or replacement. These caverns are distinguishable from more modern above-ground, storage tanks that are used in other propane air peaking facilities.

Q. HOW ARE THE PROPANE-AIR PEAKING PLANTS AND STORAGE FACILITIES MONITORED?

A. They are monitored through the Company's control system. The dome pressure of the caverns is continuously monitored, even when the propane-air peaking plants are not in operation by the Gas Control Room.

Q. HOW ARE THE PROPANE STORAGE FACILITIES REPLENISHED?

A. During the non-winter heating season, propane is transported via trucks and then transferred to the caverns.

Q. ARE THERE RESTRICTIONS ASSOCIATED WITH THE TRANSFER OF PROPANE INTO THE STORAGE FACILITIES?

A. Yes. Propane is a combustible substance and, as such, particular precaution is taken when the Company is refilling the caverns with the propane needed to operate the propane-air peaking plants. Such precautions are dictated by NFPA 58 and include restricted access and removal of possible ignition sources within a designated buffer zone during active unloading activities.

Q. ARE THERE RISKS INHERENT IN PROPANE OTHER THAN THOSE RELATED TO THE TRANSFER PROCESS MENTIONED ABOVE?

A. Propane is heavier than air and, unlike natural gas, is not dispersed upward. Rather, it will find a lowest point and may pool in that location. A practical consequence of this natural characteristic of propane is that leaks can be more difficult to identify because the propane will have settled in a low area. Propane also has a higher BTU and a hotter flame as compared to natural gas. The ignition point for propane is lower than that for natural gas. In a liquid state, propane can cause frostbite upon contact with skin.

Q. AS THE COMBINED NATURAL GAS AND PROPANE TRAVEL THROUGH THE DISTRIBUTION SYSTEM AND UTLIMATELY REACH CUSTOMERS, ARE THERE ANY IMPLICATIONS TO CUSTOMERS?

A. Technology, equipment, manufacturing processes have undeniably evolved since the propane-air peaking plants were placed in service more than fifty years ago. Some of today's technology, equipment, and processes cannot properly perform when propane is injected into the system. Consequently, when Duke Energy Ohio

is relying upon the propane-air peaking plants to maintain service to customers, it is necessary that certain customers temporarily discontinue or alter their operations until such time as their equipment can accept supply.

Q. WHAT IS YOUR OPINION OF THE OVERALL USEFULNESS OF THE DUKE ENERGY OHIO PROPANE-AIR PLANTS TO DUKE ENERGY OHIO'S PROVISION OF NATURAL GAS SERVICE TO ITS CUSTOMERS?

A. These facilities have been very useful in the past in providing system support for meeting seasonal and, more recently, peak day demands on our system. They are, however, aging and in some respects antiquated and in general more complicated to operate than modern natural gas pipeline delivery systems that might be used in their place.

Q. DOES DUKE ENERGY OHIO INTEND TO RETIRE THE PROPANE-AIR PEAKING PLANTS AND RELATED STORAGE FACILITIES?

A. Yes. The Company believes these plants, and the associated storage facilities, should be retired. Although the Company continues to maintain these plants and they do function safely at the present time, they are at or near the end of their useful lives. As it is not possible to maintain or update the caverns, Duke Energy Ohio must proactively plan for their retirement. Furthermore, even assuming the lives of the plants and storage facilities could be extended, such an alternative does not allow the Company to address other critical objectives related to the balance of supply and the replacement of other aging infrastructure.

III. SYSTEM DESIGN AND THE PROPANE PLANTS

Q. CAN YOU DESCRIBE HOW DUKE ENERGY OHIO'S SYSTEM IS DESIGNED?

A. Yes. Duke Energy Ohio's natural gas distribution system is designed to receive natural gas from interstate pipeline providers from the north and the south of the greater Cincinnati area. In the south, our pipeline providers are TransCanada via KO Transmission. In the north, we rely on Texas Gas, Texas Eastern Transmission, and ANR Pipeline. Natural gas flows through these interstate pipelines into our primary transmission and larger distribution lines that run north and south and then into our smaller distribution lines. I have provided a map of our system as Attachment AL-1, which illustrates this physical configuration of our system. Due to the history of our system's development and Cincinnati's growth over the decades, our system facilities currently are designed to receive supplies of natural gas from the north and south with an approximate 45% North - 55% South split. The southern interstate facilities are limited in the amount of natural gas and pressure they can deliver into our system. Therefore, on very cold days, we must ensure that approximately 45 percent of natural gas deliveries are brought onto our system from the north.

Q. WHAT IS SYSTEM PLANNING?

A. System planning is a methodology employed to ensure that a local distribution company's facilities can meet the requirements of its customers even under the most extreme conditions. As I will explain in more detail below, system planning includes the assessment of facilities for safety as well as reliability. The Company

is continually assessing the state of its facilities, as well as the current and prospective demand of its customers. Given that there is a significant time lag associated with identifying the need for new facilities and actually placing those facilities into service, Duke Energy Ohio is consistently looking forward to determine the most safe, reliable and prudent way to provide the natural gas service needed by our customers.

Q. WHAT TO DO YOU MEAN BY TIME LAG?

A. When considering whether to construct new pipelines to replace older facilities, Duke Energy Ohio's system planners must monitor the current age of the facilities and their useful life, decide whether they are repairable, and, if not, determine whether new facilities will be needed upon retirement. If new facilities are needed, the siting of those facilities may need to be approved by the Ohio Power Siting Board prior to construction. If approved, the new facilities will need to be constructed and, depending upon the size and scope of the project, the construction could take months to finish. Therefore, the time lag between when the Company identifies the need and when the new facilities are actually in-service can be considerable. For example, in this case, the Company's system planners identified the need to retire the propane caverns in 2014 and determined that the central corridor project would address the impact of the retirements and meet the needs of customers. The Company is now hoping to build the proposed pipeline and start to retire the caverns after the winter of 2020-2021.

Q. HOW DOES DUKE ENERGY OHIO DETERMINE ITS SYSTEM REQUIREMENTS?

A. Duke Energy Ohio's system planning is premised upon the safe and reliable provision of natural gas services to its customers, most of whom are residential customers. From a safety perspective, Duke Energy Ohio must ensure that its facilities are assessed for integrity on a periodic basis, that all essential portions of the system are controllable and appropriately monitored, that they meet all applicable regulatory safety requirements, and that they are constantly overseen by qualified operators. In addition, Duke Energy Ohio system planning takes into account facility upgrades and replacements based upon regulatory requirements and applicable industry standards. From a reliability perspective, Duke Energy Ohio operational and supply planning is focused on ensuring that its distribution system can meet customer demands for natural gas in the most extreme conditions. Duke Energy Ohio planners assess current and prospective system supply requirements and also determine whether system facilities can provide uninterrupted service to firm customers on the coldest day of the year. That day is projected based upon a review of historic winter weather. System planners then determine whether current facilities can meet these requirements, taking into account projected load growth. If facilities are nearing the end of their useful life, Duke Energy Ohio must determine how to replace those facilities and ensure consistent and reliable service to its customers.

Q. WHAT IS SYSTEM SUPPLY?

A. Duke Energy Ohio contracts with suppliers and interstate transportation providers to ensure that it has procured sufficient natural gas to be delivered onto its system on a daily basis. As discussed, the Company obtains its natural gas deliveries from the north and south. When I refer to system supply, I am not only discussing the supply that is delivered into our system at those points; I am also focusing on how that natural gas supply flows and is distributed within the Company's own pipeline facilities. In other words, the Company may contract for sufficient upstream natural gas deliveries but its own facilities also must effectively flow that supply to various regions within the system. That flow occurs based on the system's hydraulics and pressure requirements.

Q. CAN YOU EXPLAIN SYSTEM HYDRAULICS AND PRESSURE REQUIREMENTS?

A. Yes. A natural gas pipeline, in many ways, is designed very similar to a pipeline that carries liquids. Physically, incoming pressure from our upstream interstate pipeline providers "pushes" the natural gas onto our larger facilities and the natural gas flows through those larger diameter pipelines to our smaller lines and, finally, to our customers' homes and buildings. As customers use their heaters and appliances, they maintain the flow of that natural gas. On very cold winter days, our customers use much more natural gas than usual and at a higher rate. This causes our system's hydraulic pressure to drop because more gas than usual is being burned or "pulled off" the system. If hydraulic pressure were to drop too far, the flow of natural gas would decrease and, at some point, we would no longer be able

to provide natural gas deliveries to every part of our system, resulting in outages. Therefore, system supply can be viewed as a function of both the actual natural gas and the available pressure to ensure flow to all customers on our system. The propane caverns historically have been utilized as peaking plants that provide both additional pressure and additional supply to overcome the high use of our customers and prevent any outages or interruptions in service.

Q. HOW ARE THE PROPANE PLANTS AND RELATED STORAGE FACILITIES INTEGRATED INTO THE DUKE ENERGY OHIO SYSTEM AND PLANNING?

A. The plants typically are utilized during cold weather events when the customer demand on the system requires higher than usual supply and operational pressure. During extremely cold weather in the Cincinnati area, customers utilize more natural gas for heating their homes and buildings. The propane plants provide peaking supply and pressure that allow Duke Energy Ohio's overall system to meet these high demands without any interruptions in service for firm customers. As I mentioned, when in operation, the propane plants provide approximately 10 percent of overall system supply requirements. Currently, without the peaking services provided by the plants, Duke Energy Ohio could not ensure sufficient hydraulic operational pressure or supply to serve its entire system during cold winter days.

Q. DID DUKE ENERGY OHIO PERFORM LOAD FLOW STUDIES IN ITS SYSTEM PLANNING?

A. Yes, Duke Energy Ohio employed a premier pipeline simulation model called Synergi. This modeling program is used by hundreds of natural gas and oil

companies throughout the world. Simulation models portray the behavior of real-life systems and permit the testing of experimental changes to the system.

Q. HOW WAS THE PIPELINE SIMULATION MODELING USED?

A. Synergi was used to assist Duke Energy Ohio in the development of its system planning. The effort identified future infrastructure needs in order to maintain the ability to provide customers with supply reliability, as well as to provide sufficient flexibility of the natural gas system to be able to recover from a wide range of interruption events. Each conceived system expansion or replacement, including configuration for peaking, was modeled to determine its ability to fulfil these objectives.

Q. WHAT WAS THE FOCUS OF THE MODELING EFFORTS?

A. Reliability was the highest priority of the model, which took into account the current dependency on the aged and outdated propane plants and a single gate station that serves over half of the system's customers. The outcome demonstrated that facilities capable of bringing natural gas to the central area of Hamilton County from the northern gate stations would improve overall reliability. The proposed Central Corridor is a result of our considerable review and system planning.

IV. PROPANE RETIREMETNTS

Q. WHY IS DUKE ENERGY OHIO CONSIDERING THE RETIREMENT OF THE PROPANE CAVERN FACILITIES?

A. The caverns are nearing the end of their useful lives. Unlike other facilities, once a cavern fails, it cannot be repaired and must be retired. Therefore, given Duke Energy Ohio's historic reliance on the propane peaking caverns to meet its system

requirements, viable alternative facilities are required to ensure reliable service in all conditions, including extremely cold weather. Based upon our thorough engineering review, the central corridor project meets these requirements and will also allow Duke Energy Ohio to provide more system supply flexibility.

Q. HOW DOES THE CENTRAL CORRIDOR PIPELINE ALLOW DUKE ENERGY OHIO TO RETIRE THE PROPANE-AIR PEAKING PLANTS AND RELATED STORAGE FACILITIES?

A. The distribution pipeline proposed in this proceeding will increase the Company's supply portfolio and allow it to pull enough gas from the north to offset the 10 percent supply presently obtained through the propane-air peaking facilities. The additional gas supply from the north and added pressure from the central corridor facilities will allow operators to maintain service to customers on peak days and also more effectively balance the overall system at all times. Duke Energy Ohio will still require supply and delivery pressure from the southern interstate facilities but the additional supply that will flow through the central corridor facilities will obviate the need for the continued operation and maintenance of the propane caverns. Without the central corridor project, Duke Energy Ohio will be unable to retire the propane caverns and also meet its customers' demand requirements. In such event, our ability to make peak day deliveries to our customers would be contingent upon the continuing operability of our propane air systems and storage caverns – caverns that we cannot inspect or repair, and that are likely to fail at an unpredictable and uncontrollable time. This is not an adequate long-term solution for peak day demand.

Q. WILL THE CENTRAL CORRIDOR PROJECT BE SAFER AND MORE RELIABLE THAN THE COMPANY'S PROPANE AIR SYSTEM?

A. Yes, for several reasons. First, the central corridor project will be constructed using state-of-the-art materials and enhanced construction techniques. Second, the operations of the central corridor facilities will be physically less complex than the operations needed to use the propane-air system. Less complexity in this regard equates to less potential for failure – particularly considering the age of our propane-air system. Third, there are no operational complications for our customers from the peak day pressure and supply solutions provided by the central corridor project. Finally, the central corridor project allows Duke Energy Ohio greater flexibility in selecting supply sources for peak day (and non-peak day) service to its customers and a year-round asset through which it can more flexibly manage its system.

V. CONCLUSION

Q. DO YOU HAVE ANY FINAL THOUGHTS ON THE PROPOSAL TO RETIRE THE EXISTING DUKE ENERGY OHIO PROPANE-AIR SYSTEM IN FAVOR OF THE CENTRAL CORRIDOR PROJECT?

A. Yes. From an engineering perspective, it is necessary for natural gas distribution companies to retire and replace their facilities periodically. This is often the result of those facilities becoming outmoded or less safe because of the passage of time. This reality is why we spend so much time and effort ensuring our systems are safe and in good operating condition. The proposed replacement of the Company's propane-air system with the central corridor project is an example of this type of

activity where an older set of facilities may no longer be as reliable as they once were and need to be replaced. It is our best engineering judgment that this time has come for our propane-air facilities. That process necessitates construction of the central corridor project to replace the peak day pressure, supply, and system balancing capabilities that have previously been provided through the propane-air system.

Q. IS ATTACHMENT AL-1 TRUE AND ACCURATE TO THE BEST OF YOUR KNOWLEDGE?

A. Yes.

Q. WAS ATTACHMENT AL-1 PREPARED BY YOU OR UNDER YOUR DIRECTION AND CONTROL?

A. Yes.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

DUKE ENERGY®

OHIO

INDIANA

KENTUCKY

ANR - American Natural Resources
36" 800 MAOP

REX - 1480 MAOP
Rockies Express

24" Texas Eastern
750 MAOP

TGT - 670 MAOP
TEXAS GAS 26"

Middletown

Hamilton

SR 129

H

West Chester

C314

Lebanon

Central
Corridor
Project Area

Green Hills

A

Blue Ash

Amberley
Village

C148

AA

W

AA

N

V

AM07

ohio river

ohio river

KO Operated by Duke Energy

Columbia Gas 20"
1,000 MAOP

Existing Duke Energy
Feeder and Transmission
Pipeline > 60psi

12" - 18"

19" - 24"

25" - 30"

Interstate
Transmission
Pipeline

V Pipeline
Designation

N