

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke)
Energy Ohio, Inc., for Authority to Adjust) Case No. 19-1750-EL-UNC
its Power Forward Rider.)

In the Matter of the Application of Duke)
Energy Ohio, Inc., for Approval to Change) Case No. 19-1751-GE-AAM
Accounting Methods.)

DIRECT TESTIMONY OF

TIMOTHY J. DUFF

ON BEHALF OF

DUKE ENERGY OHIO, INC.

September 24, 2019

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Attachment:

TJD-1 – Photographs - Multi-use Poles

I. INTRODUCTION AND PURPOSE OF TESTIMONY

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

2 A. My name is Timothy J. Duff. My business address is 400 South Tryon Street,
3 Charlotte, North Carolina 28202.

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

5 A. I am employed by Duke Energy Business Services LLC, an affiliate of Duke
6 Energy Ohio, Inc., (Duke Energy Ohio, or Company) as General Manager,
7 Customer Solutions, Regulatory Strategy & Evaluation.

8 **Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL
9 QUALIFICATIONS.**

10 A. I graduated from Michigan State University with a Bachelor of Arts in Political
11 Economics and a Bachelor of Arts in Business Administration, and received a
12 Master of Business Administration from the Stephen M. Ross School of Business
13 at the University of Michigan. I started my career with Ford Motor Company and
14 worked in a variety of roles within the Company's financial organization. After five
15 years with Ford Motor Company, I began work with Cinergy in 2001, providing
16 business and financial support to plant operating staff. Eighteen months later, I
17 joined Cinergy's Rates Department, where I provided revenue requirement
18 analytics and general rate support for the company's transfer of three generating
19 plants. After my time in the Rates Department, I spent a short period of time in the
20 Environmental Strategy Department, and then I joined Cinergy's Regulatory and
21 Legislative Strategy Department. After Cinergy merged with Duke Energy in 2006,
22 I worked for four years as Managing Director, Federal Regulatory Policy. In this
23 role, I was primarily responsible for developing and advocating Duke Energy's

1 policy positions with the Federal Energy Regulatory Commission. I assumed my
2 current position in 2010.

3 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC**
4 **UTILITIES COMMISSION OF OHIO?**

5 A. Yes. I have provided testimony in previous cases related to energy efficiency, a
6 revenue decoupling pilot, and Duke Energy Ohio's SmartGrid deployment.

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

9 A. The purpose of my testimony in this proceeding is to support the Company's
10 proposal for a Smart Cities Infrastructure Acceleration Program for inclusion
11 within the Company's infrastructure modernization plan that was authorized by the
12 Commission in Case No. 17-32-EL-AIR, *et al.* (Infrastructure Modernization
13 Plan).¹ In doing so, I explain the purpose of the Smart Cities Infrastructure
14 Acceleration Program and why it should be included as part of the Company's
15 Infrastructure Modernization Plan for recovery under component three (3) of the
16 previously approved Power Forward Rider (Rider PF).

II. BACKGROUND

17 **Q. PLEASE BRIEFLY DESCRIBE THE COMPANY'S RIDER PF AND THE**
18 **INFRASTRUCTURE MODERNIZATION PLAN.**

19 A. As more fully explained by Duke Energy Ohio witness, Amy B. Spiller, the Rider
20 PF was approved by the Commission as part of a global settlement of numerous
21 proceedings that were pending before the Commission, including but not limited to

¹ *In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in its Electric Distribution Rates, et al.*, Opinion and Order, pp. 84-85 (December 19, 2018)

1 a base electric rate case, an electric security plan, and several other dockets
2 (Consolidated Cases).² The purpose of Rider PF was to recover costs associated
3 with the “evolution of the distribution grid and an enhanced customer experience.”³
4 Rider PF was designed to have three distinct components, the third of which is an
5 Infrastructure Modernization Plan.

6 **Q. PLEASE EXPLAIN WHY DUKE ENERGY OHIO IS REQUESTING THE**
7 **APPROVAL OF THE SMART CITIES INFRASTRUCTURE**
8 **ACCELERATION PROGRAM AS PART OF ITS INFRASTRUCTURE**
9 **MODERNIZATION PLAN.**

10 A. The Smart Cities Infrastructure Acceleration Program is consistent with the goal of
11 the Infrastructure Modernization Plan in that it will further the evolution of both
12 the distribution grid and enhancement of the customer experience. The Smart Cities
13 Infrastructure Acceleration Program enables Duke Energy Ohio to innovate and
14 modernize the outdoor lighting infrastructure of its distribution system to help the
15 cities and the customers located in those cities, to enjoy the benefits of a smart city.

16 As stated in PowerForward: A Roadmap to Ohio’s Electricity Future, “The
17 PUCO has shifted its focus to the distribution system and, specifically, how the
18 distribution system can be improved through innovation to better the lives of
19 Ohioans. Hence, PowerForward. PowerForward is the PUCO’s grid modernization
20 endeavor built upon the pairing of two pillars: (i) innovation; and the concept that

² Id.

³ Id. at 84.

1 this innovation should serve to (ii) enhance the customer electricity experience.”⁴
2 The Smart Cities Infrastructure Acceleration Program will further both of these
3 Commission-established pillars by providing an adaptable digital electric delivery
4 infrastructure capable of supporting Smart City technologies that are desired by our
5 municipal partners throughout the Company’s southwestern Ohio service territory.
6 This approach embraces the platform concept described in PowerForward “a stable
7 collection of components . . . provide[s] fundamental or commonly needed
8 capabilities and services to a variable set of uses or applications.”⁵ Duke Energy
9 Ohio will provide a platform—the street lighting infrastructure—that will enable
10 each individual city to adopt the applications necessary to address that city’s unique
11 circumstances and priorities.

12 **Q. PLEASE EXPLAIN WHAT DUKE ENERGY MEANS BY “SMART**
13 **CITIES” AS DISCUSSED IN YOUR TESTIMONY IN THIS PROCEEDING.**

14 A. The term “smart cities” can mean different things to different people, but for the
15 purposes of my testimony, I am referencing cities that employ new technologies to
16 operate more safely, efficiently, and effectively. Some examples of technologies
17 associated with this term include but are not limited to:

- 18 • Security/Safety Cameras
- 19 • Pedestrian counters
- 20 • Traffic control devices
- 21 • Environmental sensors (air quality, temperature, hazardous gases, etc.)

⁴ Ohio Public Utilities Commission, *PowerForward: A Roadmap to Ohio’s Electricity Future* (Aug. 29, 2018) (PowerForward Roadmap), available at <https://www.puco.ohio.gov/industry-information/industry-topics/powerforward/powerforward-a-roadmap-to-ohios-electricity-future/>

⁵ *Id.* at 14.

- 1 • Waste management sensors
- 2 • Gunshot detection sensors
- 3 • Parking space monitoring
- 4 • Digital banners
- 5 • Wi-Fi networks
- 6 • Small cell wireless

7 **Q. HOW DOES DUKE ENERGY OHIO'S INFRASTRUCTURE**
8 **ACCELERATION PROGRAM ASSIST THESE TECHNOLOGIES?**

9 A. As I explain later in my testimony, the Company's proposal is to replace existing
10 Company-owned utility pole/streetlighting infrastructure with new infrastructure
11 that can support these technologies. Municipalities that are currently taking tariffed
12 streetlighting service on Company-owned poles, and that desire upgrading to LED
13 lighting and/or deploying smart city technologies, would be responsible for
14 upgrading the infrastructure to accommodate these new attachments. Currently, this
15 additional cost to municipalities discourages such deployment. The Company's
16 proposal will facilitate the replacement of the old equipment with updated
17 infrastructure. This new infrastructure will be in the form of multi-use poles that
18 are capable of supporting far more than the standard streetlighting pole. These
19 multi-use poles will have the capability and strength to hold multiple attachments
20 that are heavier than what standard wooden or metal street lighting structures are
21 capable of handling.

1 **Q. PLEASE EXPLAIN HOW DUKE ENERGY OHIO'S SMART CITIES**
2 **INFRASTRUCTURE ACCELERATION PROGRAM WILL ASSIST ITS**
3 **COMMUNITIES IN ACHIEVING THEIR INDIVIDUALIZED SMART**
4 **CITY GOALS.**

5 A. The market for Smart City technologies is only just developing. While many
6 communities have expressed interest in taking advantage of these technologies, few
7 have the funds necessary to initiate deployment. The Company's program is
8 intended help kick start the deployment of these technologies for our communities.
9 The Smart Cities Infrastructure Acceleration Program provides an opportunity for
10 communities interested in, and committing to, participation in this program, by
11 defraying a portion of the infrastructure upgrade costs necessary to support the
12 various technologies. And as more of these technologies are deployed over time, it
13 is anticipated that such investments for our communities will become more
14 economic, thereby leading to greater deployment.

15 While implementing smart city technologies can help advance a city's goals
16 with respect to public safety, economic development, and urban renewal, many
17 cities are struggling to initiate efforts to launch smart cities due to the large capital
18 investment required. Many smart cities technologies require investing in street
19 infrastructure so that the smart city devices can be appropriately placed to gain the
20 optimum benefit. The most versatile and practical type of street infrastructure is
21 street lighting poles.

22 Street lighting poles provide the ideal locations, height, and power
23 availability that smart cities technologies require and form the backbone of any

1 smart cities initiatives. Poles are increasingly improving in style and functionality.
2 Newer poles, particularly multi-use poles, are sufficiently sturdy to support a larger
3 amount of weight than what more traditional lighting poles could bare. These newer
4 poles enable a far greater number of attachment potential, from meters to other
5 heavier attachments such as digital banners or small cell wireless enabling devices.

6 A recent Forbes article stated, “Smart street lighting is being recognized by
7 many city leaders as a first step toward the development of a smart city. In addition
8 to increasing the energy efficiency of the city and reducing energy costs, carbon
9 emissions, and maintenance costs, intelligent lighting can also provide a backbone
10 for a range of other city applications, including public safety, traffic management,
11 smart parking, environmental monitoring, and extended Wi-Fi and cellular
12 communications.”⁶ By providing smart street lighting with lighting poles that can
13 serve as a supportive backbone of infrastructure for infinite combinations of other
14 smart technologies, Duke Energy Ohio will remove the financial barrier associated
15 with being a lead mover and enable cities within its Ohio service territory to adopt
16 the smart cities concepts most suitable to serve their individual priorities.

17 **Q. HAVE OTHER CITIES USED STREET LIGHTING INFRASTRUCTURE**
18 **INVESTMENTS TO ADVANCE THEIR SMART CITY DEPLOYMENTS?**

19 **A.** I am aware of a number of cities that are in the process of using street lighting
20 infrastructure as a means to transform to a Smart City. However, widespread
21 adoption and deployment of these technologies in Duke Energy Ohio’s service
22 territory has not yet come to fruition as other areas in the Country. Los Angeles,

⁶ Eric Woods, “From Connected Street Lights to Smart Cities,” Forbes, April 6, 2018
(<https://www.forbes.com/sites/pikeresearch/2018/04/06/smart-cities/>)

1 California, for example, is in the process of deploying thousands of smart poles that
2 offer energy efficient LED street lighting as well as accommodating wireless
3 communication technology to facilitate a number of smart city monitoring
4 technologies. In fact, as the city prepares to host the 2028 Olympics, it will soon
5 will be installing a "signature" Olympic-specific smart pole that will contain remote
6 monitoring cameras and sensors to contribute to safety for everyone coming to LA;
7 sensors for people flow levels of light around Olympic venues can be adjusted;
8 digital banners to provide information; Wi-Fi connectivity; USB chargers; EV
9 chargers, and more.

10 Additionally, the city of San Diego, California has begun installing smart
11 multi-use poles to spur its Smart City transition. When talking about the recent
12 decision to not just upgrade the lights on its street light poles but rather upgrade the
13 city's street lighting infrastructure, David Graham, the City of San Diego's deputy
14 Chief Operating Officer said, "Since we were going to be investing and creating a
15 more efficient infrastructure, we asked ourselves how could we also use
16 communications and connectivity to have world-class infrastructure to help us
17 achieve more goals than just the purpose for which the infrastructure was intended.
18 That brings us to another big thing for San Diego, which is our focus on
19 sustainability and climate action. If you take the problem of under-investment in
20 infrastructure, the need to replace those assets, and a key focus on sustainability,
21 street lighting is a perfect place to accomplish many of those goals and leapfrog
22 traditional technologies around illumination."⁷ (Andrews, 2018)

⁷ <https://news.itu.int/san-diego-smart-lighting/> Last accessed September 17, 2019.

III. PROGRAM DESCRIPTION

1 **Q. PLEASE DESCRIBE THE SMART CITIES INFRASTRUCTURE**
2 **ACCELERATION PROGRAM THE COMPANY IS REQUESTING BE**
3 **APPROVED BY THE COMMISSION.**

4 A. As mentioned previously, street lighting poles are an essential component of the
5 deployment of smart technologies and Duke Energy Ohio already owns and
6 operates existing street lighting pole infrastructure in many of the desirable
7 locations for smart cities technologies to be deployed. Therefore, Duke Energy
8 Ohio can more easily and economically accommodate a city's needs regarding the
9 city's desired smart cities technologies attachments. Specifically, Duke Energy
10 Ohio can utilize the existing locations and replace the existing streetlight only poles
11 with enhanced, multi-use street lighting poles that are more robust than standard
12 lighting poles. These multi-use poles can easily accommodate smart cities
13 attachments such as 5G, cameras, sensors, and more in an efficient and aesthetically
14 pleasing manner.

15 **Q. PLEASE EXPLAIN IN MORE DETAIL HOW THE MULTI-USE STREET**
16 **LIGHT POLES ARE CRITICAL TO SMART CITY DEVELOPMENT.**

17 A. In many ways, I think the deployment of smart street lighting infrastructure is
18 analogous to the development of the smartphone. Originally, cell phones solely
19 sought to provide mobile voice communications, just as street light poles have
20 traditionally served the sole purpose of providing illumination in outdoor areas.
21 However, as cell phones began to develop into Smart Phones, they became a
22 platform for a multitude of applications that a user could choose from to customize

1 the “smart” benefits of a mobile device (in addition to mobile voice
2 communications, which cell phones continued to provide all along). In a similar
3 vein, “smart” street lighting poles will continue to provide illumination, but will
4 also enable a multitude of new attachments that can allow the city to develop and
5 adopt its own specific Smart City vision. Similar to early adopters of smartphones,
6 cities who adopt smart street lighting infrastructure early will serve a critical role:
7 they will demonstrate to other cities that such infrastructure (1) is a viable platform
8 for developing new technology and attachments and (2) yields tremendous benefits
9 for city residents, visitors and business located there.

10 **Q. PLEASE DESCRIBE THE SCOPE OF THE COMPANY’S PROPOSAL.**

11 A. Typically, busy urban areas such as shopping centers, malls, city centers, and
12 commercial business centers are ideal areas to install multi-use poles, as well as
13 near arenas that host sporting, music, and other events where large numbers of
14 people gather. Ultimately, participating cities will decide where to locate their
15 multi-use poles and what attachments to install. But as a preliminary means to
16 estimate the scope of the program, Duke Energy Ohio evaluated its existing street
17 lighting infrastructure in the five largest cities within its service territory and
18 determined there are approximately 200 general locations within city centers and
19 major commercial areas that would be potential locations for installing multi-use
20 poles to showcase the value of Smart City applications and facilitate the
21 proliferation of smart cities devices. From its analysis, the Company determined a
22 reasonable scope to enable the deployment of capital to facilitate the proposed

1 infrastructure modernization to support multiple Smart City applications
2 throughout the Company's service territory.

3 Based on its preliminary evaluation, Duke Energy Ohio has had initial
4 conversations with the city of Middletown about being the first participant in the
5 pilot and deploying up to 30 multi-use poles within the city footprint. Depending
6 upon the scope of other proposals that may be proffered by municipalities in the
7 Company's service territory, the remaining funds in the "pilot" would be available
8 in a similar manner. The Company estimates, assuming each installation requires a
9 multi-use pole upgrade, approximately 170 multi-use poles will be available to
10 other cities on a first come first serve basis until all of them are deployed and
11 showcasing the benefits of Smart Cities.

12 Duke Energy Ohio will collaborate with cities interested in deploying Smart
13 City technologies. In order to participate, cities will need to develop a proposal and
14 commit to deploy technologies to (1) identify and replace existing streetlight poles
15 in strategic locations that would benefit most from multi-use poles or other
16 infrastructure upgrades necessary to accommodate Smart City technologies and (2)
17 ensure that the infrastructure is suitable to support the desired Smart City
18 technologies. Once the cities develop a plan, the Company and the City together
19 will come to the Commission with details on the deployment.

20 **Q. WHY DOES THE COMPANY NEED TO REPLACE INFRASTRUCTURE**
21 **TO SUPPORT SMART CITY TECHNOLOGIES?**

22 A. Multi-use poles capable of supporting Smart City Technologies are a relatively
23 recent development. In many instances, the streetlighting infrastructure that is

1 currently in place pre-existed the development of these Smart City devices and thus
2 is not capable of supporting the advanced technologies, either from a wiring
3 perspective, or from a physicality perspective. Many advanced technologies, such
4 as digital banners and small cell devices are heavy and not structurally supportable
5 with existing infrastructure. In some cases, if feasible, the Company will work with
6 the cities to use the funds on other types of pole upgrades that could satisfy the
7 incorporation of the desired smart city functionality short of replacement with a
8 multi-use pole.

9 **Q. PLEASE DESCRIBE THE APPEARANCE AND FUNCTIONALITY OF**
10 **THE PROPOSED INSTALLATIONS.**

11 A. The new poles would be “attachment ready” as well as aesthetically pleasing,
12 matching the “look” of the surrounding area while providing the necessary
13 attachment capability for wireless, cameras, and other smart city associated
14 technologies. Attachment TJD-1, includes photographs of examples of multi-use
15 poles that host and conceal the wireless radios and the associated wiring and
16 attachment equipment via internal raceways. Some raceways inside these poles are
17 dedicated for electrical circuits while others are for communication wiring. These
18 poles also easily accommodate additional attachments such as cameras. Duke
19 Energy has already begun discussing with multi-use pole vendors how they might
20 customize poles to match the appearance of some of our most popular decorative
21 street light poles, so as to better thereby accommodate the various aesthetic needs
22 of each city.

1 **Q. AS PART OF THIS PILOT WILL DUKE ENERGY OHIO ALSO PROVIDE**
2 **THE ATTACHMENTS AND SMART CITY COMPONENTS YOU**
3 **DESCRIBED?**

4 A. No. This proposal is solely to ensure the infrastructure is available for these cities
5 to support the technologies. Given the broad array of technologies and attachments
6 available and an individual city's Smart City objectives, the city itself will have the
7 flexibility to choose the desired technology, whether it is shot spotting, traffic
8 control, small cell, etc., as well as conducting the process to select the provider that
9 is going to supply these services. The Company recommends that the cities
10 interested in participating would use an RFP process to help drive awareness and
11 market participation for the technologies. The vendors selected by the cities, or the
12 cities themselves will simply attach the devices to the infrastructure and the devices
13 will be powered in accordance with the Company's applicable tariffs.

14 **Q. WILL DUKE ENERGY OHIO MONITOR OR MANAGE THE TYPES OF**
15 **ATTACHMENTS?**

16 A. Yes, consistent with the protocols associated with its existing street lighting
17 infrastructure, Duke Energy Ohio will monitor the attachments to its poles to ensure
18 that the integrity of the pole is not compromised. Additionally, in order to ensure
19 the poles remain structurally safe in terms of the number of attachments, the
20 municipalities will enter into an attachment agreement with negotiated attachment
21 rates based upon the type and number of attachments desired per pole. To the extent
22 the attachments require electricity, each will be placed upon the appropriate tariffed
23 rate for the attachment.

1 **Q. PLEASE DISCUSS THE COSTS ASSOCIATED WITH THE PROPOSED**
2 **SMART CITIES INFRASTRUCTURE ACCELERATION PROGRAM**
3 **THAT THE COMPANY IS PROPOSING AS A COMPONENT OF ITS**
4 **POWER FORWARD RIDER.**

5 A. The Company is proposing to include \$5 million in its Infrastructure Modernization
6 Plan for recovery under Rider PF associated with the Smart Cities Infrastructure
7 Acceleration Program. This projected cost will include the planning, design, project
8 management, construction, as well as the multi-use pole itself. The actual cost per
9 location will vary based on the specific location of the installation. Where a lighting
10 pole already exists in the desired location for smart city infrastructure, the cost of
11 the multi-use pole will include the removal of the existing street light only pole
12 because street light only poles are incapable of supporting the weight of wireless
13 attachment equipment and cannot accommodate other types of smart cities
14 attachments. Where a desired location does not already host an existing light pole,
15 the pilot will include the necessary costs associated with meeting the power
16 requirements at the location. These are just some of the variables that will lead to
17 significant differences in cost by location, which is why detailed engineering
18 planning, design and project management will be required to manage these multi-
19 use pole installations. Should the costs of a multi-use pole deployment exceed
20 \$25,000, the city would be expected to pay the additional costs.

1 **Q. HOW WILL DUKE ENERGY IMPLEMENT THE SMART CITIES**
2 **INFRASTRUCTURE ACCELERATION PROGRAM?**

3 A. After receiving Commission approval for the proposal, the Company will continue
4 to work with Middletown to make its initial deployment of the multi-use poles and
5 will reach out to other key city leaders within its service territory to identify
6 additional potential deployment opportunities. The Company will then work
7 closely with interested cities to define the scope of their smart cities' needs and
8 priorities, including determining the exact spots within these general locations in
9 which they wish to place multi-use poles to support smart attachments. Cities will
10 have to commit to a deployment scope and have a plan for the technologies they
11 wish to have implemented. This may require city-issued requests for proposals of
12 third parties to provide the services desired. The Company will collaborate with
13 cities to ensure their proposals are feasible given the multi-use poles and locations
14 selected.

15 After the cities select exact locations, Duke Energy will engage its lighting
16 design team to create the overall project plan and timeline for each city with the
17 detailed project components scoped out. Duke Energy will conduct field
18 inspections to determine the complexity involved in the work at each site, as well
19 as an evaluation of the existing surrounding area lighting infrastructure to determine
20 the multi-use poles that will provide the best possible "look" and "fit" to the areas.
21 Once the lead times for the installation of appropriate type of multi-use poles are
22 determined, as well as the electrical design and site work requirements for the sites,

1 then the project timelines can be completed and this information will be shared with
2 the cities.

3 **Q. HOW DOES THE COMPANY PROPOSE TO RECOVER COSTS FOR**
4 **THIS PROGRAM?**

5 A. Duke Energy Ohio witness Jay Brown will explain how such costs will be
6 recovered in rates.

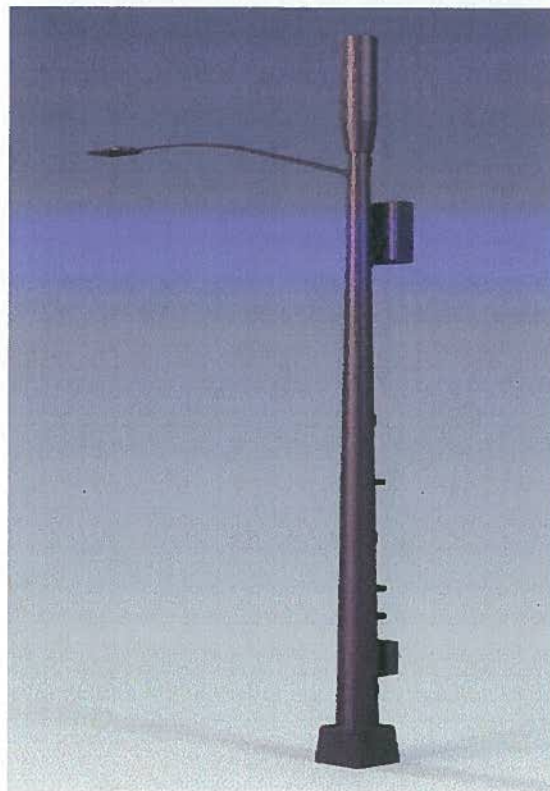
IV. CONCLUSION

7 **Q. WAS ATTACHMENT TJD-1 PREPARED BY YOU AND UNDER YOUR**
8 **DIRECTION AND CONTROL?**

9 A. Yes.

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

11 A. Yes, it does.



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Case No(s). 19-1750-EL-UNC, 19-1751-GE-AAM

Summary: Testimony Direct Testimony of Timothy J. Duff electronically filed by Mrs. Debbie L Gates on behalf of Duke Energy Ohio Inc. and D'Ascenzo, Rocco O. Mr. and Kingery, Jeanne W and Watts, Elizabeth H and Vaysman, Larisa