DUKE ENERGY OHIO EXHIBIT_____

BEFORE THE

PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in Gas Rates.	)))	Case No. 12-1685-GA-AIR
In the Matter of the Application of Duke Energy Ohio, Inc., for Tariff Approval.	))	Case No. 12-1686-GA-ATA
In the Matter of the Application of Duke Energy Ohio, Inc., for Approval of an Alternative Rate Plan for Gas Distribution Service.	))))	Case No. 12-1687-GA-ALT
In the Matter of the Application of Duke Energy Ohio, Inc., for Approval to Change Accounting Methods.	)))	Case No. 12-1688-GA-AAM

SUPPLEMENTAL DIRECT TESTIMONY OF

ANDREW C. MIDDLETON

ON BEHALF OF

DUKE ENERGY OHIO, INC.

_____ Management policies, practices, and organization

_____ Operating income

_____ Rate base

_____ Allocations

_____ Rate of return

_____ Rates and tariffs

__X_____ Other: Manufactured Gas Plants

February 25, 2013

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I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Andrew C. Middleton, and my business address is P.O. Box 58, Mount Sidney, VA 24467.

Q. ARE YOU THE SAME ANDREW C. MIDDLETON WHO PREVIOUSLY SUBMITTED DIRECT TESTIMONY IN THESE PROCEEDINGS?

A. Yes.

Q. WHAT IS THE PURPOSE OF THIS SUPPLEMENTAL DIRECT TESTIMONY?

A. The purpose of this Supplemental Direct Testimony is to supplement my previous testimony submitted July 20, 2012, and with regard to this matter to support the objections of Duke Energy Ohio, Inc., (Duke Energy Ohio or the Company) to certain findings and recommendations contained in the Report by the Staff of the Public Utilities Commission of Ohio (Staff) issued in these proceedings on January 4, 2013 (Staff Report). My previous testimony was about the history of manufactured gas in general. This testimony provides information about the historical use of the East End and West End sites of the Cincinnati Gas & Electric Company (CG&E) in the supply of gas and the current remediation efforts underway at these sites.

Q. HAS OTHER TESTIMONY BEEN SUBMITTED ON THESE TOPICS?

A. Yes. Jessica Bednarcik of Duke Energy provided information on these topics in her Direct Testimony of July 20, 2012 and in her Supplemental Direct Testimony filed contemporarily with this testimony.

Q. PLEASE SUMMARIZE YOUR SUPPLEMENTAL DIRECT TESTIMONY.

A. My Supplemental Direct Testimony summarizes how these sites and the facilities thereon were historically used and are currently used by the Company in providing utility service. While both sites, especially West End, have undergone numerous changes and are also utilized for other Duke Energy Ohio utility services, gas has been supplied to Cincinnati and surrounding areas, utilizing equipment at East End and West End, since the 1800s. Gas was manufactured at both sites using different processes at different times, resulting in the generation of residuals other than gas as was typical of these operations. The management of the residuals appears to have followed common industry practices at the time of operation. The steps that Duke Energy Ohio has taken to manage and remediate the residuals, and their constituents, from gas manufacture that remained on the properties have been prudent and consistent with current common industry practices.

Q. PROVIDE AN OVERVIEW OF GAS SUPPLY TO CINCINNATI AREA FROM INCEPTION TO THE PRESENT.

A. The first gas supplied to the Cincinnati area was that manufactured at the West End MGP beginning in 1843. In 1884, gas manufacture began at the East End MGP to increase the supply of gas thereby also establishing a second major distribution point within the area. Cincinnati was supplied only with manufactured gas until 1907 when some of the gas supply began to come from natural gas wells in Ohio. In 1909 natural gas became the sole source of gas as a pipeline from natural gas wells in West Virginia reached Cincinnati. Gas

manufacture was restarted with new equipment at West End in 1918 and at East End in 1925 to supplement the supply of natural gas as needed. Gas manufacture apparently ceased at West End in 1928. In addition to this manufactured gas, other manufactured gas (e.g., coke oven gas) was purchased to supplement natural gas in the time frame of 1928-50. In 1947 a propane gas plant began operation at East End to supplement the supply of natural gas as needed and has continued to operate through the present. After expansion of propane storage capacity in 1963, gas manufacture by coal and/or oil processes (e.g., carburetted water gas and oil gas) at East End ceased. However, the propane gas plant at East End has continued to operate through the present to supplement the natural gas supply as needed. More details about the processes used at West End and East End are provided below.

Q. WHAT HAS BEEN THE RELATIONSHIP BETWEEN MANUFACTURED GAS, NATURAL GAS AND OTHER ENERGY GENERATION AT THE EAST END AND WEST END FACILITIES?

A. The initiation of gas manufacture at the West End facility in 1843 and the East End facility in 1884 established gas service within the Cincinnati area including development of the local distribution piping systems from these two locations and a residential population using gas as a source of energy. In 1907-09 the presence of these facilities provided a basis for the provision of natural gas to the Cincinnati area as natural gas wells in Ohio and West Virginia were developed and the construction of pipeline technology for conveyance of natural gas from these wells became practical. Within ten years of the conversion to solely natural

gas, gas manufacture from coal and oil was restarted as described above to supplement the supply of natural gas during peak demand re-establishing the Cincinnati area as receiving a mixture of natural gas and manufactured gas early in the 20th Century. Supplementation of the natural gas supply with manufactured or propane produced gas has continued through the present with the historical manufacture from coal and/or oil ending at West End apparently in 1928 and at the East End around 1963. Propane produced gas from the East End continues to supplement natural gas through the present.

Storage of gas (manufactured, natural, or mixed gas) in low-pressure, water-sealed gas holders apparently occurred at East End and West End at least until the 1950s and possibly into the 1960s.

Both the East End and West End facilities represent points which are part of present gas distribution systems with a transmission pipeline at West End and a connection at East End to pipeline gas and to the propane gas production facility.

The West End facility became the site of other energy production around 1916, when the decision was made to construct a coal-fired steam electric plant at the West End facility. This decision was logical given the property's ownership by CG&E, its location adjacent to the river, and the cessation (albeit only temporarily) of gas manufacture at this location. Presently, the West End facility continues as an integral part of the interstate gas transmission and regulation system and an electrical energy system providing space in downtown Cincinnati for substations and transmission towers.

In summary, the historical manufactured gas facilities and equipment have been interrelated to natural gas distribution and electrical generation and distribution systems from the first inception of these latter systems through the present.

II. WEST END MGP

Q. PLEASE PROVIDE AN OVERVIEW OF THE HISTORY OF THE WEST END MGP.

A. The West End MGP began gas production in January 1843; one of the earliest MGPs in the U.S. It operated from that time until around 1909 during which time certain expansions of gas-making capacity and gas storage occurred. In 1909 natural gas became available to all of Cincinnati thereby negating the need to manufacture gas, albeit only temporarily. This hiatus of gas manufacture at West End lasted from 1909 until 1918 when the demand for gas in the heating season was such that manufacture needed to be restarted to supplement natural gas. The West End MGP then manufactured gas until 1928 when gas manufacture there apparently ended. Gas holders remained on the site at least through 1956 indicating the storage of gas there. The West End electric generating plant began operation in 1918 and operated until 1976, fueled by coal over the dominant period of its operation (1918-68) and natural gas in its last years (1968-76).

Q. PLEASE DESCRIBE HOW MANUFACTURED GAS MADE AT WEST END?

A. Gas manufacture was solely by the coal gas process using retorts from 1843 until 1893 when the carburetted water gas process was added to the facility. See my Direct Testimony of July 20, 2012, for descriptions of these processes. Gas

manufacture continued until 1909 when the gas distribution system in the Cincinnati area was converted solely to natural gas. In 1918 a newly constructed producer gas plant began operation to supplement natural gas supplies, especially during the heating season. This producer gas plant was apparently a "blue gas plant" based on it being listed as a "water gas producer" on the 1934 Sanborn map. A blue gas plant is effectively the first vessel of a carburetted water gas plant where a lower Btu gas of primarily hydrogen and carbon monoxide is made in a cyclical process consisting first of blowing air through a bed of burning solid fuel (e.g., coal) to heat it until the bed is red hot, then followed by blowing of steam through the red hot bed to make the hot gas, which cools the bed causing the need to repeat the air blowing step. Hot gas processing steps include quenching, cooling and purification. Since this blue or producer gas did not have its heat content increased by addition of oil (i.e., carburetted), it had a lower Btu content suitable for supplementing natural gas supply, but not being a single source of gas for distribution. J.J. Morgan, in his "Textbook of American Gas Practice, Vol. 1: Production of Manufactured Gas," 1931 at p.443, commented on this process: "One of the great advantages of the blue gas apparatus is its adaptability to use as a standby apparatus. It can be brought into operation even when cold in a few hours and can be shut down on a few minutes notice." This plant operated until around February 1928 when it was apparently closed down.

III. EAST END MGP

Q. PLEASE PROVIDE AN OVERVIEW OF THE HISTORY OF THE EAST END MGP

A. The East End MGP began gas production in November 1884, operating from that time until around 1909 when the system was converted solely to natural gas. The hiatus of gas manufacture at East End lasted from 1909 until 1925 when new gas manufacturing equipment was installed to supplement natural gas. The East End MGP then manufactured gas from coal, coke or oil with various modifications until around 1963, when gas manufacture there ended. In 1947 a propane gas plant was installed at East End which continues to operate through the present.

Q. PLEASE DESCRIBE HOW MANUFACTURED GAS MADE AT EAST END?

A. Gas manufacture was by the coal gas process using retorts from 1884 until 1909 when gas manufacture temporarily ended. In 1925, a carburetted water gas process was installed at the restart of gas manufacture. See my Direct Testimony of July 20, 2012, for descriptions of these processes. The carburetted water gas plant operated to supplement natural gas until 1946, at which time it was converted to an oil gas process with the subsequent addition of oil gas equipment. See my Direct Testimony of July 20, 2012, for descriptions of this process. In 1947 a propane gas plant was installed at East End. A propane gas plant vaporizes and blends propane with air to make a gas mixture compatible for distribution with natural gas. Propane is purchased, delivered to East End and placed in storage until needed to supplement natural gas. With the 1963

expansion of propane storage, there was no longer a need to manufacture gas from oil and gas manufacture ended.

Q. WHAT RESIDUALS DID THE WEST END AND EAST END GAS MANUFACTURING GENERATE?

A. My Direct Testimony described the generation of solid and liquid residuals in more detail and I will summarize them here by the types of gas manufacturing processes that operated at these two facilities at different times. The types of residuals found at East End and West End are consistent with the processes described below, as well as the equipment and structures found in the subsurface that would have been used to manufacture gas and handle the residuals generated.

- Coal Gas (East End and West End): The primary residuals were coke, coal tar, ammonia, spent purifier solids (spent lime until the 1880s and spent iron oxides thereafter), ash from the burning of coke beneath the retorts and wastewater effluent.

- Carburetted Water Gas (East End and West End): The primary residuals were carburetted water gas tar, spent purifier solids (spent iron oxides), clinker from the generator vessel and wastewater effluent.

- Producer Gas (West End): The primary residual produced by a blue gas plant was clinker resulting from the ash content of the solid fuel used; analogous to the clinker from the carburetted water gas process. Other residuals included tar and spent iron oxides.

- Oil Gas (East End): The primary residuals were oil gas tar, spent purifier solids (spent iron oxides), clinker from the generator vessel and wastewater effluent.

- Propane Gas (East End): There are no solid or liquid residuals from this process.

- Boiler Ash (East End and West End): Where ash-containing fuel (e.g., coal) was used to produce steam at any of these plants, boiler ash would also be a residual.

Q. PLEASE EXPLAIN HOW THE RESIDUALS WERE MANAGED AT WEST END AND EAST END DURING THE MGP OPERATION TIME PERIOD AND DURING THE DEMOLITION OF THE STRUCTURES.

A. Based on the historical information that has been found about these two facilities, it appears that residuals were managed in a manner consistent with the practices I described for the industry in general in my Direct Testimony of July 20, 2012. For example, historic Sanborn maps show the presence of tar wells and separators and tar tanks on the East End and West End MGPs indicating the presence of equipment for tar recovery and storage. In addition, on the 1904 East End Sanborn shows the presence of the B.P. Clapp Ammonia Co. adjacent to the East End property which would be consistent with the manufacture of coal gas at that time from which ammonia could be recovered as a byproduct. A 1963 CG&E site drawing of East End shows the presence of tar recovery and management equipment and facilities.

The 1958 CG&E history includes the following information about residuals management:

- "The sale of coke and tar began in the early 1840's ..." Coke was sold under contract to local coal companies and tar was sold to chemical companies in Cleveland and St. Louis. [p.128]
- The first annual report issued January 1, 1847 noted that construction in 1846 included a new holder of 37 Mcf capacity and a tar well of 200 barrel capacity. [pp.15-16]
- The North and South Works had been consolidated in 1863. The plant was spread over lots on both sides of Front Street and "extending as far north as 2nd Street. Half of the manufacturing was done on the south side ... and half was done on the north side ... Three new holders and ample tar tanks were also built ..." [pp.63-64]
- Around 1874 ammonia began being sold to chemical companies in Cleveland and St. Louis. [p.128]
- Around 1890, the sale of by-products (ammonia, coke, and tar) constituted around 19% of gross revenues. [p.128]

Information has been found in historic newspapers. An article (May 18, 1885) in the Cincinnati Evening Post reported "The [Forest City Chemical] works were built about a year ago, and took all the tar of the Cincinnati Gaslight & Coke Co., amounting to 900,000 gallons." An article (April 15, 1886) in the Cleveland Leader Herald stated that "... in an agreement entered into on June 19, 1880, the

[Standard] chemical company undertook to receive all the ammoniacal liquor manufactured by the gas company during the ensuing five years. ... The gas company in pursuance of the contract erected a tank capable of holding 60,000 gallons, it being understood that they were not to be held responsible if the accumulation exceeded that quantity and were authorized to allow the surplus to go to waste."

All of the above historical information is consistent with the practices of the MGP era as described in my Direct Testimony. As further described in my Direct Testimony, it was the handling and disposition of residuals that resulted in releases of materials or their constituents to the East End and West End MGPs that resulted in levels on the sites that by current laws and regulations require remediation.

Q. WAS THE TIMING OF THE INITIATION OF INVESTIGATION AND REMEDIATION EFFORTS ON THE EAST END AND WEST END SITES REASONABLE?

A. Yes it was. As described in Jessica Bednarcik's Supplemental Direct Testimony, reprioritization of the East End site occurred in 2006 due to anticipated changes in the pathways by which people could be exposed to chemical constituents at the site resulting from nearby residential development and onsite projects. It was reasonable to initiate and proceed with addressing this site in its entirety following these changes to address conditions in advance of the development of the new exposure pathways. As further described by Ms. Bednarcik, reprioritization of the West End site in 2009 occurred when the recommended location of the new Brent

Spence Bridge was finalized with part of it on the West End site necessitating the relocation of electrical equipment (e.g., substation) to other parts of the West End site. It was reasonable to proceed with addressing this site in its entirety at that time since a major portion of this site's subsurface will be inaccessible with the new bridge or relocated electrical equipment being on top of it greatly limiting, if not eliminating, the ability to address site conditions in the future. These events on these two sites triggered the need to begin the site assessment and remediation (SAR) process described in my Direct Testimony of July 20, 2012, depicted there diagrammatically in ACM-20.

Q. WAS THE APPROACH FOLLOWED FOR INVESTIGATION AND REMEDIATION REASONABLE?

A. Yes it was. As described in Jessica Bednarcik's Supplemental Direct Testimony, the work performed followed the general SAR steps I described in my Direct Testimony including site investigations, selection of a remedy to address risks, regulatory requirements and site conditions, all under the guidance of an Ohio EPA certified professional.

IV. CONCLUSION

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

A. Yes.