The data shown above in Table 5 illustrate the various pressure level systems for each group of services. Most services operate in Duke Energy Kentucky's intermediate and high pressure systems (pressures ranging from 5 psig to 60 psig). Many others continue to operate in the lowest pressure system, Standard Pressure (SP) (7 to 10 inches of water pressure). About 1,300 service lines operate in Duke Energy Kentucky's highest pressure systems where pressures are above 60 psig. Only five service lines are listed as not having a known pressure.

4.4.2 C-M Service Line Pressure Categories

Table 6 identifies the number of service lines at each allowable limits of operating pressure for C-M service lines currently installed in Duke Energy Kentucky's system.

Table 6. Number of C-M Services by Allowable Limits of Operating Pressure

Number of C-M Services by Allowable Limits of Operating Pressure	
SP (7" – 10" W.C.)	13,735
MP (1 – 5 psig)	-
IP (5 – 35 psig)	44,974
HP (15 – 60 psig)	30,188
Feeder (60+ psig)	807
Transmission	227
Unknown	236
Total	**90,167**

Data Source: EGIS file – Services_w_Zip_Codes_Ky.xlsx

In Table 6 above, Duke Energy Kentucky's C-M records are in fair agreement with the records shown in Table 5. Slightly more are listed as serving in a system of unknown pressure. However; there are also nearly 7,000 missing records from those shown in Table 6 since the number of Duke Energy Kentucky's services should total 96,746.

5 Comparison of Risks on Service Lines and Mains

5.1 Risk Considerations for Service Lines and Mains

Lummus Consultants recognizes that the key consideration for pipe replacement programs (either service lines or mains) is the safety of the general public and Duke Energy Kentucky's employees and contractors. Risk to public safety involving piping is typically the result of, and often the product of, three factors. These three factors represent the occurrence of a leak, the ability of the leak to then travel to a building, and the amount of gas that may accumulate at the building:

1. Integrity or condition of the pipe - That is, its propensity for leakage as a result of corrosion, coupling integrity, pipe breaks, or other.
2. Unlike mains, which are located primarily under or adjacent to street surfaces, service lines connect directly to buildings. Gas access to a structure is proportional to the distance that the pipe is from a building. Duke Energy Kentucky's service lines average sixty-five feet in length. This means that a typical main is, on average, no closer than sixty-five feet from customer premises. Leaks located at these distances are less likely to gain access to buildings where customers and the general public may be located. The further away the main, the lower the risk. Service lines, however, extend right up to the buildings where customers and the general public may be located. Leaks along these service lines are closer to the buildings; perhaps right at the wall of the structure.
3. The potential for serious consequence - Larger diameter pipes and higher pressure gas within the pipes raise the stakes considerably for potentially serious consequences.

5.2 First Safety Factor – Pipe Condition

Duke Energy Kentucky's DIMP focuses on pipe integrity. Pipe condition can be assessed through a number of its attributes, including: its tendency to leak or break, its age, and its material. Leaks and breaks in pipes arise from pipe deterioration, due to influences such as: corrosion, differential settlement around joints, and earlier technologies in use.

System-wide, the total pipe condition risks are dependent on a variety of factors, including: (1) mileage of existing pipe, (2) pipe wall thickness, (3) number of piping leaks, (4) number of hazardous piping leaks, (5) age of existing piping, and (6) number of unknown age and unknown material types. Each of these factors is quantified and analyzed separately below.

5.2.1 Pipe Inventory of the Kentucky Systems

Pipe risks are directly proportional to the total existing inventory of the piping. Table 7 shows a comparison of the mileage of Duke Energy Kentucky's service line system to the mileage of it mains system. Also shown in the figure is a similar comparison of the length of all U.S. gas distribution systems.

Table 7. Comparison of Mileage of Service Lines to Mains

Comparison of Mileage of Service Lines to Mains				
	Duke Kentucky (2014)		United States (2013)	
	Miles	Share of Miles	Miles	Share of Miles
Services	1,189	46%	894,643	42%
Mains	1,404	54%	1,254,837	58%

Data Source: Duke Kentucky DOT data Form 7100.1-1 & PHMSA website

The above table indicates that the total mileage of Duke Energy Kentucky's service line piping system is very large; in fact, the service line mileage is close to the total mileage of its mains piping system. The proportion (46%) of service lines to all piping in Duke Energy Kentucky's system is slightly higher than the proportion (42%) found in gas distribution systems across the U.S.

5.2.2 Wall Thickness of the Kentucky Piping Systems

The pipe condition risks are also related to the ability of each piping system to withstand deterioration. Since leaks and breaks in metallic pipes arise from influences such as corrosion and to differential settlement around joints, the thickness of the pipe wall is also directly related to the risk associated with leaks. Service lines, which typically have diameters of ¾ to 1 inch, possess much thinner pipe walls than do mains, which are typically larger diameter (generally in the range of 2 inch to 4 inch or more). These thinner metallic service line pipe walls provide significantly less protection against leaks caused by corrosion or settlement.

5.2.3 Annual Number of Leaks Repaired on the Kentucky Service Line and Mains Systems

Pipe condition can also be measured by the number of leaks that are repaired on each piping system. Since leaks (and breaks) on pipes are a direct measure of current condition; the annual number of reported leaks is also directly related to the risks of the piping system. Table 8 shows in the mains column that the annual number of leaks dropped significantly until the end of the mains replacement program (2010). Since that time, the annual number of leaks has continued to drop; although less steeply.

The service line column; however, shows that the level of leaks is many times higher than the level of leaks for mains and shows little sign of abating. The service line leaks comprised 89% of all piping leaks repaired in the latest year.

Table 8. Number of Leaks per Year Repaired on Duke Energy Kentucky's Piping Systems

Number of Leaks per Year Repaired on Duke Energy Kentucky's Piping Systems			
Year	Annual Number of Leaks on Mains	Annual Number of Leaks on Services	Share of Service Leaks compared to Total Leaks
2005	145	459	76%
2006	124	460	79%
2007	93	459	83%
2008	88	446	84%

Number of Leaks per Year Repaired on Duke Energy Kentucky's Piping Systems			
Year	Annual Number of Leaks on Mains	Annual Number of Leaks on Services	Share of Service Leaks compared to Total Leaks
2009	52	325	86%
2010	49	410	89%
2011	58	407	88%
2012	44	367	89%
2013	46	409	90%
2014	43	335	89%

Data Source: EGIS Leak Repairs-Grade-State-Suburb-Collection.xlsx

5.2.4 Hazardous Leaks on the Kentucky Service Line and Mains Systems

The greatest inherent safety risk can be associated with the number of hazardous leaks that are reported annually on each piping system. Hazardous leaks are Grade 1 leaks. A Grade 1 classification represents an indication of leakage presenting an existing or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous. Information on hazardous leaks has only been collected by PHMSA since 2010; however, the Duke Energy Kentucky EGIS system has captured Grade 1 leaks for all years.

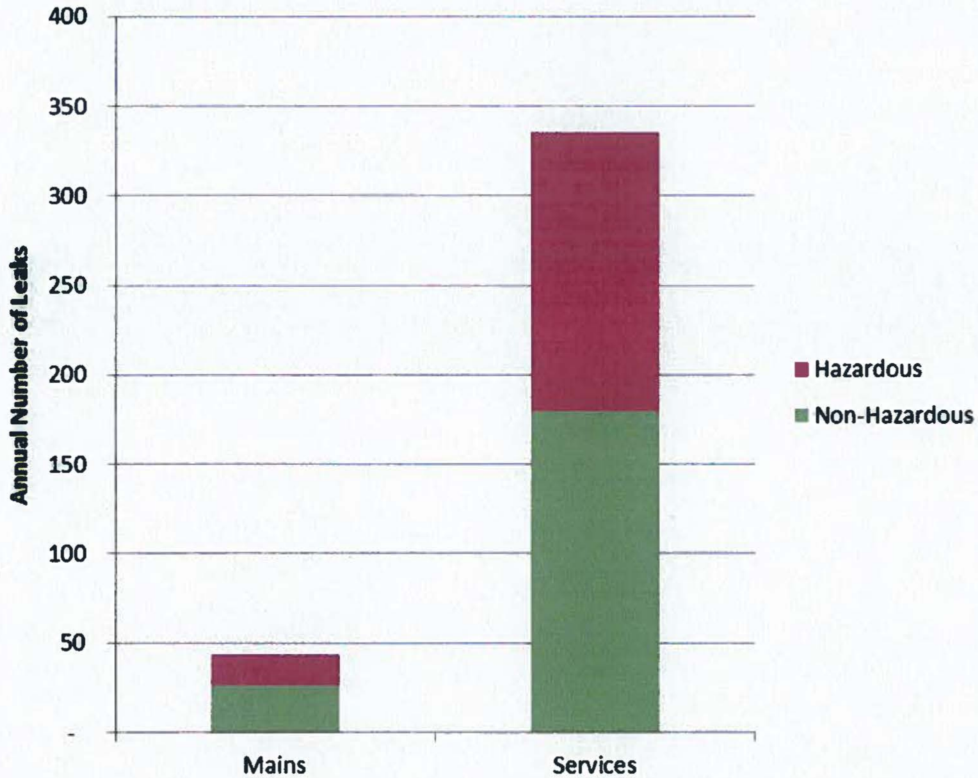
Table 9. Number of Hazardous Leaks per Year on Duke Energy Kentucky's Piping Systems

Number of Hazardous Leaks per Year on Duke Energy Kentucky's Piping Systems			
Year	Annual Number of Hazardous Leaks on Mains	Annual Number of Hazardous Leaks on Services	Share of Hazardous Service Leaks compared to Total Hazardous Leaks
2005	90	297	77%
2006	75	331	82%
2007	45	297	87%
2008	51	251	83%
2009	20	174	90%
2010	23	145	86%
2011	24	150	86%
2012	22	150	87%
2013	21	179	90%
2014	17	155	90%

Data Source: EGIS Leak Repairs-Grade-State-Suburb-Collection.xlsx

Table 9 shows that since the end of Duke Energy Kentucky's AMRP in 2010, the number of hazardous leaks has been fairly stable for mains. The service line column, however, shows that the level of hazardous leaks is many times higher than the level of leaks for mains and has not declined since 2010. The service line hazardous leaks were 90% of all hazardous leaks in the latest year. Figure 10 illustrates this relationship.

Figure 10. Number of Leaks on Duke Energy's Kentucky Piping Systems (2014)



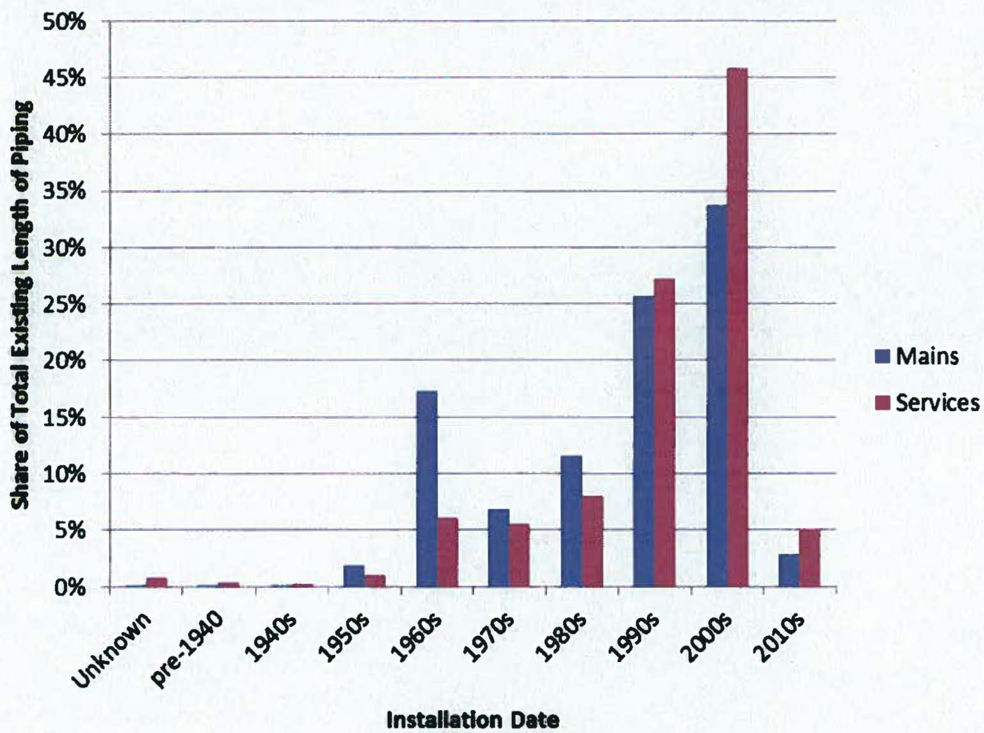
Data Source: EGIS Leak Repairs-Grade-State-Suburb-Collection.xlsx

5.2.5 Age of Existing Piping in the Kentucky Service Line and Mains Systems

Another measure of the risks inherent in pipe condition can be measured by the age of the existing piping, since pipe deterioration factors such as corrosion, coupling integrity, breakage, or differential settlement around joints increase with age.

Figure 11 shows that Duke Energy Kentucky's service lines are approximately the same age as their mains. They are of quite comparable numbers, particularly in the oldest (and most important) decades. However, as shown in section 5.2.2, metallic service line pipes do not have as much wall thickness as mains, and therefore would reach a critical (*i.e.*, failing) thickness sooner than mains under the same deterioration influences (such as corrosion). Also, Duke Energy Kentucky's records on the age and condition of services are not as complete as those for mains; particularly for the homeowner-owned portion of the service line. Thus it is important to act on the side of safety since some lines could be older than Duke Energy Kentucky's records indicate.

Figure 11. Installation Date of Duke Energy Kentucky's Current Piping Systems



Data Source: Duke Kentucky DOT data Form 7100.1-1

5.2.6 Number of Unknown Age and Unknown Material Types

Another factor that must be taken into account when assessing risk is the completeness of records. Duke Energy Kentucky maintains records on all of its mains. Records of certain service line ages or types of material are not as complete, due primarily to historical homeowner ownership of a portion of the line. Therefore, this risk factor is greater for service lines than it is for mains.

5.3 Second Safety Factor – Gas Access to Buildings

Unlike mains, which are located primarily under or adjacent to street surfaces, service lines connect directly to buildings. These include not only single-family residences, but also high-occupancy structures, such as apartment buildings, hospitals, nursing homes, restaurants, shopping malls, movie theatres, houses of worship, etc. For this reason, the second risk factor applies more to service lines than it does to mains, which are normally not installed near buildings.

Gas access to a premise is proportional to the distance that the pipe is from a building. Duke Energy Kentucky's service lines average sixty-five feet in length. This means that a typical main is on average no closer than sixty-five feet from customer premises. Leaks located at these distances are less likely to gain access to buildings where customers and the general public may be located. The further away the main, the lower the risk.

Service lines, however, extend right up to the buildings where customers and the general public may be located. Leaks along these service lines are closer to the buildings, perhaps right at the wall of the structure.

5.4 Third Safety Factor – Potential for Serious Consequences

The potential for serious consequences arises from two measures: pipe size and pipe pressure. Both of these measures figure into the amount of gas that would escape when a leak or break occurs in a pipe. Service lines are not as large (in diameter) as are mains. This one measure of relative size lowers the potential for serious consequences for service lines. However, the second measure (gas pressure) is equal for both mains and for service lines.

Similar to mains, service lines typically operate under the same pressure as the mains they are connected to. Pressure is not normally reduced in a service line until it reaches the building where a regulator reduces the pressure before entering the meter. For this reason, the risks associated with pressure levels apply equally to service lines as they do to mains.

Noting the factors above and risks they present to the general public, as well as to Duke Energy Kentucky's employees, contractors, and to emergency responders; the replacement of service lines is an appropriate measure, particularly as in a planned pro-active accelerated program.

5.5 Summary of Risks on Service Lines versus Risks on Mains

As described above, there are five factors contributing to higher risks on services than on mains:

- Pipe walls are thinner on service lines;
- Annual number of leaks is higher on service lines;
- Annual number of hazardous leaks is higher on service lines;
- Service line piping is closer to buildings than mains piping; and
- Considerable number of services of unknown age and unknown material type.

There is one factor resulting in higher risks on mains than on services:

- Mains are larger in diameter than service lines

There are also three factors resulting in comparable risks on services and mains:

- Pipe mileage for service lines is comparable to mileage of mains;
- Age of service lines is comparable to age of mains; and
- Pressure levels are identical on mains and on service lines.

6 Accelerated Replacement Considerations

6.1 Accelerated Service Line Replacement Programs

Duke Energy Kentucky, like most LDCs, replaces a small number of service lines based on their condition and judged level of obsolescence. These replacements are included in rate base proceedings for reimbursement of expenses.

In the last decade or so, another reimbursement procedure has been adopted in a number of states throughout the U.S. whereby expense trackers have been utilized to provide reimbursement for selected pipe replacement expenditures. This procedure has been encouraged by federal pipeline safety authorities and state commissions that have been concerned with the decaying pipeline infrastructure and a number of serious accidents that have occurred in recent years. By using this accelerated reimbursement procedure, LDCs are incentivized to replace a much larger number of pipes than historically observed.

Duke Energy Kentucky had been authorized by the KPSC to utilize the accelerated replacement procedure for its mains during its 10-year AMRP (see Section 2.2 above). As shown in above figures of this report, the reduction of higher-risk materials in its mains, and resultant reduction in the number of leaks, shows that the AMRP has succeeded exactly as intended.

In 2015, Lummus Consultants was retained by Duke Energy Kentucky to analyze the types of materials in Duke Energy Kentucky's existing service lines and their leak history in order to determine the need for a similar accelerated replacement program for service lines. Such an ASRP would be designed to supplement the success of the Kentucky AMRP.

6.2 PHMSA Justification for Accelerated Replacement Programs

PHMSA has sent a Call to Action to all pipeline stakeholders, including the National Association of Regulatory Utility Commissioners (NARUC) and its members, and in it specifically called on public utility commissions to establish cost recovery mechanisms that effectively address infrastructure replacement costs. A copy of key documents distributed by PHMSA can be found at the link: http://opsweb.phmsa.dot.gov/pipelineforum/docs/PHMSA%20111011-002%20NARUC.pdf. Included is an overview of natural gas ratemaking, a discussion of the need to take prompt action to remediate high-risk pipeline infrastructure, and a description of the various state programs that are being used for that purpose. Also included are definitions and descriptions of the types of piping materials considered high-risk by PHMSA.

In this document PHMSA states: "We believe that the timely repair, rehabilitation, and replacement of high-risk gas pipeline infrastructure are critical to ensuring public safety. A series of recent gas pipeline accidents, including the September 9, 2010 San Bruno, California accident, the January 19, 2011 Philadelphia, Pennsylvania accident, and the February 10, 2011 accident (in Allentown, PA), show the terrible loss of life and property that can occur without adequate attention to the integrity of pipeline infrastructure. PHMSA believes that an effective program for ensuring the timely rehabilitation, repair, or replacement of high-risk gas pipelines might have helped prevent these accidents."

PHMSA often uses the term "high-risk" pipeline segments or infrastructure when describing its replacement targets. PHMSA also regularly cites the three incidents given above when making a case for public safety through the prevention of these types of incidents. Together, the three incidents resulted in fourteen fatalities, thirty-three injuries, thirty-eight homes destroyed, and over two million dollars in other property damage. It is critically important to define and understand the term "*high-risk*" to clarify the objectives that PHMSA and the public would want and the KPSC might support for the ASRP proposed by Duke Energy Kentucky. PHMSA's definition of "high-risk" pipe follows from pages 4 and 5 of their document and is stated below:

"High-risk pipeline infrastructure is piping or equipment that is no longer fit for service. As discussed below, that lack of fitness can be the product of a variety of factors.

a. **Cast iron gas mains and service lines** can be prone to failure as a result of graphitization or brittleness. The installation of cast iron pipe dates to the 1830s, and remained prevalent until the post-World War II period. Many major urban areas, including Philadelphia, PA; Boston, MA; Baltimore, MD; Washington, DC; Detroit, MI; Chicago, IL; and San Francisco, CA, still have cast iron pipe in their natural gas distribution systems.

b. **Certain vintages of plastic pipe** are susceptible to premature failures as a result of brittle-like cracking. In April 1998, the National Transportation Safety Board (NTSB) released a Special Investigation Report on Brittle-Like Cracking in Plastic Pipe for Gas Service. NTSB found that the long-term strength and resistance of plastic pipe to brittle-like cracking may have been overrated for much of the plastic pipe manufactured and installed from the 1960s through the early 1980s. The NTSB also found that any potential public safety hazards from these failures are likely to be limited to locations where stress intensification exists. In response to the NTSB report and subsequent investigations, PHMSA issued four advisory bulletins on the susceptibility of certain kinds of older plastic pipe to brittle-like cracking.

c. **Mechanical coupling installations** are devices that are used for the joining and pressure sealing of two pieces of pipe. These devices are prone to failure under certain conditions. In March 2008, PHMSA issued an Advisory Bulletin (ADB) on the use of mechanical couplings in natural gas distribution systems. The ADB noted that these devices are more likely to fail when there is inadequate restraint for the potential stresses on the two pipes, when the couplings are incorrectly installed or supported, or when components experience age-related deterioration. The ADB also noted that inadequate leak surveys can fail to detect a coupling in need of repair and lead to more serious incidents.

d. **Pipelines lacking adequate construction records** or assessment results to verify their integrity. In January 2011, PHMSA issued an ADB on the need to use traceable, verifiable, and complete records in establishing the maximum allowable operating pressures and developing and implementing integrity management programs for natural gas pipelines. The ADB responded to an NTSB recommendation, which resulted from its investigation of the September 2010 intrastate natural gas transmission line rupture in San Bruno, California, which is discussed below.

e. **Other kinds of pipe installations**, including bare steel pipe without adequate corrosion control (*i.e.*, cathodic protection or coating) and copper piping, are also more susceptible to failure.

f. **Age of pipe** should be considered in determining whether pipeline infrastructure is vulnerable to failure from time-dependent forces, like corrosion, stress corrosion cracking, settlement, embrittlement, or cyclic fatigue."

6.3 Analysis of PHMSA's Recommendations for Accelerated Service Line Replacement Program

Lummus Consultants investigated the 2014 data provided in the DOT Gas Distribution System Annual Reports for Duke Energy Kentucky and earlier years to assess the current inventory of pipe, segmented into the number of service lines, age, operating pressures, as well as size of pipe. This permitted an assessment of the need for a replacement plan for Duke Energy Kentucky, since different pipe sizes and material types may require very different rates of replacement depending on current inventory, leak rate, and age. It also permits an assessment of the types or specific attributes of pipes that should be addressed in a replacement plan.

Lummus Consultants also compared the characteristics of the Duke Energy Kentucky service lines, particularly Duke Energy Kentucky's remaining metallic services, to those identified by PHMSA as being in "high-risk" categories. Lummus Consultants' analysis of Duke Energy Kentucky's service line records indicates that these pipes include five of the six attributes that are included in PHMSA's list of "high-risk" pipeline infrastructure as defined above:

1) Cast iron gas mains and service lines (Duke Energy Kentucky has one cast iron service line in the Commonwealth)
2) Mechanical coupling installations
3) Pipelines lacking adequate construction records
4) Other kinds of pipe installations, including bare steel pipe without adequate corrosion control (*i.e.*, cathodic protection or coating) and copper piping
5) Age of pipe

7 Conclusions

7.1 Duke Energy Kentucky's Service Line Replacements

Lummus Consultants has evaluated the leak patterns shown for service lines (Section 3.4) and for specific causes of service line leaks (Section 3.6). Since these patterns have not shown the degree of abatement in certain causes of leaks (those due to corrosion and materials & welds) that would be expected from replacement trends, we suggest that a program be developed for the replacement of additional service lines, which have the potential to corrode or dislodge from mechanical fittings (see Appendix B).

Lummus Consultants recommends that material types having the potential to corrode or dislodge from mechanical fittings be considered for inclusion in this program. Materials that fit this category include all types of metallic service lines:

- Cast iron
- Steel
- Copper

These service lines should be replaced with modern materials, as is practiced in the industry world-wide.

Duke Energy Kentucky's records indicate that 10,027 (see Section 4.2.1) M-C metallic service lines remain in its service territory as of year-end 2014 as well as 689 service lines of unknown material. Replacement of the metallic service lines and the service lines of unknown material is suggested. (Please refer to Table 2 for specific number of services of each type). This would concurrently address the number of metallic C-M service lines, which are partly undefined due to a large number still remaining under ownership of the property owner.

7.2 Prioritization of Service Line Replacement by Age

Lummus Consultants recognizes that, in addition to quantitative considerations, there are many practical considerations involved in the prioritization of pipe replacements. It is usually preferable, for instance, to group replacements geographically, in order to realize lower costs by minimizing contractor equipment and resource mobilization. Lummus Consultants believes that Duke Energy Kentucky's Operating and Engineering personnel are best positioned to group replacements, capitalizing on their familiarity with the system. These types of considerations should be factored into prioritizing replacements. Lummus Consultants additionally recommends quantitative prioritization based on certain broad measures of leak rates, material type, age, and pressure, as discussed herein.

Lummus Consultants suggests that leak rates on the underground portion of the service lines (excluding riser assemblies, meters, and regulators) be used as the primary metric for prioritization of service line replacements. We have also illustrated two secondary factors for further prioritization for the replacement of Duke Energy Kentucky's metallic service lines: first by age of installation, as shown in Table 10. This table arranges prioritization by age. We do not suggest that older service lines should be strictly prioritized; however, the service lines having the earliest installation dates (*i.e.*, those in the top rows of the table) should be considered for earlier replacement, when all other considerations are equal. We note that we did not have information available that would have permitted Lummus Consultants to analyze the possible correlation between age and leaks on Duke Energy Kentucky's service lines. We have presented however a table showing age versus material types in Table 10. Note that the "unknown" service installation date category is not included in this table, so the total is slightly less than the metallic subtotal in Table 1.

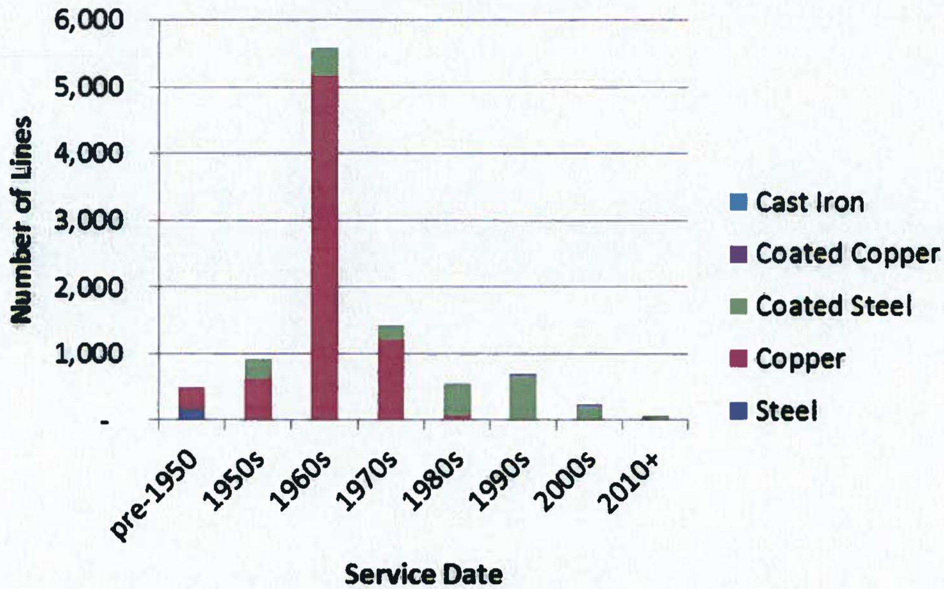
Table 10. Service Installation Date versus Material Type – M-C Kentucky Metallic Services

Service Installation Date versus Material Type – M-C Kentucky Metallic Services						
	Bare Steel	Copper	Coated Steel	Coated Copper	Cast Iron	Total
pre-1950	170	306	4	-	1	481
1950s	8	621	291	-	-	920
1960s	-	5,162	423	-	-	5,585
1970s	-	1,213	225	-	-	1,438
1980s	-	70	484	-	-	554
1990s	-	22	665	1	-	688
2000s	3	5	212	1	-	221
2010+	2	1	69	-	-	72
Total	183	7,400	2,373	2	1	9,959

Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

Figure 12 illustrates the installation date and associated type of metallic material that was used on service lines as tabulated in Table 10. It shows that remaining bare steel services were primarily installed previous to the 1950s; the remaining copper services were primarily installed during the 1960s; and the remaining coated steel services were installed primarily between the 1950s and the 2000s. Duke Energy Kentucky's sole cast iron service dates to the pre-1950s.

Figure 12. Service Installation Date versus Material Type – M-C Kentucky Metallic Services



Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

7.3 Prioritization of Service Line Replacement by Pressure

Lummus Consultants has prioritized Duke Energy Kentucky's service lines also by operating pressure, as shown in Table 11. Again, we do not suggest that higher pressure services should be strictly prioritized; however, the service lines having the highest pressures (*i.e.*, those in the top rows of the table) should be considered for early replacement, with all other considerations being equal.

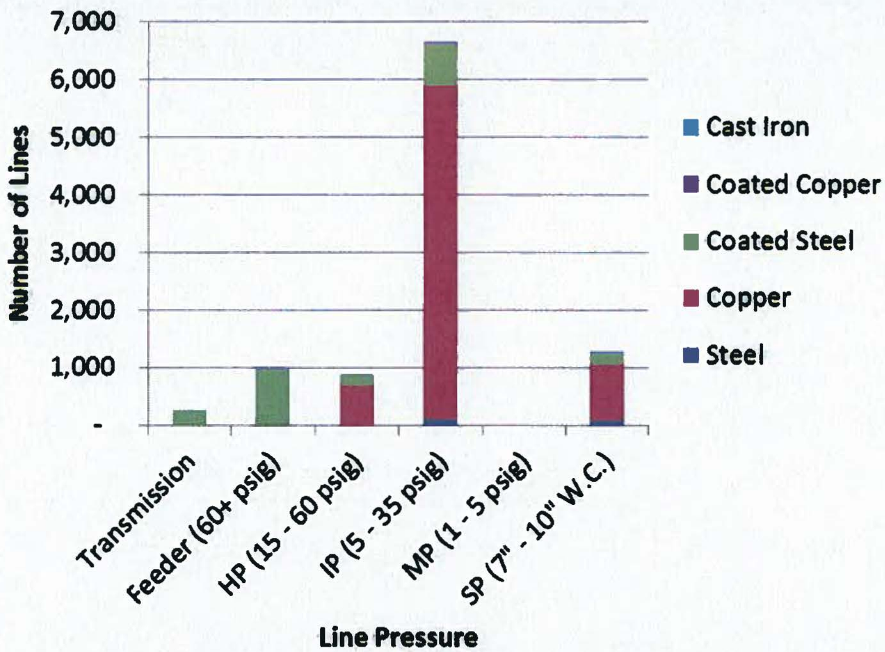
Table 11. Material Type versus Pressure Level – M-C Kentucky Metallic Services

Material Type versus Pressure Level – M-C Kentucky Metallic Services						
	Bare Steel	Copper	Coated Steel	Coated Copper	Cast Iron	Total
Transmission	1	-	263	-	-	264
Feeder (60+ psig)	1	1	982	-	-	984
HP (15 - 60 psig)	-	687	192	-	-	879
IP (5 - 35 psig)	104	5,791	733	2	-	6,630
MP (1 - 5 psig)	-	-	-	-	-	-
SP (7" - 10" W.C.)	80	969	220	-	1	1,270
Total	186	7,448	2,390	2	1	10,027

Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

Figure 13 depicts data from Table 11. It identifies the number of service lines with the indicated operating pressure regimes for the various types of metallic materials. As shown in Figure 13, the remaining bare steel services serve primarily intermediate pressure (IP) and Standard Pressure (SP) pressure levels. The remaining copper services serve primarily the IP and high pressure (HP) pressure levels. The remaining coated steel services serve at all pressure levels. This figure is meant to aid in the selection of service lines for early replacement.

Figure 13. Material Type versus Pressure Level – M-C Kentucky Metallic Services



Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

7.4 Prioritization of Service Line Replacement by Age and Pressure

Lummus Consultants has prioritized Duke Energy Kentucky's service lines by both age and pressure, as shown in Table 12. The metallic service lines with the earliest installation dates, as well as the highest pressure (*i.e.*, those nearest to the top left corner of the table) should be considered for early replacement, with all other considerations being equal. Note that unknown categories for service installation date and pressure level are not included in this table so the total is less than the previous tables.

Table 12. Service Installation Date versus Pressure Level – M-C Kentucky Metallic Services

Service Installation Date versus Pressure Level – M-C Kentucky Metallic Services							
	Transmission	Feeder (60+ psig)	HP (15 - 60 psig)	IP (5 - 35 psig)	MP (1 - 5 psig)	SP (7" - 10" W.C.)	Total
pre-1950	1	1	-	306	-	174	**482**
1950s	-	-	6	769	-	145	**920**

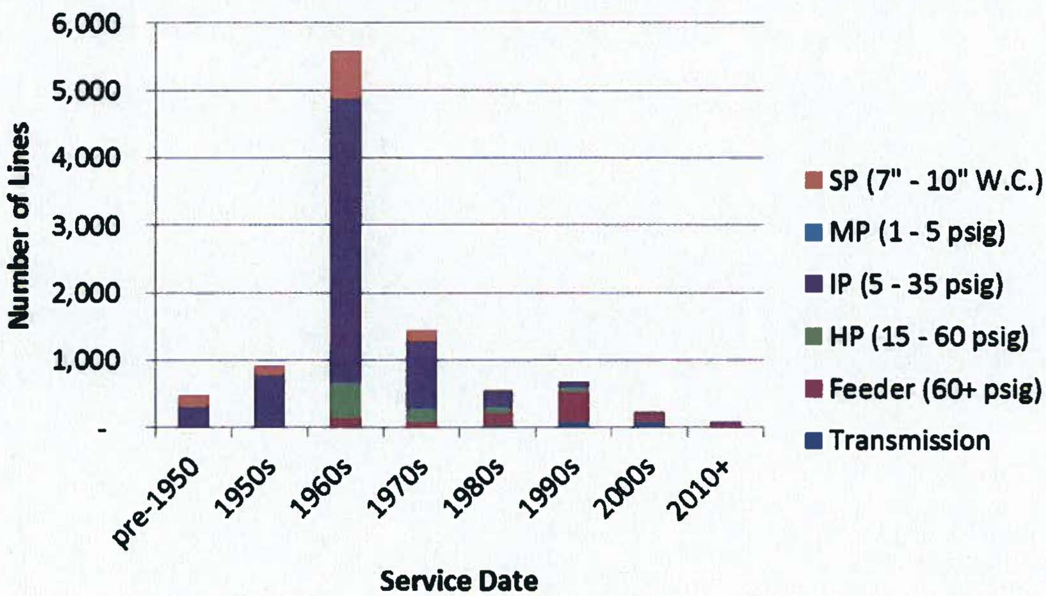
Service Installation Date versus Pressure Level – M-C Kentucky Metallic Services							
	Transmission	Feeder (60+ psig)	HP (15 - 60 psig)	IP (5 - 35 psig)	MP (1 - 5 psig)	SP (7" - 10" W.C.)	Total
1960s	12	122	532	4,205	-	714	5,585
1970s	15	75	197	987	-	164	1,438
1980s	39	180	76	219	-	40	554
1990s	90	436	58	83	-	21	688
2000s	84	116	1	12	-	8	221
2010+	21	45	-	6	-	-	72
Total	262	975	870	6,587	-	1,266	9,960

Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

Service lines closest to the top left corner of Table 12 represent service lines that are both the oldest and those operating at the highest pressure. These would be candidates for prioritization of replacement.

Figure 14 depicts the data from Table 12, identifying the number of metallic service lines categorized by both year of installation and pressure regime. This is a complementary way of choosing candidates for early replacement.

Figure 14. Service Installation Date versus Pressure Level – M-C Kentucky Metallic Services



Data Source: EGIS file - Services_w_Zip_Codes_Ky.xlsx

7.5 Conclusions Regarding the Applicability of an Accelerated Service Line Replacement Program

Lummus Consultants has reviewed the categories of pipes recommended for accelerated replacement programs by PHMSA (Section 5.3). Our analysis of Duke Energy Kentucky's service line records indicates that these lines include five of the six pipe attributes that are included in PHMSA's list of "high-risk" pipeline infrastructure, as defined above:

1. Cast iron gas mains and service lines
2. Mechanical coupling installations
3. Pipelines lacking adequate construction records
4. Other kinds of pipe installations, including bare steel pipe without adequate corrosion control (*i.e.*, cathodic protection or coating) and copper piping
5. Age of pipe

Based on our findings, we conclude that Duke Energy Kentucky's service lines would qualify for accelerated replacement, in adherence to five out of six of PHMSA's priority categories. Such a program should include all of Duke Energy Kentucky's metallic services as well as the small number of services composed of unknown material.

Appendix A List of Documents Reviewed

Section	File Name
Background/Historical Trends	Duke DIMP Plan [DIMP Plan.pdf]
	Duke Kentucky DOT 2005 through 2014 Annual Reports
	DOT Data [PHMSA F 7100.1-1 Gas Distribution System Annual Report.xlsx]
	Duke Leak Repair Data [EGIS Leak Repairs-Grade-State-Suburb-Collection.xlsx]
Comparison of Risks of Services Line and Mains	PHMSA website [http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.6f23687cf7b00b0f22e4c6962d9c8789/?vgnextoid=35d3f5448a359310VgnVCM1000001ecb7898RCRD&vgnextchannel=3430fb649a2dc110VgnVCM1000009ed07898RCRD&vgnextfmt=print]
	ANSI [http://www.engineeringtoolbox.com/ansi-steel-pipes-d_305.html]
	Duke Kentucky DOT data Form 7100.1-1 [PHMSA F 7100.1-1 Gas Distribution System Annual Report.xlsx]
Recommendations	Curb to Meter Duke Kentucky Data [Services_w_Zip_Codes_Ky.xlsx]
	Main to Curb Duke Kentucky Data [Services_w_Zip_Codes_Ky.xlsx]

APPENDIX B - THREAT (CAUSE) DEFINITIONS

2.0 THREAT DEFINITIONS

2.1 Duke Energy has defined each threat category as it applies to its distribution system in order to maintain a consistent application of the threat identification procedure.

2.2 Corrosion - All metallic pipe and components in the distribution system are subject to one or more of the following types of corrosion.

2.2.1 External Corrosion. The threat of external corrosion will be identified where the pipeline is not cathodically protected, where trending shows insufficient cathodic protection or in areas where gas leakage has been identified in the past where the root cause was determined to be external corrosion.

2.2.2 Internal Corrosion. The threat of internal corrosion will be identified only where there is an expectation of liquid being present or liquid was previously found in the facility, or when an internal pipe inspection has shown corrosion to be present on the inside surface of the pipeline.

2.2.3 Atmospheric Corrosion. Atmospheric corrosion is a subset of external corrosion that will occur only on pipe and components that are exposed to the atmosphere. For exposed pipe in areas where only a light surface oxide forms that does not affect the safe operation of the facility (§192.479), the threat of atmospheric corrosion will not be identified.

2.2.4 Stray Current Corrosion. Induced AC current and fault AC current on the pipelines, due to close proximity to overhead high-voltage AC power lines or foreign line crossings, are threats that could lead to external corrosion. Ground Beds and Anode beds are installed at various locations to eliminate or reduce the effects of stray currents. Other stray currents (e.g., foreign DC current sources) could also be threats that could lead to external corrosion.

2.3 Natural Forces - Natural force threats are events which happen naturally, are unpredictable and can cause damage to distribution pipelines. Examples include:

- Ice damage
- Water damage (e.g., floods or heavy rain. associated erosion)
- Earthquake
- Tree roots
- Lightning strikes
- Wind damage (e.g., tornado, straight line)

- Excessive high or low temperatures
- Hill slides, road slides

2.4 Excavation Damage – Except as noted below, buried facilities in the Duke Energy distribution system face the threat of being damaged by excavation activities.

2.4.1 The excavation damage threat generally does not apply to piping within protective casings, inside underground structures such as basins or vaults, or within fenced Duke Energy-owned property.

2.4.2 Mechanical clean out of sewer laterals poses a threat to directionally drilled gas lines, requiring camera work to be performed prior to sewer lateral cleanout being performed. Clean outs or drainage pipes are tagged at the customer's premise with notice to contact Duke Energy prior to sewer work.

2.5 Other Outside Force Damage - Aboveground facilities including the following are considered of primary interest when determining if this threat is present.

2.5.1 Gas piping is close enough to vehicular traffic (e.g., automobiles, trucks, forklifts, construction equipment) where it may be reasonably expected that damage from vehicle movement could occur.

2.5.2 Locations known to be subject to vandalism, destruction, wreckage, sabotage, or other harm (e.g., unauthorized adjustment or valve movement) may be assigned a higher probability of this threat.

2.5.3 Gas facilities impacted by fire or explosion may be assigned a lower probability of this threat since this damage is a result of the fire or explosion, not a cause.

2.6 Material or Welds - This threat occurs due to potential or existing defects in pipe, fittings, components and joints that are introduced during the manufacturing or installation process.

2.6.1 Longitudinal pipe seams made by low-frequency ERW before 1970, electric flash welding, lap welding, hammer welding, or butt welding and fittings or components fabricated by welding may pose a weld-related threat.

2.6.2 Defects within fittings and components from the manufacturing process are material threats.

2.6.3 Certain vintage plastic piping materials in the Duke Energy distribution system such as, low-ductile inner wall DuPont Aldyl A PE pipe are subject to this threat.

2.6.4 Where it can be determined that pullout from a mechanical or compression fitting can be anticipated or a threaded connection is subject to vibration, the joint failure threat will be determined to apply.

2.7 Equipment malfunction - Items of equipment exhibiting possible systemic problems are considered vulnerable to the equipment malfunction threat. Such items may include:

2.7.1 Regulator or relief valves (e.g., failing to perform the intended task or operating outside of the manufacturer's specified tolerances),

2.7.2 Repeated history of:

- Failed flange gaskets.
- Failed O-rings.
- Broken pipe or stripped threads.

2.7.3 Equipment with a history of problems (e.g., a particular style or model of mechanical couplings).

2.8 Incorrect Operation - The threat of incorrect operation may be applicable to construction, operation (e.g., start up or shut down of a pipeline, purging) or maintenance activities (e.g., ignition of escaping gas). This threat is totally associated with personnel performance and does not include the designed operation of a device.

2.8.1 Poor workmanship or outdated methods during the construction or installation process (e.g., acetylene girth welds, wrinkle bends, cast iron joining or inadequate support) are considered within this threat category.

2.8.2 Knowledge of instances where personnel have not followed approved procedures could lead to identification of an inappropriate operation threat.

2.8.3 Human error is possible in performing every activity associated with a distribution pipeline system and is therefore always a threat.

2.9 Other - Duke Energy considers the following an "other" threat and will determine on a case-by-case basis when additional threats are present that are not covered in the above descriptions. "Other" threats will likely be attributable to special circumstances in specific locations on the system.

2.9.1 Incorrect installation (e.g. Horizontal Directional Drill (HDD) through a sewer lateral.)

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LUMMUS CONSULTANTS
INTERNATIONAL

COMMONWEALTH OF KENTUCKY
BEFORE THE
KENTUCKY PUBLIC SERVICE COMMISSION

In the Matter of:

The Application of Duke Energy Kentucky, Inc., for a Certificate of Public Convenience and Necessity Authorizing the Implementation of an Accelerated Service Line Replacement Program, Approval of Ownership of Service Lines, and a Gas Pipeline Replacement Surcharge	)	Case No. 2015-00210

DIRECT TESTIMONY OF

CHARLES R. WHITLOCK

ON BEHALF OF

DUKE ENERGY KENTUCKY, INC.

July 6, 2015

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I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Charles R. Whitlock, and my business address is 139 East Fourth Street, Cincinnati, Ohio 45202.

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

A. I am employed by Duke Energy Business Services LLC (DEBS) as Senior Vice President Midwest Delivery and Gas Operations. I also have continuing responsibilities as President of Midwest Commercial Generation (MCG). DEBS provides various administrative and other services to Duke Energy Kentucky, Inc., (Duke Energy Kentucky or the Company) and other affiliated companies of Duke Energy Corporation (Duke Energy).

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

A. I am a graduate of the University of Alaska at Anchorage with a Bachelor of Business Studies Degree in Accounting. I am also a graduate of the Mahler School Advanced Management Skills Program and the Center for Creative Leadership Developing Strategic Leadership Program. I have also taken advanced course work in business management at Harvard University.

Prior to joining Cinergy Corp. (Cinergy), I was a Senior Power Trader for Statoil Energy. I also held various positions with Vitol Gas and Electric, which included responsibilities for energy trading, marketing and risk management. I joined Cinergy in May 2000 as a power trader for Cinergy Services, Inc. I held positions of increasing responsibility within the trading organization, culminating in the position of Vice President, Power Trading. In 2004, I became Vice President, Portfolio Optimization. In this role, I managed the commodity exposure related to the generation assets. I remained in this position through the merger with Duke Energy. I was named President of MCG (defined above) in October 2009. In March of 2014, I assumed the role of Vice President of Gas Operations. In June of 2015, I assumed my current position, becoming Senior Vice President Midwest Delivery and Gas Operations and added the responsibility for the electric distribution business in Kentucky, Ohio, and Indiana.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AS PRESIDENT, MCG AND SENIOR VICE PRESIDENT, MIDWEST DELIVERY AND GAS OPERATIONS.

A. My responsibilities related to MCG are limited to providing transition services to Dynegy Inc., (Dynegy) as a result of the sale of the Duke Energy Midwest Commercial Generation business to Dynegy, effective April 2, 2015.

One of my main responsibilities, and the reason I am providing this testimony, is because of my leadership role in Gas Operations where I direct the day-to-day natural gas operations of Duke Energy Kentucky and Duke Energy Ohio, Inc. In this role, I am responsible for organizations that deliver the safe, reliable, and economic supply of natural gas throughout our distribution and transmission operations. This includes construction and maintenance, gas engineering, gas supply, integrity management, and performance and compliance management.

Q. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KENTUCKY PUBLIC SERVICE COMMISSION (COMMISSION)?**

A. No.

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

A. My testimony provides a brief overview of Duke Energy Kentucky and our natural gas operations. I provide a summary of the Company's request in this proceeding and also discuss the need for and reasonableness of our proposal to implement our accelerate service line replacement program (ASRP), including the program's benefits to customers. Finally, I introduce the witnesses supporting the Company's application.

II. <u>OVERVIEW OF DUKE ENERGY KENTUCKY</u>

Q. **PLEASE GENERALLY DESCRIBE DUKE ENERGY KENTUCKY'S OPERATIONS.**

A. Duke Energy Kentucky is a regulated utility operating company that provides retail electric services in five counties and natural gas service in seven counties in northern Kentucky. Duke Energy Kentucky's local business office is in Erlanger, Kentucky, with its main business office across the Ohio River in Cincinnati, Ohio. Duke Energy Kentucky serves a relatively densely populated territory that, though not heavily industrialized, includes a fairly diverse mix of industrial customers.

Duke Energy Kentucky currently provides natural gas distribution service to approximately 97,000 customers in Boone, Campbell, Gallatin, Grant, Kenton, Bracken, and Pendleton counties in northern Kentucky. The Company also owns, operates, and maintains approximately 1,490 miles of mains on our natural gas distribution system. Duke Energy Kentucky's gas and electric service territories encompass approximately 2,148 and 700 square miles, respectively. In addition, Duke Energy Kentucky has operational facilities in Covington and Erlanger, Kentucky.

Duke Energy's Gas Operations business is organized into the following functional groups: Gas Resources; Engineering; Field and Systems Operations; Customer Operations; Regulatory Compliance and Performance Support. These functional groups are designed to ensure the safe, reliable, and economic supply of natural gas services to Duke Energy Kentucky's customers. Gas Operations employs approximately 400 individuals who manage the day-to-day operations of both the Kentucky and Ohio businesses. Additionally, Gas Operations has approximately 400 contract employees to assist in our mission.

Q. PLEASE GIVE AN OVERVIEW OF DUKE ENERGY KENTUCKY'S CURRENT RETAIL NATURAL GAS DELIVERY RATES.

A. Duke Energy Kentucky's average gas delivery rates (including the cost of gas) compare favorably to both national average rates and Kentucky investor-owned utility average gas delivery rates. According to the December 2014 Bill Comparison Report provided by the American Gas Association (AGA), Duke Energy Kentucky's gas delivery rates for residential, commercial, and industrial customer classes were below the national average as reported in the survey.

Q. WHEN WAS DUKE ENERGY KENTUCKY'S LAST NATURAL GAS BASE RATE CASE?

A. Duke Energy Kentucky's last natural gas base rate case was in 2009. Since our last general gas rate case, Duke Energy Kentucky has continued to make the capital investments necessary to serve new customers and to maintain and improve the safety and reliability of our natural gas delivery systems. While the Company is continuously looking for opportunities to enhance the safety and reliability of the natural gas delivery system, the Company is also mindful of the impacts those investments have on customer rates and is continually looking for ways to improve our delivery system in a cost-effective and efficient manner.

Q. PLEASE DESCRIBE GAS OPERATIONS' MAJOR SAFETY AND RELIABILITY INITIATIVES.

A. All of the activities within Gas Operations incorporate safety and reliability considerations. Safety and reliability are organizational responsibilities and not the purview of any one part of the organization. For example, the Gas Resources group purchases gas that meets current pipeline quality standards. Gas Engineering designs and installs the Duke Energy Kentucky's natural gas system in accordance with applicable safety codes promulgated in Title 49 of the Code of Federal Regulations. Gas Field and System Operations follows Pipeline and Hazardous Materials Safety Administration (PHMSA) and Commission safety regulations when installing, operating, and maintaining transmission and distribution facilities. This deliberate focus on safety and reliability is also demonstrated by Gas Operations, including our individual functional groups and is evidenced by the Company's exemplary safety record for natural gas distribution service in the Commonwealth.

In addition to these daily safety measures, Gas Operations is constantly exploring opportunities for implementation of programs that focus on safety and reliability, all of which are relevant to these proceedings. The first such program was Duke Energy Kentucky's very successful accelerated main replacement program (AMRP), which was designed to replace the Company's cast iron and bare steel mains and associated services on an accelerated basis. As Duke Energy Kentucky witness Gary Hebbeler explains, the AMRP has significantly reduced leak repairs on Duke Energy Kentucky's gas distribution system and the costs associated with such repairs.

The second, major program is the Accelerated Riser Replacement Program (RRP), which was designed to replace certain types of service head adapter-style risers that have been associated with riser leaks. Mr. Hebbeler also discusses this program, which was completed in 2012, and the Company's effective management of it.

Finally, Duke Energy Kentucky has been focused on Pipeline Integrity Management, which is a comprehensive, risk-based approach to managing pipeline safety that is required for both transmission and distribution systems. Again, Integrity Management requires the entire organization's focus. Mr. John Hill describes these programs in detail in his Direct Testimony.

Q. HOW HAS GAS OPERATIONS PERFORMED ON ITS MAJOR SAFETY AND RELIABILITY MEASURES?

A. Duke Energy's Gas Operations for Kentucky and Ohio have consistently performed in the top quartile, according to AGA reporting criteria for Number of

Outages Affecting Multiple Customers per 1,000 customers in 2007, 2008, 2009, and 2010. Duke Energy was honored as an industry leader in employee safety having received the 2011 AGA Safety Achievement Award for achieving the lowest DART (Days Away, Restricted, or Transferred) incident rate among medium-to large-sized local distribution companies. Duke Energy also was awarded a Safety Achievement Award among Local Distribution Companies from the AGA in 2013.

Q. PLEASE DISCUSS THE COMPANY'S EFFICIENT MANAGEMENT OF ITS GAS OPERATIONS BUSINESS.

A. Duke Energy Kentucky has aggressively investigated and, where justified, implemented new products, technologies, and work methods to increase our productivity. Duke Energy Kentucky and Ohio participate in the AGA's Gas Utility Operations Best Practices Benchmarking Program. In this program, approximately 60-80 gas distribution companies from the United States and Canada routinely benchmark three to five distribution operations topics each year. Duke Energy Kentucky has implemented process improvements and utilized new technology, materials, and equipment as a result of what it has learned through participating in this program. Similarly, Duke Energy Kentucky shares its practices with the other participating AGA members. As a result of this information exchange, Duke Energy's Gas Operations was recognized as a unique performer due to the AMRP and was selected to present at the AGA's Distribution Best Practices Roundtable for Main and Service Replacements in both 2007 and 2010. In addition, Duke Energy's Gas Operations was selected to present at the

AGA's Best Practices Roundtable for Leak Management in 2011, based on Duke Energy Gas Operations' top quartile performance in the following areas: (1) jurisdictional leaks found by leak survey per total jurisdictional leaks reported; (2) total leak survey cost per mile of mains and services surveyed; (3) service repair labor hours per service leak repaired; and (4) leak repair total cost per leak repaired. Duke Energy was selected to present at the AGA's Gas Utility Operations Best Practices Roundtable for Leak Management in 2014, based on Duke Energy top quartile performance in 2013 the following areas: (1) jurisdictional leaks found by leak survey; (2) number of open leaks at the end of the year per 1000 miles of mains and services; (3) number of open leaks at the end of the year per 1000 customers; (4) average age at year end of Grade II leaks in calendar days; and (5) percent of services surveyed in 2013. Duke Energy was also selected in 2014 to present at the AGA's Best Practices Roundtable for Damage Prevention, Marking and Locating for improvements made in our damage prevention program since the previous benchmark in 2011.

Q. IF DUKE ENERGY KENTUCKY'S OPERATIONS AND MANAGEMENT OF ITS NATURAL GAS DELIVERY SYSTEM HAVE BEEN RECOGNIZED FOR ITS HIGH PERFORMANCE, WHY DOES IT NEED TO IMPLEMENT ANY NEW INITIATIVES?

A. Duke Energy Kentucky's customers expect and Duke Energy Kentucky strives to deliver safe, reliable, and reasonably priced natural gas service each and every day. Notwithstanding federal and state regulations and the associated integrity management obligations that require the Company to be ever vigilant in the management of our natural gas delivery system, Duke Energy Kentucky believes that the safety of our system is of the utmost importance. In order to maintain our historic high level of performance, Duke Energy Kentucky must continually evaluate threats to our pipelines and implement strategies to improve our performance. Maintaining current measures and strategies is not enough. That is why Duke Energy Kentucky is pursuing its ASRP initiative.

III. DUKE ENERGY KENTUCKY'S APPLICATION TO IMPLEMENT THE ASRP

Q. WHAT IS THE ASRP?

A. The ASRP is the logical next step in continuing the Company's mission to provide safe, reliable, and reasonably priced natural gas service to our Kentucky customers. The ASRP, like its predecessor AMRP, is intended to replace out of date and aging natural gas delivery infrastructure that has a high likelihood of developing leaks or even failure. By installing new and current industry standard facilities, the ASRP will improve safety and reliability of the gas delivery system. The Company's proposal to take over ownership of these services replaced and relocate interior meters to an exterior location on the customer's premises, it will ultimately improve customer satisfaction, convenience, and reduce costs.

Q. PLEASE EXPLAIN HOW THE PROGRAM WILL IMPROVE SATISFACTION, CONVENIENCE AND REDUCE COSTS TO CUSTOMERS.

A. Scheduling meter inspections with customers whose meters are inside of their homes requires a disruption of the customer's day. Relocating interior services to an exterior part of the customer's premises means Duke Energy Kentucky will have access to these services and the meter for routine inspections and maintenance without having to gain entrance into the customer's home. While this initiative will not relocate all such interior meters, it will touch a significant amount of these services. This, in turn, should result in fewer instances where Duke Energy Kentucky simply cannot gain access to our meters for interior testing and inspection or reading. Some customers with interior services do not permit the Company to have free access to the interior of their home to read the meter on a monthly basis. Appointments must be made at a mutually convenient time for the Company to read or inspect the meter. At times, this process can be frustrating both for the Company and the customer. Today, the cost to relocate interior meters would be borne by the individual customer. By allowing the Company to relocate and replace these services, going forward, these customers will no longer be responsible for the cost to maintain or repair this interior equipment. And, all customers will benefit through the reduction in ongoing expense of reading and inspecting these interior meters and services.

Similarly, by continuing the Company's existing practice of taking over ownership of services once replaced, Duke Energy Kentucky then becomes responsible for all costs of these facilities.

Q. PLEASE BRIEFLY SUMMARIZE DUKE ENERGY KENTUCKY'S APPLICATION AND THE RELIEF REQUESTED IN THIS PROCEEDING.

A. Duke Energy Kentucky's application in this proceeding includes four requests. First, the Company is requesting approval of a certificate of public convenience and necessity (CPCN) to implement the ASRP. Second, the Company is also requesting, as part of this program, authority to relocate interior meters to an exterior location on the customer premises. Third, Duke Energy Kentucky is seeking to continue our existing authority to take over ownership of customer-owned service lines once the Company renews or replaces those services. Finally, the Company is requesting approval to implement a natural gas pipeline surcharge mechanism to recover the costs of instituting the ASRP initiative.

Q. PLEASE DESCRIBE THE COMPANY'S REQUEST FOR A CPCN.

A. Duke Energy Kentucky is requesting that the Commission issue a CPCN and authorize the Company to begin our ASRP initiative in 2016. The ASRP is a key component of the Company's reliability, integrity management, and safety initiatives for our natural gas delivery operations. This program is driven by federal pipeline standards, including those of the United States Department of Transportation's Office of Pipeline Safety and the PHMSA. As part of the Company's integrity management program, the service lines that are targeted for replacement under the ASRP have been identified as a safety risk due to their age, material, and corresponding high likelihood for leakage and breakage. Currently, the Company replaces approximately 200 service lines a year and also in a reactive fashion after leaks are discovered. Under this current process and timetable, it would take nearly fifty years to replace all of the services that have been identified for accelerated replacement as part of the ASRP. The ASRP will allow the Company to replace these older services, on an accelerated basis, using current industry standard materials, before a failure occurs or an emergency situation arises.

Q. PLEASE BRIEFLY EXPLAIN THE COMPANY'S REQUEST FOR AUTHORITY TO RELOCATE INTERIOR METERS ON A CUSTOMER'S PREMISES.

A. As I previously explained, because some of the services that are impacted by the ASRP may also happen to have interior meters, the Company is proposing to relocate those interior meters, where applicable and permissible, to a suitable location outside the customer's premises. By relocating these interior meters to an exterior location on the premises, the Company will be able to reduce the costs associated with maintaining these interior meters and minimize the inconvenience and impact to customers from having to gain interior access on a monthly basis or to conduct estimated reading when interior access is not possible.

Q. PLEASE BRIEFLY EXPLAIN THE COMPANY'S REQUEST TO CONTINUE ITS EXISTING AUTHORITY TO TAKE OVER OWNERSHIP OF CUSTOMER-OWNED SERVICE LINES ONCE THE COMPANY REPLACES THOSE SERVICES.

A. As part of our 2009 natural gas rate case, Case No. 2009-00202, Duke Energy Kentucky received Commission authorization to take over ownership of customer-owned (curb-to-meter) service lines once the services are placed by the Company. Duke Energy Kentucky's request in this regard is simply informing the Commission and our customers of the Company's intent and desire to continue such practice.

Q. PLEASE BRIEFLY EXPLAIN THE COMPANY'S RIDER ASRP.

A. Rider ASRP is simply the mechanism the Company is proposing to recover its costs of implementing the program. This discrete rider will allow the Company to timely recover, and the Commission to review the ASRP initiative costs, as well as the Company's progress on an annual basis. The ASRP Rider also allows the Company and the Commission to avoid the expense and time associated with a full base rate proceeding or multiple consecutive proceedings over the course of the ASRP initiative.

Q. PLEASE DESCRIBE THE BENEFITS OF THE COMPANY'S ASRP INITIATIVE.

A. The ASRP is just one of the Company's strategies for addressing the top integrity risks identified as part of the Company's overall distribution integrity management plan. Duke Energy Kentucky witness John Hill discusses these other initiatives in his Direct Testimony. The ASRP improves pipeline safety by eliminating identified threat of outdated material that has demonstrated to be prone to corrosion and leakage and breakage. The ASRP is cost-effective because it allows for efficient and programmatic utilization of labor. The ASRP improves customer satisfaction by transferring meters outside of homes and transferring ownership of curb to meter lines to Duke Energy Kentucky. Increasing the safety and integrity of the natural gas delivery system benefits all customers. Fewer leaks means fewer instances of outages. The Company's proposal to implement a tracking mechanism for the recovery of costs to implement this program is consistent with the rate design principle of gradualism and will allow the

Company to mitigate any potential for rate shock that customers may experience with a base natural gas rate case, or multiple consecutive rate cases, where all utility costs are adjusted at once. The discrete surcharge mechanism will allow the Company to recover our costs in a way that essentially phases in the rate increase of the program over the five-year term of the program, rather than all at once through a single or multiple consecutive and expensive base rate proceedings.

Q. WHY IS THE COMPANY PROPOSING THIS ASRP NOW?

A. As Mr. Hill explains, the risk posed by the services targeted for replacement under the ASRP was identified as part of, and in accordance with, federal regulations and guidance. Under those regulations, once a system risk is identified, a prudent operator must take action to address and reduce or eliminate those risks. As I previously mentioned, and as discussed by other Company witnesses, the ASRP is thus designed to address one of the most significant integrity risks to the Company's natural gas delivery system, and one in which the Company can control through a systematic and targeted replacement strategy. The failure rate of services due to material and corrosion is the second leading cause of hazardous leaks on the Company's system, second only to leaks caused by third-party excavations. Although the Company has also implemented a strategy to address the risk of excavations through public education and outreach, despite the Company's best efforts, third-party excavation risk is not one that the Company can wholly control. These services risks are controllable, and the sooner the Company takes action, the safer the delivery system will remain.

Q. IN ADDITION TO YOUR TESTIMONY, PLEASE IDENTIFY THE OTHER WITNESSES SUPPORTING THE COMPANY'S APPLICATION.

A. The Company's application is supported by the following witnesses:

- John A. Hill, Jr., Director, Gas Engineering, Gas Operations supports the need for the ASRP initiative from a safety, reliability, and compliance standpoint. Mr. Hill describes the federal pipeline safety regulations that are driving the Company's decision to pursue the ASRP initiative, how the ASRP complies with those regulations, the program budgets and costs, and the benefits that will be achieved from an overall system integrity and customer safety standpoint.
- Gary J. Hebbeler, General Manager, Gas Field and System Operations, describes how the Company will identify and replace the services impacted by the ASRP initiative. Mr. Hebbeler describes the location of the service lines to be replaced under the program and supports the work plan, construction specifications, for the initiative and the five-year construction schedule. He also describes the Company's proposal to relocate interior natural gas meters to an exterior location at the customer premises. Mr. Hebbeler also describes how the Company will manage our costs under the ASRP.
- Peggy Laub, Director, Rates and Regulatory Planning, describes and supports the revenue requirement for the Company's service line replacement surcharge mechanism, the rider ASRP tariff, and the calculation of the ASRP rates and the customer rate impact. Ms. Laub also explains the Company's proposal to establish the initial rider ASRP charges and how the rider will be

trued-up and adjusted on an annual basis while it is in effect.

- Edward A. McGee, from Lummus Consultants International, Inc. will support analysis of the Company's natural gas delivery system and need for the ASRP initiative to replace the services identified as presenting a system integrity risk in a rapid fashion.

V. <u>CONCLUSION</u>

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

A. Yes.

VERIFICATION

STATE OF OHIO)
) SS:
COUNTY OF HAMILTON)

The undersigned, Charles R. Whitlock, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing testimony, and that the answers contained therein are true and correct to the best of his knowledge, information and belief.

Charles R. Whitlock, Affiant

Subscribed and sworn to before me by Charles R. Whitlock on this 1st day of June 2015.

NOTARY PUBLIC

My Commission Expires: 11-19-15

NOTARIAL SEAL
STATE OF OHIO

Julie M. Thompson
Notary Public, State of Ohio
My Commission Expires 11-19-2015