BEFORE THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

In the Matter of the Application of Kansas Gas Service, a Division of ONE Gas, Inc. for Approval of an Accounting Order to Track Expenses Associated with the Investigating, Testing, Monitoring, Remediating and Other Work Performed at the Manufactured Gas Plant Sites Managed by Kansas Gas Service.	)	Docket No. 17-KGSG-455-ACT

DIRECT TESTIMONY

OF

EMMA L. ROMI

ON BEHALF OF KANSAS GAS SERVICE

A DIVISION OF ONE GAS, INC.

JANUARY 3, 2025

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I. POSITION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Emma L. Romi, and my business address is 9400 Ward Parkway, Kansas City, Missouri, 64114.

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

A. I am employed by Burns & McDonnell Engineering Company, Inc. ("Burns & McDonnell"), as a Remediation Section Manager and Project Manager within the Environmental Services Global Practice**.** I am a licensed Professional Geologist in the States of Kansas and Missouri. I am providing testimony on behalf of Kansas Gas Service, a division of ONE Gas, Inc. ("KGS").

Q. PLEASE DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I have an Associate's Degree in General Studies from Metropolitan Community College and a Bachelor of Science Degree in Geology from Missouri State University. With respect to my professional experience, I have worked in the Remediation Section of Burns & McDonnell's Environmental Services Global Practice since August 2017. I was hired as an Assistant Geologist and have since served as a Staff Geologist, Project Manager, and currently as a Remediation Section Manager.

Q. WHAT IS BURNS & MCDONNELL'S ROLE ON THE TWELVE (12) MANUFACTURED GAS PLANT ("MGP") SITES MANAGED BY KGS?

Burns & McDonnell has served as the primary firm providing environmental consulting and remediation services at KGS's 12 Manufactured Gas Plant ("MGP") sites since the early 2000s. In addition to developing overall remediation plans for KGS's MGP sites, Burns & McDonnell assists KGS with the day-to-day environmental management tasks and future planning of each site.

Q. WAS THIS TESTIMONY PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?

A. Yes, it was.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE KANSAS CORPORATION COMMISSION ("COMMISSION")?

A. No, I have not.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

My testimony provides additional support for KGS's request to increase the cap of an accounting authority order previously approved in this docket. In particular, testimony focuses on future remediation efforts KGS is scheduled to perform and the anticipated costs of those efforts. Ms. Janet Buchanan testifies to how the accounting authority order allows KGS to track expenses associated with environmental work performed under Consent Order 94-E-0172 ("Consent Order") issued by the Kansas Department of Health and Environment ("KDHE") for 12 former manufactured gas plant (MGP) sites currently managed by KGS. My testimony addresses four areas:

1) A history of the manufactured gas industry in Kansas;
2) Background information regarding MGP sites managed by KGS;
3) Status of environmentalwWork performed at each MGP site managed by KGS; and

4) The 36-month Tentative Schedule of environmental work at each active MGP site managed by KGS.

III. A HISTORY OF THE MANUFACTURED GAS INDUSTRY IN KANSAS

Q. CAN YOU PROVIDE A BRIEF HISTORY OF THE MANUFACTURED GAS INDUSTRY IN KANSAS?

A. Yes, I can. In 2008, KDHE prepared an article titled "*The Manufactured Gas Industry in Kansas*" which is attached to my testimony and incorporated herein as Exhibit ELR-1. As discussed in this article, between 1869 and 1930, before natural gas was discovered and/or readily accessible throughout the United States, many Kansas towns relied upon manufactured gas to heat homes, cook food, and to utilize for lighting. At the time, manufactured gas was seen as a "state of the art" technology and was the preferable alternative to kerosene lanterns and candles. The presence of a manufactured gas plant within a community was used to attract settlers to the area. A map is included on page 2 of the KDHE article depicting the location of manufactured gas plants in Kansas as well as a list of their years of operation. The demand for manufactured gas began to decline in the 1890s as natural gas became more widely available in the area, but its popularity saw a resurgence in 1910s when natural gas prices began to rise.[1] As electric power increased in popularity in the early 1900s and the invention of the incandescent lightbulb began to replace the need for gas lighting, many manufactured gas plants ceased production, and in 1930, the last manufactured gas plant in Kansas closed.[2]

Q. HOW DID THESE MANUFACTURED GAS PLANTS WORK?

A. A summary of the gas manufacturing process can be found in the 2008 KDHE article

[1] Exhibit ELR-1, pages 1 and 2
[2] Exhibit ELR-1, pages 9 and 10

attached to my testimony as Exhibit ELR-1.[3] As discussed in the article, manufactured gas was produced at facilities called a "gas works." The gas works generally consisted of up to two buildings, coal storage sheds, and a gasholder, also referred to as a gasometer. As described in KDHE's article, gasholders were cylindrical structures with a wooden shell and were often lined with brick or concrete and sealed with hydraulic cement. The holders commonly consisted of two to three telescoping sections that floated on water that filled a large underground tank and rose as the holder filled with gas. Because of this design, gas works engineers could estimate the volume of gas on-hand by observing the height of the holder.[4]

Manufactured gas was produced using two different methods; coal carbonization and carburetted water gas which are described and illustrated in the 2008 KDHE article. The coal carbonization method was an earlier method that primarily utilized oily bituminous coal and steam to produce carbon monoxide and hydrogen gas along with hydrocarbon rich vapors. A diagram of this process can be found on page 5 of the 2008 KDHE article.[5] The carburetted water gas method was developed later in this time period and also utilized coal and steam but included an additional process of spraying crude oil or lighter "gas oil" onto hot bricks within the carburetor to create a gas product rich in hydrocarbons. A diagram of this process can be found on page 7 of the 2008 KDHE article.[6]

Both manufacturing methods used a purification process where the gas was conveyed through purifiers that allowed heavier hydrocarbons to condense and be filtered out to create the byproduct coal tar. The coal tar was often collected to be

[3] Exhibit ELR-1, pages 3 through 8
[4] Exhibit ELR-1, page 4
[5] Exhibit ELR-1, page 5
[6] Exhibit ELR-1, page 7

reused as fuel or sold as feedstocks in the chemical industry. The purification process also included processes to remove excess hydrogen sulfide which simultaneously removed cyanide compounds. After going through the purification process, the gas could be sent to the gas holder before being distributed to the local communities.[7]

IV. BACKGROUND INFORMATION REGARDING MGP SITES MANAGED BY KGS

Q. CAN YOU IDENTIFY AND DESCRIBE THE MGP SITES MANAGED BY KGS?

A. Yes. Exhibit ELR-2 is a spreadsheet prepared by KGS, in collaboration with Burns & McDonnell, which summarizes the ownership and regulatory status as well as investigation and remediation activities that have been completed at each of the MGP sites KGS manages.[8] Each of the MGP sites is managed under KDHE's State Cooperative Program.

Page 1 of Exhibit ELR-2 summarizes the ownership and regulatory status of each of the MGP sites. Pages 2 and 3 include a brief narrative of the current status of each site as well as summaries of past environmental activities and a brief description of estimated future activities to be completed. It is my understanding that the costs incurred to date as discussed in Ms. Janet Buchanan's Testimony are the result of the past environmental activities summarized in Exhibit ELR-2.

Q. CAN YOU PROVIDE AN OVERVIEW OF THE REGULATORY PROCESS TO BRING EACH OF THE FORMER MGP SITES TO CLOSURE IN ACCORDANCE WITH THE CONSENT ORDER AND KDHE'S STATE COOPERATIVE PROGRAM?

A. Yes. Each of the 12 MGP sites subject to the Consent Order will go through the following regulatory steps: Preliminary Assessment, Site Investigation, Corrective Action Study, Corrective Action, Post-Remediation Monitoring, and Closure. The

[7] Exhibit ELR-1, page 4
[8] Exhibit ELR-2

Preliminary Assessment is completed by reviewing available documents regarding the site and surrounding areas and completing a site visit to determine the potential for MGP-related impacts that may exist at the site. This information is then used to create a preliminary estimate of the nature and extent of impacts to inform a path forward for the site. If the Preliminary Assessment identifies the potential for MGP impacts, a Site Investigation phase is completed to characterize and delineate impacts that may be associated with the MGP. Following Site Investigation, a Corrective Action Study is completed to assess potential remedial options for each site based on the current site setting (e.g., current use, location, ownership, surrounding properties, structural impediments, etc.). During the Corrective Action Study, KDHE will issue an Agency Decision Statement indicating the preferred remedy for the site. Following KDHE's review of the Corrective Action Study and statement of preferred remedy, the Corrective Action is completed to implement the chosen remedy. Corrective Action is followed by a period of Post-Remediation Monitoring to monitor and document the performance of the implemented remedy. Once data collected during the Post-Remediation Monitoring phase indicate that the remedy is sufficiently protective of human health and the environment and meets the requirements set forth in the KDHE Bureau of Environmental Remediation (BER) Policy #BER-RS-024 *Site Closure in the State Cooperative Program* (attached to this Testimony as Exhibit ELR-3),[9] the site may be considered for closure.

V. STATUS OF ENVIRONMENTAL WORK PERFORMED AT EACH MGP SITE MANAGED BY KGS

Q. CAN YOU PROVIDE A SUMMARY OF THE STATUS OF THE ENVIRONMENTAL WORK PERFORMED AT EACH MGP SITE MANAGED BY KGS?

[9] Exhibit ELR-3

A. Yes. Pages 2 and 3 of Exhibit ELR-2 include a summary of the environmental work relating to soil, groundwater, and vapor intrusion at each MGP site managed by KGS. Each of the sites has undergone some level of soil and/or groundwater investigation or remediation. While a limited source removal has been completed or deemed unnecessary at each of the 12 sites,[10] MGP impacts still exist at all 12 MGP sites managed by KGS.

As of the date of this testimony, five of the 12 sites have been reclassified by KDHE as "Resolved with Restrictions" within the KDHE State Cooperative Program. In accordance with KDHE BER Policy #BER-RS-024 *Site Closure in the State Cooperative Program* (attached to this Testimony as Exhibit ELR-3), a site may be considered for conditional closure and reclassified as "Resolved with Restrictions" under the following conditions:

- Institutional and engineering controls are in place to ensure the protectiveness of the remedy through enforcement by KDHE;
- The source area has been remediated to the extent practicable;
- There are no existing or reasonably anticipated exposures above cleanup levels through cross-media transfer;[11]
- Sites with residual groundwater concentrations above cleanup levels are evaluated based on:
    - groundwater plume dimensions;
    - contaminant concentrations and trends;
    - groundwater use and receptors in the vicinity; and

[10] A "limited source removal" is a targeted excavation and removal of heavily impacted soil from a specific area.

[11] "Cross-media transfer" is the process in which contaminants move from one medium such as soil to another medium such as groundwater through natural or anthropogenic processes.

- potential for the plume to cause an exceedance of cleanup levels in an adjacent aquifer.

This classification often requires that institutional controls be used to prevent unacceptable future land use that are not compatible with site conditions following remediation.[12] An example of one of these controls would be an "Environmental Use Control Agreement" that prevents certain structures from being constructed on the site. As shown on page 1 of Exhibit ELR-2, institutional controls are currently in place on nine of the 12 MGP sites managed by KGS.[13]

Seven of the 12 MGP sites currently managed by KGS are currently classified as "Active" with KDHE and are in various phases of the site investigation/corrective action process as shown and further discussed in Exhibit ELR-2.[14]

Groundwater monitoring wells are currently present at all seven of the MGP sites that are currently listed as "Active" in the KDHE State Cooperative Program and are sampled on an annual basis for common MGP constituents to evaluate and monitor groundwater data trends. These results are reported to KDHE each year. Monitoring wells were previously present at the MGP Sites in Concordia and Topeka. In 2021, Concordia and Topeka MGP sites were conditionally closed and reclassified as "Resolved with Restrictions" and subsequently, the monitoring wells at the site were plugged and abandoned.

Q. WHAT FUTURE ACTIVITIES ARE EXPECTED AT EACH OF THE FORMER MGP SITES?

No additional work is anticipated at the five former MGP sites currently classified as "Resolved with Restrictions" unless site conditions change in such a manner that

[12] Exhibit ELR-3, pages 4-5
[13] Exhibit ELR-2, page 1
[14] Exhibit ELR-2,

provides access to impacted materials previously determined to be inaccessible, or if site conditions no longer remain protective of human health and the environment.

Site management, investigation, and/or corrective action activities will continue at each of the seven MGP sites that are currently classified as "Active" in the KDHE State Cooperative Program until they meet the requirement of conditional or unconditional closure. The current phase of each site within the KDHE State Cooperative Program is shown on page 1 of Exhibit ELR-2.[15] In summary, the phases to be completed at each site are as follows:

- **Abilene:** Post-Remediation Monitoring, Request for Closure
- **Atchison:** Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Concordia:** None – Classified as Resolved with Restrictions
- **Emporia:** None – Classified as Resolved with Restrictions
- **Hutchinson:** Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Junction City:** Site Investigation, Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Kansas City:** Site Investigation, Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Leavenworth:** None – Classified as Resolved with Restrictions
- **Manhattan:** Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Parsons:** None – Classified as Resolved with Restrictions

[15] Exhibit ELR-2, page 1

- **Salina:** Site Investigation, Corrective Action Study, Corrective Action, Post-Remediation Monitoring, Request for Closure
- **Topeka:** None – Classified as Resolved with Restrictions

VI. THE 36-MONTH TENTATIVE SCHEDULE OF ENVIRONMENTAL WORK AT EACH ACTIVE MGP SITE MANAGED BY KGS

Q. CAN YOU DESCRIBE THE NEAR-TERM ENVIRONMENTAL WORK KGS WILL PERFORM AT THE SEVEN ACTIVE MGP SITES?

A. Exhibit ELR-4 is a 36-month tentative schedule for anticipated environmental work at each of the seven active MGP sites managed by KGS.[16] The spreadsheet is updated periodically by KGS in collaboration with Burns & McDonnell and shared with KDHE for their review. This schedule is used for planning purposes to assist KGS and KDHE in identifying and prioritizing environmental activities at each of the sites over the next three years. KGS and KDHE periodically review and update the schedule to reflect current site progress or prioritization based on field experiences, stakeholder input, site conditions, or other factors.

The anticipated environmental work at each site is informed by the evaluation of site investigation data, KDHE and stakeholder input, and site setting and contaminant exposure scenarios. KGS and Burns & McDonnell meet with KDHE regularly to provide updates on current site activities and seek feedback on future plans for each site. Prior to the submission of a Corrective Action Study, KGS and Burns & McDonnell often meet with KDHE to present the proposed path forward for each site to obtain concurrence and feedback on the required future activities. Costs for future activities are then estimated on a relative order of magnitude basis until the scope of work can be refined by evaluating data collected during site investigation phases and

[16] Exhibit ELR-4

considering input provided by project stakeholders (e.g., property owners, local residents, and local municipalities). Relative order of magnitude costs for anticipated environmental work are estimated by evaluating past costs of similar projects, solicitation of preliminary bids from subcontractors and vendors in the industry, and the use of estimating tools and references such as RS Means. Following the approval of the site Corrective Action Study, KDHE issues an Agency Decision Statement establishing the chosen remedy. Burns & McDonnell then designs the remedy and implements a bidding process to solicit subcontractor and vendor bids at which point the cost can be refined. As the bidding process progresses, the understanding of the final remedy design and the final implementation cost becomes more defined and at times, additional work is identified to be necessary. Furthermore, the bidding cycle identifies current market pricing, which has been unpredictable in recent years due to labor and material shortages, resulting in deviations from previously anticipated cost estimates.

Q. CAN YOU IDENTIFY SOME OF THE MAJOR PROJECTS THAT HAVE TENTATIVELY BEEN SCHEDULED OVER THE NEXT THREE-YEAR PERIOD?

A. Yes. A description of major activities tentatively scheduled at each active site is as follows:

- **Abilene:** A minimum of one additional year of groundwater monitoring is necessary to evaluate post-remediation groundwater trends. If groundwater trends indicate that the site is eligible for closure in the KDHE State Cooperative Program, a request for closure will be prepared and submitted to KDHE.
- **Atchison:** A Corrective Action is anticipated to be completed at the north parcel of the MGP site which is currently occupied by an apartment complex

managed by the Atchison Housing Authority. A pre-design investigation has been initiated at the site to design a permeable reactive barrier to treat groundwater at the property boundary in accordance with the KDHE approved Corrective Action Study. KGS is currently working with the property manager to obtain access to the building to install a sub-slab depressurization system in accordance with the KDHE-approved Corrective Action Study. Following negotiation of building access, KDHE will issue an Agency Decision Statement regarding the remedy.

- **Hutchinson:** KDHE has advised KGS to seek an Environmental Use Control Agreement ("EUCA") on the alleyway north of the MGP site to address non-aqueous phase liquid that has been observed in one of the site monitoring wells. KGS is currently making plans to approach the property owner (the City of Hutchinson) to request that they allow an EUCA to be placed on the property. Following the placement of an EUCA on the property and possible submittal of a Corrective Action Study, KGS will submit a request for closure to KDHE.
- **Junction City:** A Site Investigation was completed in 2019 that identified both on-site and off-site impacts indicating that further investigation is necessary to fully delineate impacts and inform the development of a Corrective Action Study. Groundwater monitoring is currently completed on an annual basis at the site to monitor groundwater trends.
- **Kansas City:** KGS is currently negotiating access agreements to complete a Supplemental Site Investigation to collect soil and groundwater data that will inform the development of a Corrective Action Study.
- **Manhattan:** KGS is currently planning public outreach efforts in accordance with KDHE requirements and the United States Environmental Protection

Agency's Environmental Justice guidance. Following this outreach effort, KGS will develop a Corrective Action Study which will be submitted to KDHE evaluating potential corrective action alternatives for the site. Due to the presence of the City of Manhattan's Traffic Operations Center at the property, treatment of on-site source material is likely not feasible at this time. Therefore, corrective action alternatives included in the Corrective Action Study will focus on containment of on-site residues and off-site groundwater.

- **Salina:** KGS plans to develop and submit a Site Investigation Work Plan to characterize and delineate site impacts and inform the development of a Corrective Action Study.

VII. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

LIST OF EXHIBITS

ELR-1	2008 KDHE Article titled "*The Manufactured Gas Industry in Kansas*"
ELR-2	Manufactured Gas Plant Status Spreadsheet
ELR-3	KDHE BER Policy BER-RS-024 *Site Closure in the State Cooperative Program*
ELR-4	36-Month Tentative MGP Schedule

VERIFICATION

STATE OF MISSOURI)
) ss.
COUNTY OF JACKSON)

Emma L. Romi, being duly sworn upon her oath, deposes and states that she is the Remediation Section Manager for Burns & McDonnell, that she has read and is familiar with the foregoing Testimony filed herewith; and that the statements made therein are true to the best of her knowledge, information, and belief.

E R.

Emma L. Romi

Subscribed and sworn to before me this 23rd day of December 2024.

Alicia Horton

NOTARY PUBLIC

ALICIA HORTON
Notary Public - Notary Seal
Jackson County - State of Missouri
Commission Number 21646120
My Commission Expires Mar 4, 2025

My appointment Expires:
03/04/2025

Kansas Department of Health and Environment
Bureau of Environmental Remediation/Remedial Section
Developed By: Aspen Junge and John Cook June 30, 2008

The Manufactured Gas Industry in Kansas

For 60 years, many Kansans depended on manufactured gas to light and heat their homes, and to cook their food. Manufactured gas, produced in factories called gas works, was considered one of the most civilizing improvements a frontier city could make.

Imagine your city as it may have been in the 1860s. Horse-drawn buggies and wagons travel down unpaved streets, which were a sea of mud after it rained. At night it was very dark, because there were no streetlights. What little light there was came from lanterns, fueled by kerosene or candles, placed in windows or in front of whatever businesses were open late. Most people stayed home at night, choosing to go out only when a full moon lit the sky. The dark streets could be dangerous—if you didn't get robbed or lose your way, you could fall into a pothole or get run down by a carriage.

But then gas comes to town and the streets are lined with stately lamp-posts that turn night into day. Homes were lit with a cheery flame that was almost as bright as sunlight, and businesses could stay open later in the evening. Community life flourished as people spent their evenings attending theatre and lectures or socializing.

Gas light was considered far superior to candles or kerosene lanterns. The Kansas Daily Tribune wrote on July 1, 1869:

"There is nothing that will contribute so much to beautify our city, and make life pleasant and agreeable, as gas light. It is a steady, handy and constant light, and not near so wearing to the eyes as candle or oil light. Then one need not worry himself about oil cans, lamps or lamp chimneys. He may go home with his mind at rest, sure that when the shades of night are closing in around him, his faithful spouse (if he has one, or, in lieu thereof, a mother or sister, or some other man's sister) will have the gas lit, his slippers and gown ready, and a generous welcome in store for the weary toiler (of the Kaw), instead of a lecture on female suffering, caused by his forgetting to bring home the can of oil and the chimneys. In the long run, it is as cheap or cheaper than oil, and not near so destructive in its results. Insurance is always reduced on a building where gas is in use. It is always clean; while with oil you are always spilling, breaking lamps, getting it into your dough and spoiling the hot biscuits, &c., &c."

Not only was gas light considered a superior form of lighting, it was one way of demonstrating that a city was up-to-date. Kansans of the 19th century, much like Kansans of the 21st century, were interested in technological gadgets and conveniences. They were also very interested in extolling the benefits of Kansas to those who might like to move here. A city that could advertise that it had gas lighting, a municipal water supply, paved streets, modern schools, plenty of churches, and a vibrant

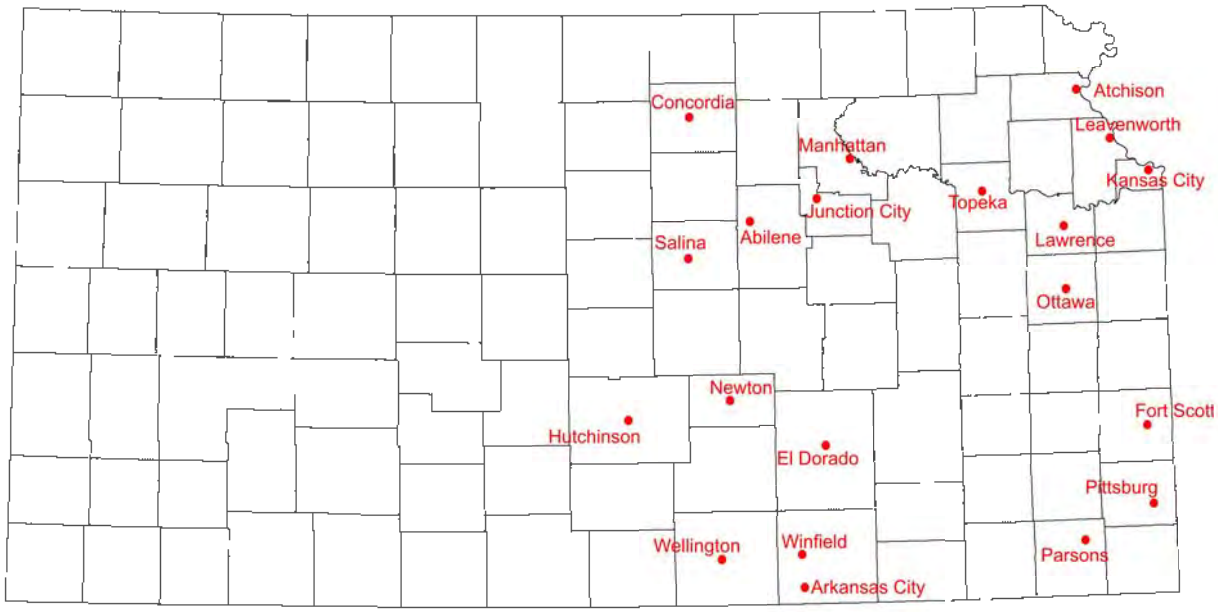
community could attract settlers who were seeking a new life but weren't quite ready to rough it out on the prairie.

Locations of Manufactured Gas Plants

Gas was manufactured in Kansas from 1869 until 1930.

The first big push for building manufactured gas plants was in the late 1860s, after the Civil War, when Kansas was experiencing a huge growth in population. So many people were settling in Kansas that cities were competing with one another to see which would grow in population and influence the fastest, and wanted to be able to advertise modern conveniences. There was a certain rivalry between cities—Topeka and Leavenworth were both constructing gas works, so of course Lawrence had to do the same.

The first boom in manufactured gas plant construction lasted from 1868 to 1871, when four communities, Leavenworth, Topeka, Lawrence, and Fort Scott, invested in gas. From 1880 to 1890, 13 more plants were built, primarily in the eastern and southeastern parts of the state. In the 1890s natural gas was being discovered and developed, and proved to be an excellent fuel for industry and heating although it did not produce as much light when burned as manufactured gas. Twelve manufactured gas plants had closed by 1908. However, when the shallow, easily tapped gas fields began to fail in the early 1910s, prices for natural gas rose to the point where manufactured gas could again compete. Four more gas works were constructed in 1912 and 1913, and remained in operation at least until 1928.



Leavenworth	1868-1906	Hutchinson	1885-1906	Pittsburg	1887-1905
Topeka	1869-1908	Kansas City	1886-1905	Arkansas City	1890-1904
Fort Scott	1871-1905	Wellington	1886-1906	Salina	1881-1928
Atchison	1880-1905	El Dorado	1886-1907	Manhattan	1912-1928
Emporia	1880-1927	Lawrence	1869-1905	Abilene	1913-1928
Parsons	1884-1900	Newton	1886-1917	Junction City	1913-1928
Winfield	1884-1916	Ottawa	1886-1917	Concordia	1913-1930

The Gas Works

Gas was manufactured in a factory called a gas works. The factory usually consisted of one or two buildings, some sheds for storing coal, and a distinctive cylindrical structure called a gas holder or gasometer. Leavenworth's Times and Conservative newspaper described the construction of a new gas holder on April 23, 1869:

"The Gas Company are adding a gas holder to their works, their present one being inadequate to supply the increasing demand for gas. The excavation for the new holder has been made and workmen were busy laying the inlet and outlet pipes. The dimensions of this addition are as follows: brick tank 66 ½ feet in diameter by 20 feet in depth; gas holder 40 feet high by 61 ½ feet in diameter. The gas holder is of the kind known as telescope holder being in two sections linked together by a hydraulic cup. There are six iron columns placed at equal distances around the holder, each column being 40 feet in height and 15 inches in diameter. The columns are connected at the top by iron truss girders 33 feet long by 30 inches high. The counter balance weights will be in the columns and out of sight. The capacity of the holder will be 250,000 feet per day. The cost of the improvement aggregates $50,000 and it is expected connexion will be made with the works and street about the first of September. When completed the new holder will be quite an ornament to that part of the city—in all the gorgeousness of red paint contrasting sharply with the black of the columns and girder."

An excavated gas holder tank in Kansas City. In this picture is the "dumpling," made of bedrock or concrete, usually left in the holder tank in order to support the gas holder framework and piping.

The gas holder was often built over a large underground tank. Quite often, a knob of rock or concrete, called the "dumpling," would be left behind to save on excavation costs and to provide a foundation for the framework. The tank would be lined with brick or concrete and made watertight by adding a layer of hydraulic cement. The gas holder itself was a wooden shell, sometimes in two or three telescopic sections, that floated in water that filled the tank. As the holder filled with gas, it rose in the tank. A framework of steel girders surrounded the holder to prevent it from toppling over, and the weight of the holder and counterweights pressurized the gas as it flowed outward through the distribution piping. An engineer could estimate the amount of gas on hand by the height of the gas holder.

Manufacturing Gas

Coal Carbonization Method

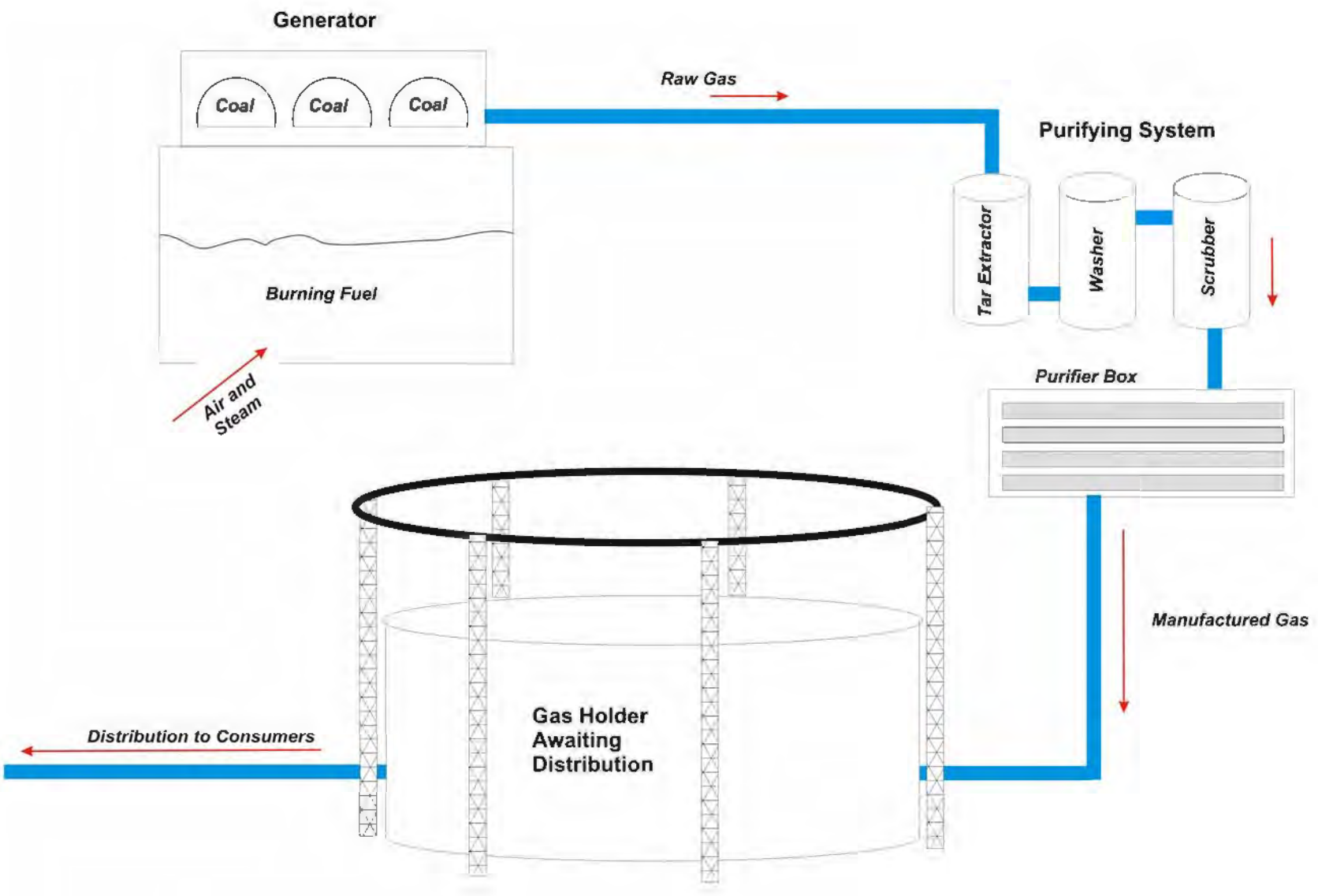
The earliest method of gas manufacture was a relatively straightforward process known as coal carbonization. The figure labeled "The Gas Manufacturing Process: Overview" on the next page demonstrates the process.

The generator consists of one or more "benches", each one consisting of a coal fired furnace and up to six cylindrical ceramic containers known as retorts. The retorts would be loaded with oily bituminous coal. Beneath the bench was an iron pan which would be filled with water. When the fire was lit in the bench, the water would boil and become steam, which mixed with the air entering the furnace.

By carefully controlling the amounts of air and steam entering the fire, the engineer could control the relative amounts of carbon monoxide (CO) and carbon dioxide (CO_2) produced. These fumes heated the retorts packed with coal, and when steam was introduced into the retorts, it reacted with the carbon in the coal to produce CO and hydrogen, both of which are flammable and were the primary constituents of gas. Also, by becoming red hot, the coal in the retorts gave off vapors rich in hydrocarbons. These hydrocarbons made the gas flame brighter, an important quality when the gas was intended for lighting. Once the coal in the retorts had given off all its volatile gasses, it could be used in the furnace as fuel.

After leaving the retorts, the carbon-rich gas was cooled to between 100° and 60° Fahrenheit, and sent through a set of purifiers. The first stage, condensation, simply cooled the gas, allowing the heavier hydrocarbons to condense into tiny droplets of tar aerosolized in the gas. The tar extractor, the second stage, removed this tar. One popular model did so by forcing the gas through hundreds of tiny holes, forcing the tar droplets to collide and merge, precipitating out of the gas completely. This coal tar was collected and could be used as fuel or sold as feedstock to the chemical industry.

The third stage of purification, washing and scrubbing, removed ammonia compounds from the gas. Ammonia dissolves easily in cool water, so the gas would be bubbled through a tank of water (washing), then pass through a scrubber which acted by spraying water through the gas. The wash water was called ammoniacal liquor, and would be condensed and sold.



The Gas Manufacturing Process: Overview

Finally the gas needed to have hydrogen sulfide (H_2S) removed from it. Hydrogen sulfide has a strong rotten egg smell and is toxic in high doses. Even low doses cause irritation, headaches, and dizziness, so it was important to remove it before delivering the gas to consumers' homes.

This was done through a fairly simple process. Iron oxide (Fe_2O_3) shavings, obtained by mixing iron filings with damp wood chips and letting them rust, were placed in trays in a series of purifier boxes. The gas passed through the purifier boxes, and the hydrogen sulfide would react with the iron oxide from the damp wood chips to form iron sulfide (Fe_2S_3). Any cyanide (CN) compounds in the gas would also be removed by the iron oxide filings, producing a ferricyanide.

At least once a week, when the iron oxide in the box was exhausted, the material could be "revivified" by placing it in heaps on the floor. Oxygen in the air would combine with the iron sulfide, reducing it back to iron oxide, and producing elemental sulfur as a byproduct. The iron oxide could then be reused several times until saturated with sulfur and discarded or sold.

If chemical analysis showed the gas contained too much carbon dioxide, it could be removed by sending the gas through another set of purifier boxes filled with trays of hydrated lime.

The finished gas could now be sent to the gas holder to await distribution to consumers.

Carburetted Water Gas Method

After 1875 the carburetted water gas (CWG) method became the most commonly used in the United States. CWG contained more illuminating hydrocarbon compounds than coal gas, producing the brighter flame that consumers wanted for illumination, and could be manufactured more efficiently.

In the CWG process, the generator was modified to include a carburettor and a superheater. Both of these structures were built of firebrick laid in a checker board pattern. The carburettor and superheater would both be heated to high temperatures during the manufacturing process. The figure on the next page demonstrates CWG manufacturing.

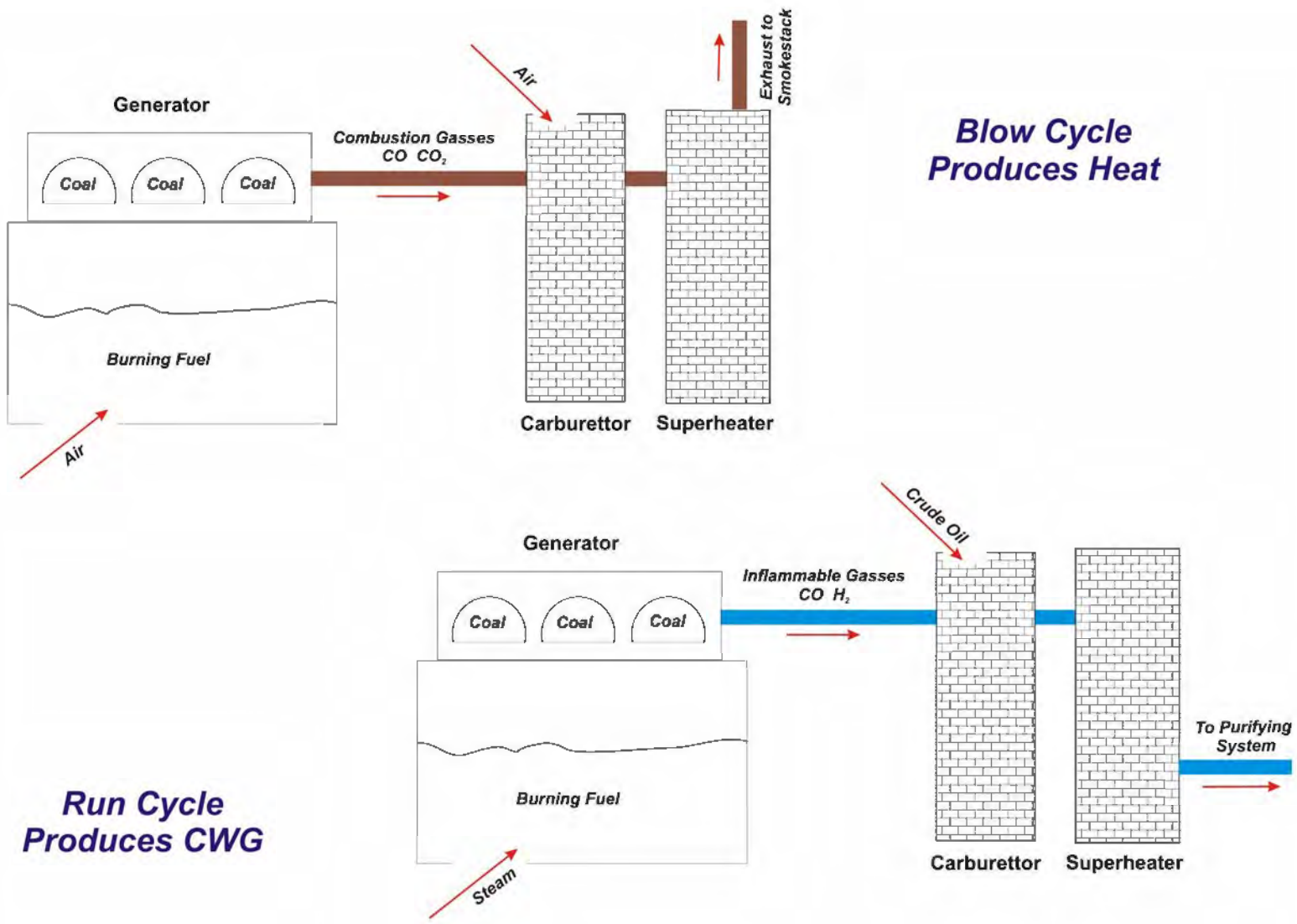
The process had two states, a blow cycle and a run cycle. In the blow cycle, air would be forced through the burning fuel in order to produce large amounts of heat. When the hot fumes passed into the carburettor, more air was blown in to complete combustion and produce more heat. The waste gasses passed through the superheater and were directed out of the smokestack and into the atmosphere.

Once the system was sufficiently hot, the run cycle would begin. The engineer would direct steam, rather than air, into the generator, and it would react with the burning fuel and hot coal in the retorts to make what was known as "blue gas" or "water gas." This gas burned hot and well, but it didn't have enough hydrocarbon compounds suspended in it to make a good light.

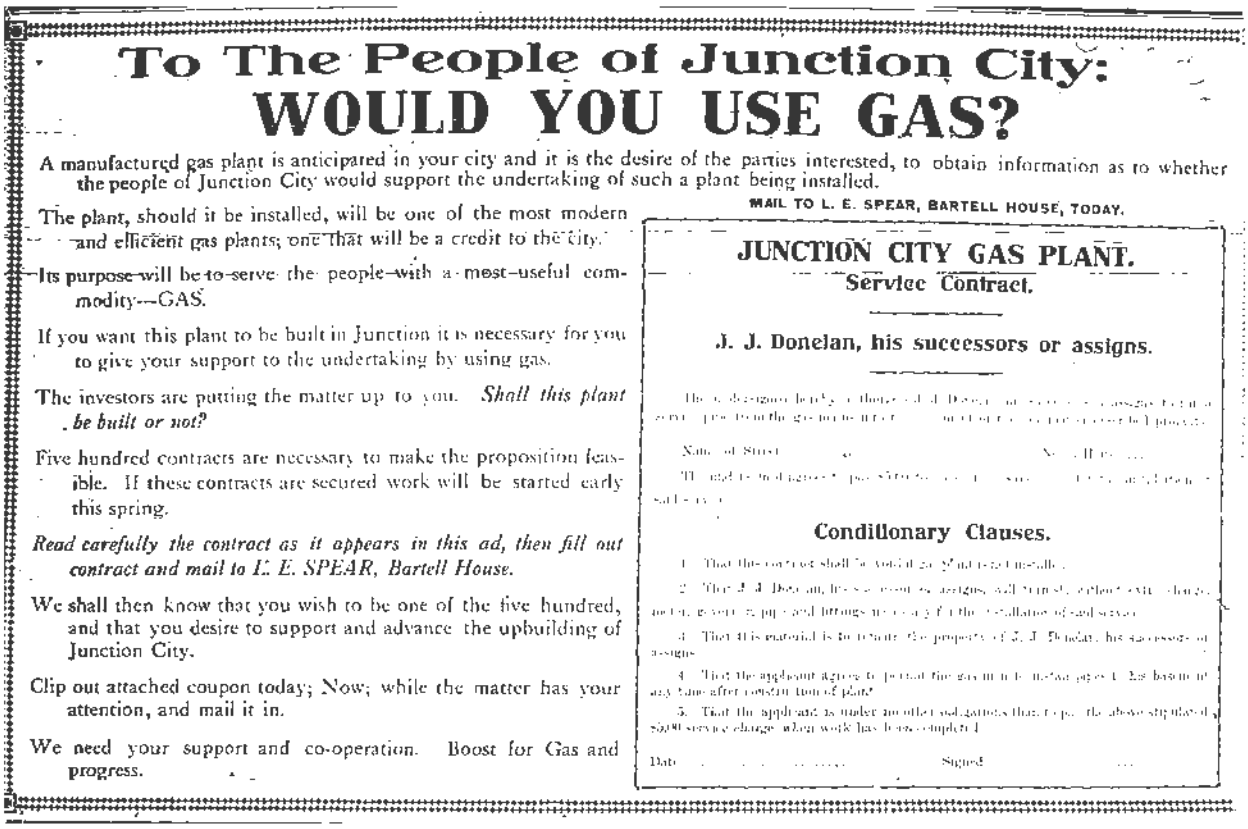
Hydrocarbons were added by spraying crude oil, or lighter "gas oil," onto the hot bricks in the carburettor. This thermocracked the oil into smaller compounds, which would be permanently fixed in a gaseous state by exposure to the high temperature in the superheater.

Once made, the CWG would be sent through the same purification and delivery process as coal gas.

Water gas, without carburetion, continued to be produced even after natural gas became available nationwide. Because water gas is chemically similar to natural gas, it was possible to make gas during times when natural gas supplies were limited, or there was high demand, and it could be used in the same appliances as natural gas.



The Carburetted Water Gas Manufacturing Process: Blow and Run Cycles



To The People of Junction City:
WOULD YOU USE GAS?

A manufactured gas plant is anticipated in your city and it is the desire of the parties interested, to obtain information as to whether the people of Junction City would support the undertaking of such a plant being installed.

The plant, should it be installed, will be one of the most modern and efficient gas plants; one that will be a credit to the city.

Its purpose will be to serve the people with a most useful commodity—GAS.

If you want this plant to be built in Junction it is necessary for you to give your support to the undertaking by using gas.

The investors are putting the matter up to you. *Shall this plant be built or not?*

Five hundred contracts are necessary to make the proposition feasible. If these contracts are secured work will be started early this spring.

Read carefully the contract as it appears in this ad, then fill out contract and mail to L. E. SPEAR, Bartell House.

We shall then know that you wish to be one of the five hundred, and that you desire to support and advance the upbuilding of Junction City.

Clip out attached coupon today; Now; while the matter has your attention, and mail it in.

We need your support and co-operation. Boost for Gas and progress.

MAIL TO L. E. SPEAR, BARTELL HOUSE, TODAY.

JUNCTION CITY GAS PLANT.
Service Contract.

J. J. Donelan, his successors or assigns.

The undersigned hereby [illegible] J. J. Donelan [illegible] gas into the [illegible] premises [illegible]

Name of Street [illegible] No. [illegible]

[illegible] said [illegible]

Conditionary Clauses.

1. That this contract shall be void if gas [illegible]

2. That J. J. Donelan, his successors or assigns, shall furnish without extra charge, [illegible] pipe and fittings necessary for the installation of said service.

3. That it is material to the property of J. J. Donelan, his successors or assigns [illegible]

4. That the applicant agrees to permit the gas to be turned on at any time after completion of plant.

5. That the applicant is under no other obligations than to pay the above stipulated $5.00 service charge when work has been completed.

Date [illegible] Signed [illegible]

Junction City awarded its manufactured gas enterprise to J. J. Donelson, who promised to build a plant if enough citizens pledged to use gas. Advertisements like this were placed in the Junction City Union. Construction began in May 1913 and customers were using gas stoves by August.

Gas Distribution

The gas was delivered to consumers through a series of pipes laid underneath the city streets. Usually the gas works was located at a low elevation relative to the rest of the city because gas is naturally lighter than air and would rise through the mains.

One of the problems encountered was that of condensation in the pipes. The gas would pick up humidity from the purification process, and on very cold days this water would condense or freeze in the pipes, blocking or perhaps breaking them. Other substances also condensed; napthalene, the chemical used in mothballs and a primary component of coal tar, would often precipitate into crystals in the pipes. Napthalene is associated with anemia, liver damage, and cataracts, and may be a carcinogen. Its unpleasant odor made it an unwelcome addition to the gas.

In order to control condensate, the distribution lines included drip pots in low spots. These pots acted as sumps, collecting water and tars from the gas. Workers would regularly maintain the pots by pumping them out.

Manufactured Gas in Daily Life

Before gas could be used for light, heating, and cooking, the building had to have gas pipes installed. Fitters would install pipes from a meter on the distribution line to each room in which gas would be used. The pipe required a corrosion resistant coating that prevented it from reacting with compounds in the gas.

Lighting fixtures could be installed on the walls or ceiling, and were often elaborately decorated. Many of our modern electrical lamps and chandeliers are based on the designs for gas lamps.

A kitchen stove had burners and an oven heated by gas. In order to use any of these, the owner would simply turn a valve and light the gas with a match. Gas cooking stoves were particularly appreciated in the summer, because when the cook was finished preparing a meal, she could just turn the stove off. Wood or coal stoves, by contrast, would continue heating the kitchen until the fire burned out. Heating stoves were often small enough to fit on a shelf or a table, and were connected to the pipes by special valves that could be connected and disconnected easily, allowing the heater to be moved from room to room.

One of the primary uses of gas was to fuel street lights. Lighting the streets improved safety, reduced crime, and encouraged people to socialize in the evening. Shops could stay open later, and the city's downtown could become an entertainment district, with theaters and fine restaurants, as well as a business center. The street lights were maintained by lamplighters, who would light and extinguish the gas and polish the soot off the glass.

Gas lighting wasn't perfect. The pipes would make noise, and burning gas left soot on the walls and ceilings. The gas itself had a distinctive unpleasant odor. The burners had to be properly adjusted and provide the correct mixture of gas and air, otherwise the gas wouldn't burn cleanly and compounds like carbon monoxide could poison the residents. If a gas pipe leaked, or a valve was left open, enough gas could build up in a room to cause an explosion. Several contaminants found in gas, such as hydrogen sulphide, cyanide, and napthalene, could make residents seriously ill after inhaling them.

In the 1890s, gas mantles became available. These were thumb-shaped mesh bags impregnated with thorium, which incandesces at high temperatures. The burning gas would heat the bag, which would glow brightly. The gas mantle, now often made with non-radioactive yttrium, is still used in propane-powered camp lanterns.

The End of Gas Manufacturing

Pittsburg, Kansas, had abundant coal with which to power its industries; Lawrence had its Kaw River dam and water mills. Iola, in Allen County, discovered it had rich and accessible reserves of natural gas, and began successfully promoting itself as the next industrial center in Kansas. Natural gas was so abundant in Iola that every citizen was initially given as much gas as they wanted for $1 per month. Allen County aggressively recruited fuel hungry industries such as zinc smelting, portland cement manufacturing, and glass making to locate in Iola and the neighboring cities of La Harpe and Gas. Gas field entrepreneurs quickly learned how to store and transport natural gas to locations away from the gas fields, and by 1908, eleven manufactured gas plants statewide had been abandoned.

Electric power was being developed in Kansas about the same time as manufactured gas. Photographs of downtown Topeka from the early 1870s show electric street cars, and in many cases, the manufactured gas plant also began to generate electricity for domestic and industrial use. With the development of a successful incandescent light bulb by Thomas Edison in 1879, gas lighting now had a competitor, and

many gas consumers retrofitted their gas lighting fixtures to use the new power source. Electricity didn't produce soot or odors like gas would, and proved to be very popular. Electricity, provided by a gasoline-powered generator, was particularly advantageous on farms and households which were too far from town to be connected to the gas mains.

By 1930, the last manufactured gas plant in the state closed its doors. Gas was still manufactured in other parts of the United States until a nationwide system of natural gas pipes was completed in the 1960s. Europe, without ready access to natural gas, continued to manufacture gas into the 1980s, when an exploitable reserve of natural gas was discovered in the North Sea. The buildings housing the gas holders have been considered cultural and historical landmarks, and many have been converted into living, retail, or office space.

These gasometers in Vienna were used until 1984, and have since been converted to retail, office, and living space.

Manufactured Gas and its Environmental Legacy

Although it was relatively clean-burning at the consumer's end, gas was anything but clean to make. In recent years, there has been a lot of interest in locating and assessing the environmental impact of former manufactured gas plants in the United States. The process of making gas left behind substances such as coal ash, clinkers, coal and oil tars, lampblack, ammonia, cyanide compounds, and emulsions of oil or tar in water.

Some of these materials had commercial value and could be resold or used. Coal tar, lampblack, sulfur, and ammonia could be used as feedstock for the chemical industry. Coal tar could also be used as fuel in the furnaces. Coal ash and cinders were often used as inexpensive construction fill or to treat icy roads in the winter.

Residual material that could not be sold was often stored or disposed of on site. These materials might include water contaminated with ammonia and tar, which might be dumped into the nearest creek or river. Coal tar could be stored in a tar well—a pit often lined with brick or concrete. Even if the tar was later recovered and sold, it might have leaked through cracks in the lining into the soil. Coal tar would also collect in the gas holder tank, and could leak from there into the soil. Spent lime and iron shavings used in the purification process, along with the wood chips or ground corn cobs used to increase the surface area of the purifier material, would be spread or buried on-site.

Once the plant was decommissioned, it was usually torn down. Leftover equipment, residual materials, and construction debris would be used to fill in the gas holder tank. The city of Wellington decided to turn their former manufactured gas plant into a park and community center. In order to fill the gas holder tank, the entire city cleaned out their closets, basements, and yards, and used the trash as fill.

In her history of Sellers Park, Marie Seelers Van Denenter wrote:

"On the property was also a deep pit 54 feet in diameter and 20 feet deep, originally known as the "gasometer" or "holding tank" which was inadequately covered. It was filled with stagnant water and debris and gave off a foul odor. Filling this pit was a primary concern of the Cary Circle women because of the possible danger to children playing in the area. The problem was how to get it filled.

It was decided there wasn't anything Wellington needed more than a citywide cleanup and no better place for the trash than this deep hole. Therefore, with the approval of the City Commission for a cleanup, every club and organization was asked to help, and a week was set aside in March (1914) for all property owners and all renters to cleanup their premises, and on March 21st, all discarded trash would be hauled away free. Publicity, donated by the two daily and one weekly newspapers, urged citizens to contribute anything they wanted to get rid of, and produced an overwhelming response. Many men with teams and wagons gave their time and equipment free of charge to help with the hauling. There were old stoves, broken household furniture, iron beds and bedsprings, cupboards, broken china, and trash of every kind and description, and a great many loads went into the hole. Everyone seemed to catch the spirit, with one city ward vying with another to see which would contribute the most trash to fill the old gas tank. It is doubtful if Wellington ever presented a more shining appearance than in the week following this scouring.

The first cleanup and dumping of rubbish which took several hundred loads to fill was a great success, but the trash soon sank and more was needed. The following year another cleanup was proclaimed and with the support of the citizens the level of the pit was again achieved."

The gas generation building was turned into a clubhouse, and used for many years for parties, banquets, and community gatherings. After World War II, the Park House was turned into a recreation center managed by the local school district. Park House is now the Panhandle Railroad Museum.

Park House in Wellington was used as a community center and now houses the Panhandle Railroad Museum.

Removing the contents of the gas holder tank at the former manufactured gas plant in Manhattan. The contents are primarily water, woody debris, soil, and hard-parts refuse.

Excavated material from the site placed in the gas holder tank to soak up water contaminated with coal tar. The contaminated material was removed and properly disposed of at a hazardous waste disposal facility.

Excavation revealed underground foundations and structures. These were left in place when clean fill was installed.

The outside wall of the coal tar well. This kind of brick construction was typical of underground structures at a manufactured gas plant.

Filling the gas holder with clean fill. The bottom of the gas holder tank was broken to prevent water from continuing to collect in it.

The site after remediation was completed. It can now be redeveloped and put back into use.

The Remediation of a Former Manufactured Gas Plant

The substances usually associated with a former manufactured gas plant are hazardous, consisting of coal tars containing polynuclear aromatic hydrocarbons (PAHs) and volatile organic chemicals (VOCs), purifier residues that may contain sulfur and cyanides, and coal ashes that may contain heavy metals such as arsenic. However, these substances are typically immobile when buried in the subsurface and do not migrate appreciable distances by, for example, contaminating very large amounts of ground water. Some of these contaminants would have, over the time since the former manufactured gas plant was closed, have evaporated or been subject to natural biodegradation in the environment. Remedial efforts usually involve contaminant source removal and/or containment, and a long term commitment to assessing and monitoring ground water quality.

There are many strategies that can be applied to remediation, ranging from simple excavation of impacted soil and residual tars for disposal in an approved landfill, to on-site treatment options, to placing Environmental Use Controls on the property to limit current and future land use. These remedial strategies can be applied to soil, sediments, and ground water.

Selection of the best remedial alternative is only made after careful and thorough characterization of the nature and scope of contamination, and only after consideration of stringent screening criteria, including the overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements (ARARs); long-term effectiveness and permanence, reductions of contaminant toxicity, mobility, and volume through treatment; short-term effectiveness; cost; state acceptance; implementability; and, perhaps most importantly, community acceptance. In a few cases, after thorough site assessment, no remedial action at all is required.

The cleanup costs at former manufactured gas plants are highly variable, depending on the amount of impacted material, how deep below the ground surface it is buried, and the availability of an appropriate disposal facility.

Locating and cleaning out the gas holder tank and coal tar well, if it exists, are a high priority. Experience has shown that these are the locations in which contamination is most likely to be concentrated. Remediation often consists of digging out and removing the contents of these underground structures, assessing the removed material for its hazardous characteristics, and disposing of it offsite in an approved waste disposal facility. The gas holder and tar well may then have the brick or concrete linings broken in order that water does not collect in the structure, and then are filled with clean gravel and soil. Soil, debris, and other materials which are judged to be non-hazardous can be consolidated onto one section of the site and covered with an engineered cap which is designed to protect the subsurface soil and prevent rain water from percolating into the subsurface. The cap can be paved and used a building foundation or a parking lot, or planted with grass.

In most cases, these activities successfully remediate the site to below Kansas Risk-Based Standards for non-residential properties. If low levels of contamination remain in the subsurface, the remediation process can be completed by placing an Environmental Use Control on the property, adding language to the deed which restricts certain future activities on the site such as digging or excavation, and prevents the installation and use of wells.

Manufactured Gas in our Future

America is currently seeking new forms of energy, and manufactured gas, now known as "syngas", may make a comeback. The gasification process for coal; oil; or the biomass from wood, vegetable oil, or garbage is a well-understood method of making hydrogen. Hydrogen is a fuel that burns without releasing pollutants or greenhouse gasses into the atmosphere, and is being considered as a fuel for cars. Some companies are developing new technologies that may make manufacturing syngas both economical and clean by improving the efficiency of the gasification process and developing more effective methods of capturing and removing contaminants. If biomass, rather than natural gas or coal, is used as the primary feedstock, gasification can even be made carbon-neutral. Whether manufactured gas is once again used as a practical source for fuel remains to be seen.

Manufactured Gas Plant (MGP) Status - October 2024

Status	Kansas MGPs												
	Abilene	Atchison	Concordia	Emporia	Hutchinson	Junction City	Kansas City	Leavenworth	Manhattan	Parsons	Salina	Topeka	Kansas Summary
ONE Gas Owns Site	Yes	No	No	Yes	No	No	Yes	Yes	No	Yes	No	Yes	6 of 12
KGS Service Center Site	No	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	4 of 12
Institutional Control Filed	Yes	Yes (South Parcel)	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	9 of 12
Current Phase within KDHE State Cooperative Program	Post-Remediation Monitoring	Corrective Action Study	Resolved with Restrictions	Resolved with Restrictions	Site Investigation	Site Investigation	Site Investigation	Resolved with Restrictions	Corrective Action Study	Resolved with Restrictions	Site Investigation	Resolved with Restrictions	N/A
Additional Actions Required	Yes	Yes	Yes[1]	Yes[1]	Yes	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes	Yes[1]	13 of 13

1 - Additional actions only required if site conditions change in such a manner that provides access to impacted materials that were previously determined to be inaccessible, or if site conditions no longer remain protective of human health and the environment.
KDHE - Kansas Department of Health and Environment
N/A - not applicable

Manufactured Gas Plant (MGP) Status - October 2024

Abilene, KS	An Interim Removal Action (IRA) was completed in 2005 to remove materials from the gas holder and tar well as well as soils surrounding these structures. A limited Supplemental Site Investigation (SSI) was completed in July 2016 both on-site (soil & groundwater) and off-site (groundwater). A Comprehensive Investigation was completed in 2017 to delineate the off-site groundwater plume and on-site MGP residues. A Corrective Action Study (CAS) Report was then prepared and submitted to KDHE in 2018 recommending our remedial approach which included excavation, in situ stabilization, and groundwater treatment as the final remedy for the site. In August 2019, KDHE issued an Agency Decision Statement (ADS) presenting KDHE's remedy selection, which was consistent with the recommendations. A groundwater treatment barrier was installed downgradient of the site in 2020 and excavation and in-situ solidification of on-site soils was performed in 2021 and 2022. A Corrective Action Report documenting corrective action activities was submitted to KDHE in 2022 and was subsequently approved. An Environmental Use Control Agreement (EUCA) was recorded on the property in 2023. Three rounds of post-remediation groundwater monitoring have been completed. Groundwater trends will be evaluated for a minimum total of 4 years to support a request for site closure.
Atchison, KS	The site is divided into two parcels separated by a city street. Investigations indicated source material was present in two gas holders on the north parcel and one tar well on the south parcel. A 10-story public housing building occupies a portion of the north parcel and partially overlies the larger gas holder. In 2018 and 2019, an IRA was performed at the south parcel to address MGP residues at and surrounding the former tar well. The IRA included the excavation and disposal of approximately 3,200 tons of soil and debris and the application of an in-situ chemical oxidation (ISCO) reagent to promote the degradation of residual impacts. A CAS Report was prepared and submitted to KDHE in May 2020 which proposed ISS and excavation as the remedy for the north parcel. KDHE provided commentary on the CAS instructing ONE Gas to engage the residents of the Atchison Housing Authority (AHA) building on the north parcel and affected stakeholders before finalizing the CAS, in accordance with federal Environmental Justice requirements. A revised CAS was submitted to KDHE in 2023 following a meeting with the City of Atchison and the residents of the AHA building. The CAS was revised to recommend a downgradient groundwater treatment barrier and sub-slab depressurization system as the chosen remedy for the site and was approved by KDHE. Following submittal and KDHE approval of the CAS, the AHA expressed hesitancy with installing the sub-slab depressurization system within the building. Kansas Gas Service is working to obtain access to the AHA building for installation of the system. Investigation activities are currently being conducted at the north parcel to support the design of the groundwater treatment barrier and an EUCA was recorded on the south parcel in 2024.
Concordia, KS	An IRA was conducted in 2008. An EUCA was recorded on the property in 2009. Groundwater monitoring indicates the only impacts above state standards are relatively low levels of arsenic. KDHE approved a draft CAS in 2014 which recommended long-term monitoring combined with the existing EUCA as the remedy for the Site. In March 2020, KDHE offered to classify the Site as "Resolved with Restrictions" if ONE Gas was interested in making that change. ONE Gas submitted a closure request letter to KDHE in October 2020 which KDHE subsequently approved. The site was conditionally closed and reclassified as "Resolved with Restrictions" in May 2021. Site monitoring wells were abandoned in August 2021.
Emporia, KS	An EUCA was recorded on the property in 2010. KDHE drafted an ADS that was made available during the public comment period. No public comments were received; therefore, KDHE finalized the ADS November 2, 2012. KDHE completed a Reclassification Report consistent with KDHE Policy. ONE Gas has satisfied all technical and administrative requirements for the site. The site is currently listed as "Resolved with Restrictions".
Hutchinson, KS	An EUCA was recorded on the property in 2009. Onsite monitoring wells show limited impacts aside from one upgradient well located on the northern property boundary. In 2014, BNSF submitted a Voluntary Cleanup Investigation (VCI) Report to KDHE which indicated that the MGP was the source of groundwater contamination and LNAPL impacts near a UST that was located between the former MGP and the BNSF site to the north. ONE Gas filed a rebuttal to the VCI Report conclusions in 2017. KDHE has not provided a formal response to the VCI Rebuttal Letter; however, KDHE has indicated that BNSF is pursuing closure of the Former Freight Depot site through the KDHE Voluntary Cleanup Program. In November 2020, ONE Gas submitted a closure request letter to KDHE. KDHE responded and advised that it could not approve the request for closure due to the presence of LNAPL in monitoring well HMW-3. In March 2023, ONE Gas requested that KDHE revisit the VCI Rebuttal Letter and again consider the site for closure. KDHE recommended that ONE Gas coordinate with the owner of the alleyway north of the site (identified as the City of Hutchinson) to execute an EUCA on the alleyway to support a request for closure. ONE Gas is in the process of making arrangements to meet with the City of Hutchinson to discuss placement of the EUCA.
Junction City, KS	An IRA completed in 2008. The site is occupied by a boat maintenance and bus repair facility. Uncertain if all remaining site impacts are related to MGP operations or former and existing underground fuel storage tanks in the direct vicinity of the site. A Supplemental Site Investigation was completed in 2019 which identified benzene and PAHs in off-site groundwater monitoring wells. Semi-annual groundwater samples were collected at the site in 2021 and 2022. KDHE approved the groundwater sampling frequency to be reduced to annually starting in 2023. Annual groundwater samples were collected in 2023 and 2024.
Kansas City, KS	An IRA was conducted in 2002 to remove the contents of below grade gas holders. Approximately 4,300 tons of consolidated waste impacted material were transported to a thermal destruction unit facility in Cedar Rapids, Iowa. 50 tons of scrap metal, debris and rubble were transported and disposed of at the Lone Mountain, Oklahoma hazardous waste facility. Groundwater monitoring continues and shows MGP related impacts. Kansas Gas Service submitted a Supplemental Site Investigation Work Plan to KDHE in July 2023 to delineate on- and off-site impacts related to the MGP to inform the development of a CAS. KDHE approved the Work Plan in August 2023. ONE Gas is currently obtaining access agreements to perform work on adjacent properties. Site investigation work is expected to begin 2nd quarter of 2025.

Manufactured Gas Plant (MGP) Status - October 2024

Leavenworth, KS	Impacted soil discovered during site investigation and was removed in 1995. A Restrictive Covenant was placed on the site in 2000. Portions of site are leased to the City of Leavenworth for public use as a riverfront park. A project was completed in 2018 by City's consultant and partially funded by Kansas Gas Service to address stream bank stability issues prior to 2019 Missouri River flooding. The site is currently listed as "Resolved with Restrictions"
Manhattan, KS	Property is owned by the City of Manhattan and is occupied by the City's Traffic Operation Facility. Approximately 5,500 tons of impacted soil was removed from on-site structures in 2005 and 2006. The City of Manhattan (current property owner) after consultation with KDHE constructed a Public Works, Traffic Operations Facility in 2012. This new construction was completed within a portion of the site that is included in an EUCA and involved plugging of one ground water monitoring well. Additional groundwater characterization was performed in 2017 and 2018 to delineate groundwater impacts north of the Site. This investigation also identified MGP residues that remain onsite below the water table. A Draft CAS was completed in 2020. The CAS presents remedial strategies for the Site given the results of the 2017 and 2018 investigations. Prior to submittal of the CAS to KDHE, ONE Gas was made aware of the City of Manhattan performing trenching activities at the site for installation of modular buildings where they encountered apparent MGP residues. Samples of the encountered materials were collected, and results were provided to KDHE and the City of Manhattan. The City of Manhattan retained an environmental consultant to evaluate for potential vapor intrusion risks within the new office space. In the 1st quarter of 2022, ONE Gas began preparations to begin a public outreach effort in the community surrounding the site to fulfill federal Environmental Justice obligations. ONE Gas decided to further evaluate potential vapor intrusion risks at the property prior to beginning outreach efforts. Four quarterly rounds of soil gas samples were collected and results have been provided to KDHE and the City of Manhattan. ONE Gas is currently planning public outreach activities in accordance with federal Environmental Justice guidance to discuss remediation options with residents and stakeholders in the project area prior to submittal of the CAS to KDHE.
Parsons, KS	A limited source removal was conducted due to buildings over portions of the historic MGP operations. Part of the tar well remains under existing building. A Restrictive Covenant was placed on the property in 2005. Remaining impacts may be investigated and possibly remediated if/when building is ever removed. The site is currently listed as "Resolved with Restrictions".
Salina, KS	Site currently occupied by an automotive repair facility and is adjacent to various commercial/industrial facilities with associated contamination. An IRA was completed in 2007. A Supplemental Site Investigation is anticipated to be performed at the site in 2025.
Topeka, KS	An IRA was completed to address source material that is not located under current utilized buildings. An EUCA is currently in place on the site. Source material remains under existing buildings and will be addressed if buildings are removed. In March 2020, KDHE offered to classify the Site as resolved with restrictions if ONE Gas is interested in making that change. ONE Gas submitted a closure request letter to KDHE in October 2020 which KDHE subsequently approved. The site was conditionally closed and reclassified as "Resolved with Restrictions" in May 2021.

ADS - Agency Decision Statement
CAS - Corrective Action Study
EUCA - Environmental Use Control Agreement
IRA - Interim Removal Action
KDHE - Kansas Department of Health and Environment
MGP - Manufactured Gas Plant
PAH - Polycyclic Aromatic Hydrocarbons
VCI - Voluntary Cleanup Investigation

Site Closure in the State Cooperative Program

Bureau of Environmental Remediation Remedial Section Policy # BER-RS-024

Kansas
Department of Health and Environment
Environmental Remediation

February 2015

Concurrence

Leo Henning, P.G.
Director, Bureau of Environmental Remediation

2-26-15
Date

Chris Carey, P.G.
Remedial Section Chief

2/26/15
Date

Ryan Weiser, P.G.
Site Remediation Unit Chief

2/26/15
Date

Maura O'Halloran, P.G.
Site Restoration Unit Chief

2/26/15
Date

Kansas Department of Health and Environment
Environmental Remediation

Site Closure in the State Cooperative Program

Introduction and Purpose

This policy establishes the Kansas Department of Health and Environment's (KDHE's) procedure to determine if an *Active* site in KDHE's State Cooperative Program is eligible for site closure (*Resolved* status on KDHE's Identified Sites List), conditional closure (*Resolved with Restrictions* status), or if further actions are necessary to protect human health and the environment. This decision is based on the current and future risks posed by site-related contamination and the protection and restoration of the State's natural resources. Responsible Parties intending to seek site closure are encouraged to discuss this process and any potential issues or concerns with KDHE as early in the process as possible.

Please note this policy should not be applied on a well- or location- specific basis to justify changes to performance or compliance monitoring programs. KDHE encourages continual evaluation of these environmental monitoring programs to optimize data collection activities in coordination with KDHE.

Eligibility for Site Closure

Sites are eligible for closure once data indicate that they no longer pose a threat to human health and/or the environment. In some cases, sites can be closed without any active remedial actions taking place; in other cases, however, extensive remediation is necessary to achieve closure. The scope of remedial actions necessary at a site is determined through the Comprehensive Investigation/Corrective Action Study Process and is documented in the Agency Decision Statement or Corrective Action Decision.

Cleanup Levels and Closure Criteria

For the majority of sites in the Program, cleanup levels are KDHE's Tier 2 RSK Levels as provided in the Risk-Based Standards for Kansas (RSK) Manual for soil, groundwater and indoor air. Surface water cleanup levels are based on the Kansas Surface Water Quality Standards (K.A.R. 28-16-28b) for the designated use. Sediment cleanup levels are determined in accordance with KDHE's Sediment Policy (BER-ARS-045). In some cases, alternate remediation goals, site-specific cleanup levels, or site-specific background levels are established in the Corrective Action Decision or Agency Decision Statement. Sites are eligible for closure once remedial actions are complete, as demonstrated by performance monitoring and any necessary rebound testing,

Which sites are eligible for closure?

- Sites where investigation findings demonstrate no response actions are necessary to protect human health and the environment; or
- Sites where active remediation has been completed and no future actions are necessary to protect human health and the environment.

and when the criteria specified below are met for each environmental medium.

- **For Groundwater and Surface Water:**
  - **Option 1:** Contaminant concentrations are below established cleanup levels (or background) at representative KDHE-approved indicator monitoring locations (e.g., source area, and down gradient locations) over four semi-annual or annual sampling events;
  - **Option 2:** The four-point moving average of contaminant concentrations is below established cleanup levels (or background) at indicator monitoring locations over no less than two years and trend analyses (based on a sufficient dataset) indicate stable or decreasing concentration trends (KDHE may consider other statistical approaches on a case by case basis); or
  - **Option 3:** Site-specific risk evaluation demonstrates residual contamination does not pose an unacceptable threat to current and potential future receptors (including the potential for cross-media transfer (e.g., soil to groundwater migration, groundwater to surface water discharge, and vapor intrusion)).

- **For Soil and Sediment:**
  - **Option 1:** Contaminant concentrations are below established cleanup levels (or background); or
  - **Option 2:** Site-specific risk evaluation demonstrates residual contamination does not pose an unacceptable threat to current and future potential receptors (including the potential for cross-media transfer).

- **For Indoor Air:**
  - KDHE anticipates that indoor air impacts attributable to vapor intrusion will dissipate once soil and groundwater cleanup levels are attained.
  - Shutdown and decommissioning requirements for vapor mitigation systems are specified in BER-RS-053, *Considerations for Operations, Maintenance and Monitoring of Residential Active Sub-Slab Depressurization Systems* (KDHE, 2011).

Legal agreements and/or orders for sites that meet the requirements for site closure will be terminated once KDHE approves a request for reclassification and all other requirements in the agreements/orders are satisfied.

Eligibility for Conditional Closure

For sites that do not meet the requirements for site closure above, KDHE, in consultation with the Responsible Party, may determine that *Conditional Closure* is appropriate. Conditionally closed sites no longer require further actions under the State Cooperative Program, but are not suitable for unrestricted use (e.g., some sites with waste-in-place remedies, sites with residual contamination above residential cleanup levels, but below non-residential cleanup levels, etc.). Sites eligible for Conditional Closure typically rely on engineering or institutional controls to manage potential residual risks as opposed to addressing these sites through continued work under the State Cooperative Program.

Kansas Department of Health and Environment
Environmental Remediation

Considerations for Closure with Restrictions Status

KDHE considers the following conditions to determine whether a site is eligible for Conditional Closure:

- Institutional controls are in place that provide sufficient means for KDHE to ensure the protectiveness of the remedy through enforcement. Any engineering controls necessary to ensure the protectiveness of the remedy are incorporated into the institutional controls.
- The source area has been remediated to the extent practicable;
- There are no existing or reasonably anticipated exposures above cleanup levels through cross-media transfer;
- For sites with residual groundwater concentrations above cleanup levels, KDHE evaluates each site based on:
    - groundwater plume dimensions (vertical and lateral);
    - contaminant concentrations and trends;
    - groundwater use and receptors in the site vicinity; and
    - potential for the plume to cause an exceedance of cleanup levels in an adjacent aquifer.

Which sites are eligible for Conditional Closure?

- Sites where institutional and/or engineering controls alone are sufficient to protect human health and the environment; or
- Sites where active remediation has been completed, but institutional and/or engineering controls are necessary to protect human health and the environment.

The status of legal agreements and/or orders for sites that are conditionally closed will be evaluated on a case-by-case basis to determine the appropriate disposition.

Closure Process

Once site data support closure, the Responsible Party typically prepares a Closure Report. The Closure Report may be combined with another document if approved by KDHE. KDHE may also elect to prepare a Closure Report. Site closure determinations must be supported by a comprehensive evaluation of current and historical site data. Closure Reports should include the following components, with appropriate tables and figures to support the closure determination:

- **Site Background** – a summary of site history, location, ownership, and operations, including any known or suspected releases.
- **Investigation Summary** – a summary of past investigation activities and results, including the nature and extent of contamination, migration pathways, and known or potential human health or ecological risks.
- **Selected Remedy** – a summary of the remedial action objectives, cleanup levels, and remedial action alternative(s) specified in the site decision document.

- **Remediation and Risk Management** – a discussion of any controls, interim remedial measures, and/or remedial actions taken to address environmental impacts or eliminate exposure pathways.

- **Current Site Data and Justification for Site Closure** – a summary of the current site data in the context of the remedial action objectives and cleanup levels specified in the site decision document and the closure conditions presented herein. The discussion should also include any conditions on the closure determination (e.g., institutional and/or engineering controls, etc.).

The Closure Report will be routed through the Bureau Director for concurrence on the closure determination. KDHE will notify the Responsible Party in writing whether it approves or disapproves the closure request.

- If closure is approved, KDHE's initial notice will specify any specific restrictions or conditions of the site closure and will also identify any requirements that must be completed prior to site closure (e.g., payment of final invoices, plugging and abandonment of monitoring wells, decommissioning of remedial systems, institutional controls in place, etc.). Once these requirements are completed to KDHE's satisfaction, KDHE will provide a final notice of site closure and will change the site status accordingly in the Identified Sites List. *Please note that Closed or Conditionally Closed status indicates **known** contamination does not pose a significant threat to human health or the environment, based on information available to KDHE at the time of reclassification. Site closure does not imply that a site is free from all contamination or pollution. KDHE may require further action on a closed site if new information becomes available that indicates that the site may pose a threat to human health or the environment and/or if additional releases have occurred.*

- If KDHE determines that a site is not eligible for closure, KDHE will identify the specific criteria that affected the determination, based on this policy and site-specific project documentation and requirements, as well as any additional work necessary to facilitate closure. KDHE will review any additional information provided by the Responsible Party to supplement the initial closure request. Responsible parties may appeal KDHE's final closure determination in writing to the Director of the Bureau of Environmental Remediation.

ONE Gas
36 Month Tentative MGP Schedule

ELR-4

ID	Task Name	Duration	Start	Finish
1	**ABILENE ***			
2	Remediation Performance Monitoring	1861 edays	Tue 9/20/22	Mon 10/25/27
3	**ATCHISON ***			
4	**North Parcel***			
5	KDHE Prepares Agency Decision Statement	442 edays	Mon 10/16/23	Tue 12/31/24
6	Public Comment Period with Public Meeting (If appropriate)	30 edays	Tue 12/31/24	Thu 1/30/25
7	Pre-Design Investigation	375 edays	Mon 12/4/23	Fri 12/13/24
8	Corrective Action Plan	120 edays	Tue 12/31/24	Wed 4/30/25
9	KDHE Review of Corrective Action Plan	45 edays	Wed 4/30/25	Sat 6/14/25
10	Installation of Groundwater Barrier and VI System	100 edays	Fri 7/25/25	Sun 11/2/25
11	Performance Monitoring	763 edays	Sun 11/2/25	Sun 12/5/27
12	**South Parcel***			
13	Performance Monitoring	2901 edays	Fri 11/15/19	Mon 10/25/27
14	**HUTCHINSON ***			
15	Pursuing EUCA with City of Hutchinson, Planning/Meeting	109 edays	Mon 8/19/24	Fri 12/6/24
16	Placement of EUCA on Alleyway	60 edays	Fri 12/6/24	Tue 2/4/25
17	Closure Request Letter to KDHE (Includes Corrective Action Alternative Discussion)	60 edays	Tue 2/4/25	Sat 4/5/25
18	KDHE Issues Agency Decision Statement	90 edays	Sat 4/5/25	Fri 7/4/25
19	Public Comment Period	30 edays	Fri 7/4/25	Sun 8/3/25
20	Site Classified as Resolved with Restrictions	60 edays	Sun 8/3/25	Thu 10/2/25
21	**JUNCTION CITY***			
22	Annual Groundwater Monitoring	60 edays	Mon 7/14/25	Fri 9/12/25
23	**KANSAS CITY ***			
24	Conduct SSI Fieldwork	60 edays	Tue 4/1/25	Sat 5/31/25
25	Prepare SSI Summary Report	90 edays	Sat 5/31/25	Fri 8/29/25
26	Develop Options for Next Steps	150 edays	Fri 8/29/25	Mon 1/26/26
27	**MANHATTAN ***			
28	Initial Environmental Justice Outreach Planning and Meeting	60 edays	Mon 3/31/25	Fri 5/30/25
29	Submit CAS Report (assumes current alternatives do not require rework)	60 edays	Mon 5/5/25	Fri 7/4/25
30	KDHE Review of CAS Report	60 edays	Fri 7/4/25	Tue 9/2/25
31	KDHE Prepares Agency Decision Statement	45 edays	Tue 9/2/25	Fri 10/17/25
32	Public Comment Period with Public Meeting (If appropriate)	30 edays	Fri 10/17/25	Sun 11/16/25
33	Corrective Action Plan	90 edays	Tue 9/2/25	Mon 12/1/25
34	KDHE Reviews Corrective Action Plan	60 edays	Mon 12/1/25	Fri 1/30/26
35	Pre-Construction Public Meeting and Planning	60 edays	Fri 1/30/26	Tue 3/31/26
36	Conduct Pilot Study	180 edays	Tue 3/31/26	Sun 9/27/26
37	Design and Bid Package Procurement	120 edays	Sun 9/27/26	Mon 1/25/27
38	Remedy Implementation	200 edays	Mon 1/25/27	Fri 8/13/27
39	30 Years Operations and Maintenance and LTM	183 edays	Fri 8/13/27	Sat 2/12/28
40	**SALINA ***			
41	Develop SSI Work Plan	60 edays	Wed 1/1/25	Sun 3/2/25
42	KDHE Review of SSI Work Plan	45 edays	Sun 3/2/25	Wed 4/16/25
43	Conduct SSI Fieldwork	60 edays	Wed 4/16/25	Sun 6/15/25
44	Prepare SSI Summary Report	90 edays	Sun 6/15/25	Sat 9/13/25
45	Develop Options for Next Steps	55 edays	Sat 9/13/25	Fri 11/7/25
46	**Notes**			
47	* Groundwater monitoring will be conducted at least once each calendar year for Kansas sites that have monitoring wells.			
48	**- All dates are tentative and subject to change due to delays associated with site access, subcontractor availability, weather, and stakeholder input.**			
49				
50				

Project: ONE Gas 36 Month Schedule
Date: Fri 10/25/24

Task | Summary | External Milestone | Inactive Summary | Manual Summary Rollup | Finish-only | Manual Progress
Split | Project Summary | Inactive Task | Manual Task | Manual Summary | Deadline
Milestone | External Tasks | Inactive Milestone | Duration-only | Start-only | Progress