National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials Investigations
Washington, D.C. 20594

Operations / Pipeline Integrity

Group Chairman's Factual Report of the Investigation

Operations / Pipeline Integrity Factual Report

CenterPoint Energy Minnesota

Minnehaha Academy, Minneapolis, MN

August 2, 2017

NTSB Accident No.:

DCA17MP007

Report Date: November 20, 2019

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2 ACCIDENT SUMMARY

On August 2, 2017, at 10:22 a.m. central daylight time, a building at the North Campus of the Minnehaha Academy (Academy) in Minneapolis, Minnesota, was destroyed by a natural gas explosion (Figure 1). The accident resulted in the death of two Minnehaha Academy employees and injuries to nine others. In addition, the accident caused damage to two other Academy buildings.

The explosion and subsequent collapse of the Minnehaha Academy structure occurred following an uncontrolled release of natural gas inside the utility bunker[1] (gas meter room). The explosion occurred when two Master Mechanical, Inc. (MMI) employees were working under contract by CenterPoint Energy Minnesota Gas (CPEMG). The two MMI employees were working on a section of a natural gas service pipeline which was regulated by the U.S. Department of Transportation (DOT) Pipeline and Hazards Materials

[1] The "utility bunker" was originally built as an underground coal bunker. At the time of the accident, the utility bunker contained a portion of the gas service line (including two gas meters) and downstream customer piping.

Safety Administration (PHMSA) in accordance with 49 CFR Parts 190, 191, 192, 196, and 199.

The two MMI workers were fabricating and installing new customer piping as part of a larger CPEMG project to relocate the Academy gas meters from the inside to the outside of the building. The two new meters had been previously mounted on an exterior wall by CPEMG and were ready for the new customer piping to be connected. The older meters were still in-service, providing gas to the Academy. While MMI workers were removing the existing piping, a full-flow natural gas line at pressure was opened. The workers were unable to mitigate the release of gas. They evacuated the area and warned others to do the same.

Following the gas release, the two MMI employees exited the basement area to the rear (west) side of the building. At nearly the same time, two Minnehaha Academy employees exited through the same rear (west) doorway of the building onto the sidewalk which was above the gas meter room. As a result of the blast, the two Academy employees were fatally injured during their exit. One other person was seriously injured, and eight others sustained less severe injuries which required hospitalization.

At the time of the accident, both campuses of the Academy were in recess for summer vacation. However, routine administrative and maintenance activities were ongoing at the North Campus. Thirty-six Academy personnel were present, in addition to maintenance contractor personnel, six basketball team students, and the basketball coach.[2]

Figure 1 – Photo of the accident site taken after the building explosion with several personnel and emergency responders on scene. Source: Minneapolis Fire Department

[2] Source: statement of Minnehaha Academy, responsive to NTSB inquiry

3 ACCIDENT SITE

Minnehaha Academy, established in 1913, is a religious-affiliated, private school, which had a total enrollment of over 800 students at the time of the accident. The Academy is comprised of two campuses; the South Campus for preschool through 8th grade students, and the North Campus for 9th through 12th grade students.

The North campus, also known as the Upper School, had a population of about 350 students, 40-45 teaching faculty, and 50-55 administrative staff at the time of the accident. The site was located at 3100 West River Parkway and was comprised of a series of interconnected buildings that evolved over the years at the property. Two of the structures on the campus, which were originally referred to as the separate North building (built in 1912), and the South building (built in 1922), were located on 47th Avenue South between East 31st Street and East 32nd Street (Figure 2). In 1949, a new connection building was constructed between the North and South buildings. The North campus also included a chapel building and a gymnasium, which were connected to the other buildings of the campus. The property also included several athletics fields.[2]

At the time of the accident, both campuses of the Academy were in recess for summer vacation. However, routine administrative and maintenance activities were ongoing at the North Campus. Thirty-six Academy personnel were present, in addition to maintenance contractor personnel that were performing scheduled maintenance activities. Summer student athletic activities were also in progress in the gymnasium, which contained six (basketball team) students and their coach.[2]

The connection building consisted of a basement, a first floor, a second floor, and a third floor. The first floor was comprised of the cafeteria, bookstore, a conference room, central stairwell, science classrooms, a new STEM lab, and an athletics center. The second floor consisted of a reception area, central connector stairwell, classrooms, restrooms, business offices, student services/counseling, the president's administrative office area, and the school president's office. The third floor had classrooms, IT office, facility director office, teacher offices, computer lab, library and restrooms.[2]

The basement of the connection building was comprised of a utilities-storage room (used to store maintenance supplies), a boiler room (containing the heating system boiler equipment), and a utility bunker (gas meter room). The gas meter room was an extension of the basement spaces, consisting of a subterranean room that was constructed beneath a ground level concrete slab that extended from the west basement wall of the connection building. The gas meter room was below the sidewalk at the rear (west side) doorway shown in Figure 3. The gas meter room was accessed through an opening in the foundation wall of the boiler room (Figure 4). The boiler room was accessed through a doorway from the utilities-storage room (Figure 5).

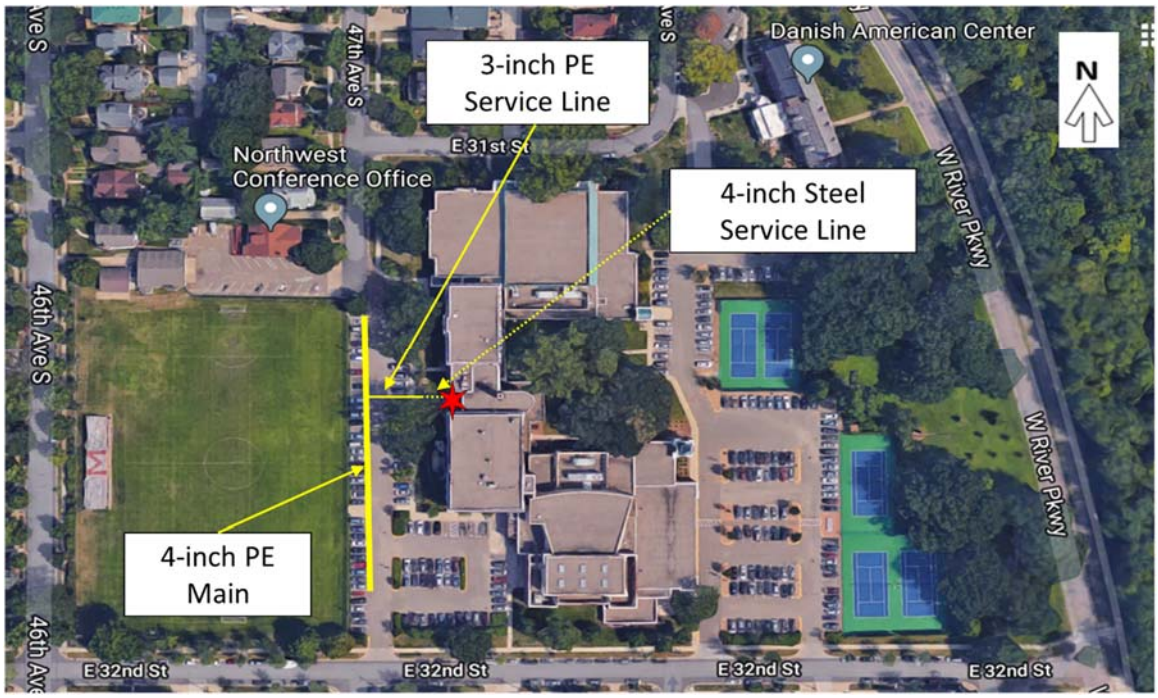

Figure 2 – Map showing the streets around Minnehaha Academy, the accident location and the approximate gas main and service line locations. Source: Google imagery with NTSB annotation

Figure 3 – Sidewalk over utility bunker (gas meter room) at the rear (west end) of the Minnehaha Academy building showing gas vent pipes. Source: CPEMG, taken: Feb2016

Figure 4 – View from utility bunker (gas meter room) into boiler room. Source: CPEMG, taken Feb 2017

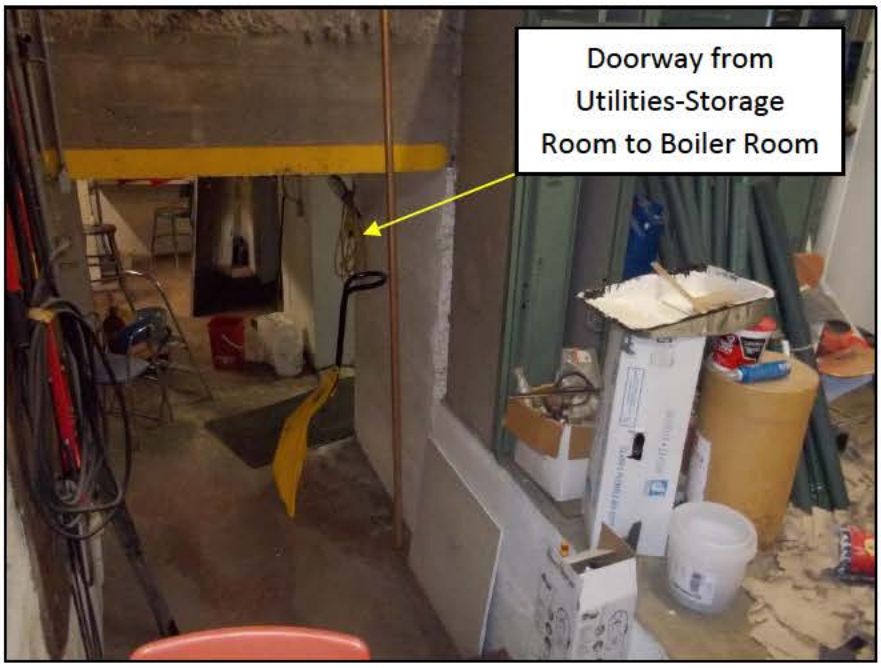

Figure 5 – View from utilities-storage room into boiler room. Source: CPEMG, taken Feb2016

4 DESCRIPTION OF THE OPERATOR[3]

As of August 2017, CenterPoint Energy Resources Corp. (CERC) was an indirect, wholly owned subsidiary of CenterPoint Energy, Inc., a public utility holding company. CERC's operating subsidiaries owned and operated natural gas distribution facilities serving approximately 3.4 million residential, commercial, industrial, and transportation customers in six states (Arkansas, Louisiana, Minnesota, Mississippi, Oklahoma, and Texas). In Minnesota, CERC's operating subsidiary was known as CPEMG.

CPEMG was the largest natural gas company in Minnesota, with over 1,200 employees serving more than 260 communities in the state in August 2017. CPEMG had been in business for over 140 years in Minnesota. CPEMG also provided unregulated services in Minnesota consisting of residential appliance repair and maintenance services along with heating, ventilation, and air conditioning equipment sales.

5 DESCRIPTION OF THE PIPEFITTING CONTRACTOR[4]

MMI was the contractor hired by CPEMG to perform the pipefitting work at the accident site. MMI is a professional mechanical contracting corporation, based in Eagan, MN. MMI employs approximately 125 employees. MMI's technical staff are hired through local unions, which provide apprenticeship training programs.

6 THE IMPACTED GAS DISTRIBUTION SYSTEM

6.1 GENERAL DESCRIPTION

At the time of the accident, natural gas was distributed to the Academy via a 4-inch polyethylene (PE) main, and a 3-inch PE and 4-inch steel service line. These pipelines were installed between 1959 and 2002.[5] The service line operating pressure at the time of the accident was about 10 psig. According to CPEMG, the maximum allowable operating pressure (MAOP) for the system was 25 psig.[6]

[3] Source: statement of CPEMG, "CenterPoint Energy Resources Corp. Overview," responsive to NTSB inquiry

[4] Source: https://mastermechanical.com/about.html

[5] Source: statement of CPEMG, Company history and pipeline detail, responsive to NTSB inquiry

[6] Source: statement of CPEMG, MAOP Statement and Pressure Chart Information, responsive to NTSB inquiry

The Minnehaha Academy utility bunker (gas meter room) contained a portion of the gas service line, both a firm and an interruptible[7,8] gas service meter, and downstream customer piping (Figure 6 and Figure 7). The 3.5-inch by 10-inch interruptible dimensional meter was preceded by a regulator and over pressure valve and were located along the north wall of the gas meter room. These facilities were connected upstream to a 3-inch Walworth plug valve that transitioned through a 4- x 3-inch steel reducer (on the upstream side) and connected with a 4-inch steel service line. The open 3-inch Walworth plug valve operating handle was correctly positioned parallel to the gas pipeline in the pictures taken in February 2016 and February 2017 (Figure 6 and Figure 4, respectively). The 4-inch steel line was encased in a 6-inch steel casing that penetrated the west wall underground to a point outside the building. The 4-inch line also had a small diameter pipe connection which fed the firm 5MTC meter. The outlets of the firm and interruptible meters were connected to unregulated customer piping.[9]

6.2 REGULATORY OVERSIGHT OF THE PIPELINE SYSTEM

PHMSA is responsible for ensuring adequate protection against risks to life and property posed by pipeline transportation of natural gas.[10,11] The regulations governing natural gas distribution systems are codified in Title 49 of the Code of Federal Regulations (CFR) Parts 190, 191, 192, 196, and 199. Through a partnership with PHMSA, Minnesota Office of Pipeline Safety (MNOPS) assumed regulatory and enforcement responsibility for the DOT-jurisdictional (regulated) portion of the gas distribution system serving the Academy.

The DOT-jurisdictional portion of the pipeline system involved in this accident includes the main and service lines serving the Academy. Per 49 CFR 192.3, the service line ends at the outlet of the customer meter.

The non-DOT-jurisdictional (unregulated or customer piping) portion of the pipeline system includes the customer piping downstream of the outlet of each of the customer meters. The unregulated portion of the pipeline system are not involved in the pipeline transportation of natural gas to the customer and are therefore not subject to the same federal

[7] "Firm" meters supply a continuous source of gas; "interruptible" meters provide an option to interrupt the flow of gas so that an alternate fuel source may be used.

[8] Source: statement of CPEMG, Explanation of Firm and Interruptible Meters and Meter Moves from Inside to Outside, responsive to NTSB inquiry

[9] Source: statement of CPEMG, Description of 02-24-2016 Pictures Taken by Meter Foreman, responsive to NTSB inquiry

[10] Source: Norman Y. Mineta Research and Special Programs Improvement Act

[11] Source: Title 49 United States Code (USC) Subtitle VIII—Pipelines, Chapter 601—Safety

requirements. Instead, these pipes belong to the gas customers and are constructed under permit from the local jurisdiction.

After DOT-jurisdictional pipelines are constructed, the operator of the piping periodically inspects the pipeline to ensure continued compliance with federal requirements. The customer piping is not required to be inspected for safety under the federal requirements; the piping maintenance is the responsibility of the gas customer.

Operators of DOT-jurisdictional pipelines are required under 49 CFR 192.805 to have a written qualification program, in part, to ensure that individuals performing covered tasks are qualified. Work on unregulated pipelines is not covered under these federal regulations.

6.3 MAINTENANCE HISTORY OF THE 3-INCH PLUG VALVE INVOLVED IN THE ACCIDENT

The 3-inch plug valve which was involved in the accident was a "Walworth 200 Lb Higher Strength Cast Iron Lubricated Plug Valve" (No. 1700F). Walworth lubricated plug valves are all purpose valves that use insoluble lubricants to ensure ease of operation, tight sealing and resistance to corrosion and wear. The Walworth Company recommended that valves that are not regularly operated should be turned and lubricated within at least six months from the previous lubrication for best results. The Walworth Company also indicated that this type of valve requires little, if any, attention when properly installed and lubricated. The Walworth Company noted that the amount of lubricant required varies greatly; if a valve is infrequently operated and remains in the open position, the entire seating surfaces are protected and there is little chance of the lubricant being washed away.[12] In response to NTSB inquiries following this accident, Walworth staff indicated that, "We know of issues with this style of valve. If the valve has not been exercised on a regular basis, or if the valve has not been maintained per our recommendations, there is low probability that this valve will operate."[13] Valve seizing is a known failure mode; lubricated plug valves provide a means to lubricate the seating surfaces of the valve, helping to eliminate valve seizing while still providing a positive seal.[14] However, there was no warning in the manufacturer's literature for this valve indicating that a failure to lubricate will give rise to valve seizing.[12] CPEMG indicated that they inquired internally and did not find any indication of valve seizure events on their distribution system; when they have encountered valves that were hard to turn, their technicians have been able to lubricate the valves to resolve the issue. CPEMG further indicated that they have not received any cautionary notifications from Walworth to lubricate their valves.[15]

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[12] Source: Excerpt from Walworth Lubricated Plug Valves, Catalog 57L, 1957.

[13] Source: Telephone conversation between NTSB Investigator-In-Charge and Walworth employee, October 2019.

[14] Source: Control Valve Handbook, Fifth Edition, Emerson-Fisher, 2017.

[15] Source: statement of CPEMG, dated 11/13/2019, responsive to NTSB inquiry

CPEMG had no records that discussed maintenance on the 3-inch Walworth plug valve involved in the accident. According to CPEMG, the Walworth plug valve would have been operated and possibly lubricated during periodic meter maintenance.[16] CPEMG provided documentation of the following activities which CPEMG indicated would have required the Walworth plug valve to be exercised: an interruptible meter oil change that took place on December 2, 2011,[17] a pressure test associated with the service line replacement in 2002,[18] and a pressure test associated with the installation of a Kerotest valve in 1971.[19] CPEMG further indicated that meter oil changes would have been completed about every five years since the plug was installed in 1959.[20] CPEMG provided records which indicated that their technicians are trained to lubricate valves (such as the Walworth plug valve which was involved in the accident) if they are difficult to operate.[21] If a CPEMG technician attempted to operate the Walworth valve and found it to be difficult to operate, the technician may have lubricated the valve consistent with their training and ancillary to the other work being performed. In such an instance, CPEMG indicated that there would not have been a separate work order for the lubrication. The most recently documented instance where a CPEMG technician was likely to have operated the Walworth valve was in December 2011, almost six years prior to the accident. Minnehaha Academy staff were not aware of any time when the valve was exercised as part of their operations; they used a downstream valve located near the boiler to switch between fuel sources.

[16] Source: statement of CPEMG, dated 10/13/2017, Walworth Plug Valve Maintenance, responsive to NTSB inquiry

[17] Source: CPEMG Records, 2011 Interruptible Meter Oil Change, provided in response to NTSB Inquiry

[18] Source: CPEMG Records, 2002 Service Line Replacement, provided in response to NTSB Inquiry

[19] Source: CPEMG Records, 1971 Kerotest Valve Installation, provided in response to NTSB Inquiry

[20] Source: statement of CPEMG, dated 10/09/2019, Walworth Plug Valve Maintenance, responsive to NTSB inquiry

[21] Source: CPEMG Records, Excerpt from Training – Inspecting and Maintaining Valves, responsive to NTSB inquiry

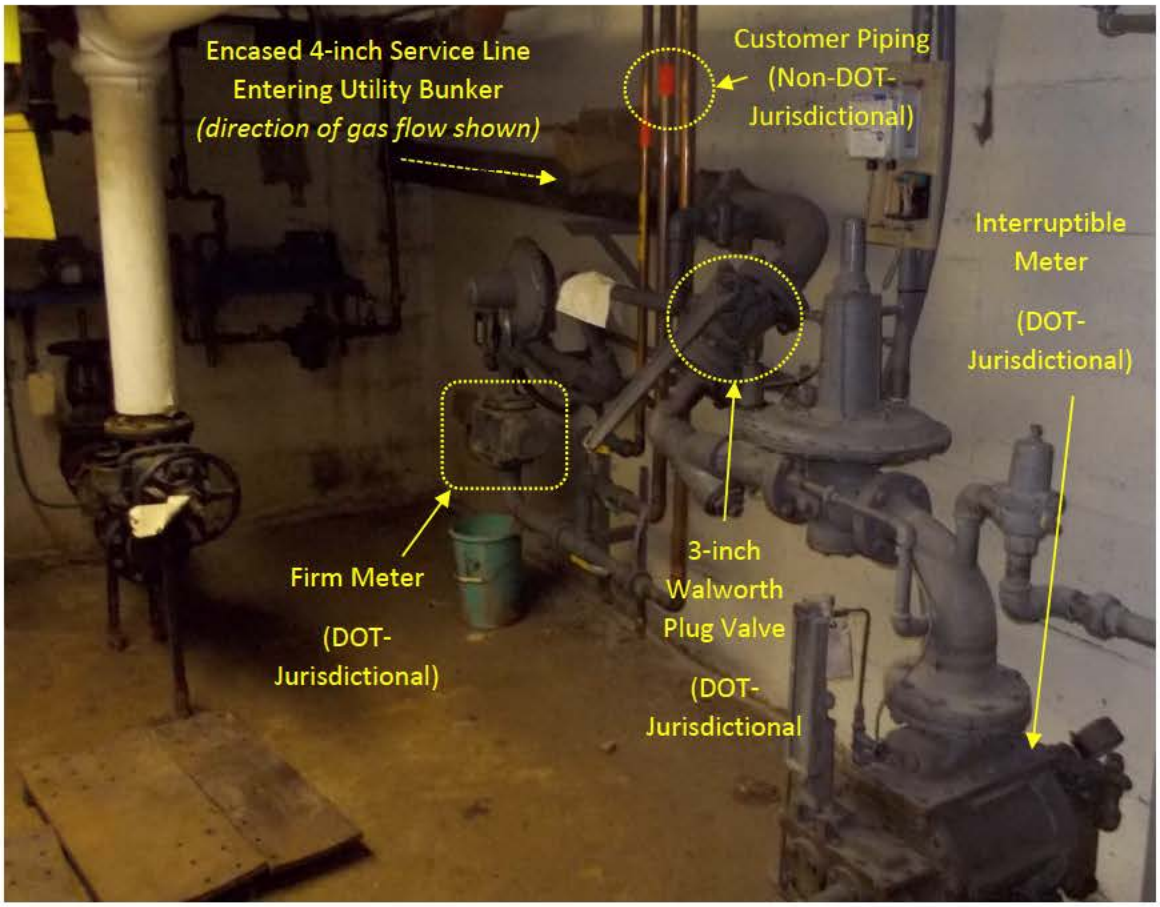

Figure 6 – Configuration of Natural Gas Service Equipment in Utility Bunker (Gas Meter Room), Source: CPEMG with NTSB annotations, Taken: Feb2016 (~1.5 years pre-accident)

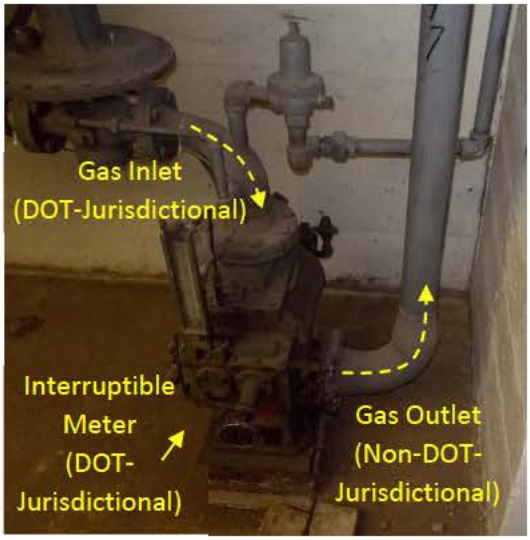

Figure 7 – Interruptible Meter and Non-DOT-Jurisdictional Customer Piping in Utility Bunker, Source: CPEMG with NTSB annotations, Taken: Feb2016 (~1.5 years pre-accident)

7 PRE-ACCIDENT ACTIVITIES

CPEMG has been engaged in a dimensional[22] meter replacement program since about 1999 to eliminate obsolescent meter equipment and improve metering accuracy. Other reasons that these meters may be replaced or relocated include customer requests (building modification and changing equipment or load demand changes), public improvement projects, and distribution integrity management projects.[23]

According to CPEMG, they use contractors to perform the work not customarily performed by their own employees. CPEMG stated that they engage qualified mechanical contractors to perform commercial work to modify customer piping.[24]

7.1 CPEMG GENERAL METER RELOCATION PROCESS

Prior to the accident, CPEMG had a process to identify meters to replace, including relocating the meter from the inside to the outside when feasible. The CPEMG engineering group determined the loads and designs for the replacement meter and regulator assemblies on the outside of the building. CPEMG solicited one or more bids for mechanical contractors for the customer piping portion of the project. The selected company was typically responsible for laying out, measuring, purchasing materials, permitting, fabricating and installing the customer piping before activation of the new meter. According to CPEMG, this process reduced the time that customers may be out of gas supply.[8]

CPEMG meter installation (M&I) and construction and maintenance (C&M) crews typically worked with the contractor on the meter relocation project. The C&M crew would shut off the gas to the service line to enable the installation of a new riser. The M&I crew installed the new meter. Generally, the new meter installation occurred before the meter change to allow the mechanical contractor a reference to measure from for the hole(s) they would drill below grade. The M&I crew worked with the contractor to abandon, disassemble, or remove the existing meters after the jurisdictional equipment is no longer energized. The C&M crew was responsible for restoring gas supply to the service line after completing the installations. M&I turned on the meter and made sure it was operating properly. After the activation of the new meter, CPEMG performed leak testing of the new service piping and ensured that customer equipment that required gas was working properly, if applicable.[8]

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[22] A dimensional meter is a rotary meter with internal rotating impellers. The term “dimensional” originates from the physical geometry of the internal meter case and its two rotating impellers within. The computational volume within the meter case with the impeller cross-sectional volume subtracted provides what is termed the “dimensional” displacement per revolution.

[23] Source: DCA17MP007-Minnehaha Doc Request 01 Item 018 Meter Relocation program

[24] Source: Attachment 7 - DCA17MP007 Minnehaha Item 042 work by contractor vs CPEMG

For CPEMG, general scope of work for both residential and commercial meter works stipulated that contractors were responsible for: customer appointments, re-painting of meter set, relighting of all gas appliances, necessary paperwork, field documentation and as built drawings. For in-to-out meter moves, CPEMG may have required its contractors to move a single or double meter fit[25] in-to-out including installing a new outside meter set, removing inside meter set, and installing pounds to inches regulators. When necessary, CPEMG required its contractors to reconnect customer piping, and fill foundation/basement walls with cement.[26]

7.2 CPEMG CONTRACTED WORK WITH MMI

CPEMG hired MMI to connect the CPEMG relocated meters to the Minnehaha Academy Upper School customer piping. MMI was responsible for relocating and reconnecting the customer piping to the new meters outside the building.

CPEMG was responsible for the inside-to-outside gas meter relocation and for the gas pipeline components which were DOT-jurisdictional. The CPEMG planned work on DOT-jurisdictional piping was required to be conducted by individuals who were qualified and authorized by the gas company for the respective tasks. CPEMG had departments that managed each aspect of these tasks to complete the relocation; including the C&M group to address the outside work and the M&I group to perform the inside work.

7.2.1 Contract agreement[27]

The CPEMG stated contract with MMI was the MMI proposal (work bid) for the project. Normally, CPEMG sent a contract work request to MMI and in the response CPEMG would receive an acceptance letter from MMI to execute the project at a cost; this would become the contract agreement. For the Minnehaha Academy Upper School meter relocation project, CPEMG and MMI agreed to the following terms in writing:

Included (What MMI offered to do):

- Connect CPEMG's relocated meters to the building,
- Use 2-inch black threaded gas piping,
- Weld 4-inch gas piping,
- Weld underground pipes,
- Conduct core-drilling as necessary,
- Perform the work during normal business hours, and
- Secure the Minneapolis City permit for the work

[25] Meter fit means the entire assembly of strainer, regulator, relief, meter, valves and piping.

[26] Source: Attachment 22 - DCA17MP007 – Minnehaha Doc Req 01 item 021 and 022 Scope of work meters.

[27] Source: Attachment 9 - DCA17MP007-Minnehaha CPEMG contractor Contract Agreement

Excluded/Not included (What MMI did not offer to do):

- Painting,
- Starting-up or re-lighting customer equipment,
- Pressure testing customer piping,
- Overtime,
- Demolition of piping,
- Work on existing meter, and
- Underground digging.

No additional or more specific information on the terms of the proposal was described in writing.

7.2.2 CPEMG Work Orders for the Minnehaha Academy project[28]

CPEMG provided no written contract for its contractor to execute, but developed work orders which allowed tracking of costs by CPEMG and invoicing by MMI. These work orders were not intended for MMI and were not seen by or shown to MMI.

CPEMG interpreted their WO descriptions for the Minnehaha Academy project as follows:

1. Replace Service Line-Plastic (WO# 82363138): Replace the existing service line with a plastic service line. The existing service line was primarily plastic with 30 feet of steel; therefore, this order was to replace the remaining 30-feet of steel service.

2. Move Meter In-to-out (WO# 82365963): Description: This order was to move and replace the inside dimensional [interruptible] meter fit with a 16MTC outside meter fit.

3. Replace Meter (WO# 82366133): This order is for billing purposes and is to replace the dimensional meter with a 16MTC meter.

4. Move Meter In-to-out (WO# 82366329): This order was to move and replace the inside 5MTC meter fit with a 5MTC outside meter fit.

5. Replace Meter (WO# 82366337): This order is for billing purposes and is to replace the existing 5MTC meter with a new 5MTC meter.

The CPEMG work orders (items 1 through 5 above), all encompassed work within the DOT-jurisdictional service line.

7.2.3 Pre-Construction Meetings Between CPEMG, MMI and the Academy

At the time of the accident, CPEMG's process for inside-to-outside meter relocations was not documented in writing. CPEMG did not provide its contractor with any construction

[28] Source: Attachment 10 - DCA17MP007-Minnehaha CPEMG work orders for Academy and Descriptions of work

plans or schematics of the pipe layout as part of the meter relocation project; pipeline and gas service equipment layout requirements were based on verbal discussions.

MMI's Superintendent met with the CPEMG Meter Installer Foreperson and Academy representative at the site prior to preparing a bid for the project. At this meeting, the CPEMG representative showed the MMI representative the location where the work was needed and the MMI representative determined the materials that were needed to connect to the customer piping.[29, 30, 31] The interviews indicated that the approximate locations of the required connection points were discussed, but the specific routing path and completion steps were not. In particular, the gas shut-off location was not discussed at this meeting. The CPEMG Meter Installer Foreperson indicated that "They [the mechanical contractor (e.g., MMI)] shut off whatever valves that they need to, the main shut-offs for the meter… a shut-off is… so they [the mechanical contractor] can do work… there was only one shut-off here. So this would be their [the mechanical contractor's] main shut-off…"[29] However, the CPEMG Advanced Foreperson indicated, "Those valves are safety valves. They're for emergencies. They're not for permanent or temporary shut-offs… They [MMI] don't normally touch our valves."[32]

On or about August 1, 2017, the MMI Superintendent met with three CPEMG representatives (Foreman, Mechanic Operator, and Helper) and the Academy representative.[30, 31, 33] According to the Mechanic Operator, this meeting was held entirely outside of the Academy buildings and focused on CPEMG's excavation work. There were no discussions about when and how gas would be turned off so that MMI could perform their work.

During interviews, several witnesses discussed the steps shut off gas to complete the work. The CPEMG Advanced Foreperson indicated that, "We weren't coming in there to take off the gas until Thursday."[32] The MMI Piping Superintendent indicated that, "that day of, we would've had our 2-inch into… the room. We would've been done on that meter outside and we would just have a 2-inch already into the room to tie in this one… The other one would've already been tied in and complete… And there'd be no gas on that meter set… So there'd be no gas on that till this week."[30] The MMI Journeyman/Pipefitter indicated that, "the interruptible gas goes to the 3-inch boiler line, and the firm gas was to remain on. Because that's what… the school was using for the rest of their gas… The gas was not going to be interrupted until the following week when CenterPoint was scheduled to run the service line… So we were going to get everything – the interruptible, we going to pipe all

[29] Interview of CPEMG Meter Installer Foreperson

[30] Interview of MMI Piping Superintendent

[31] Interview of Minnehaha North Campus Building Supervisor

[32] Interview of CPEMG Advanced Foreperson

[33] Interview of CPEMG Construction and Maintenance Mechanic Operator

100 percent together. And then the firm, we were going to get to where we were close to a tie-in point. When they shut the gas off next week to change the service, we would then connect our last piece."[34]

According to the MMI Journeyman/Pipefitter, on August 1, 2017, a day before the start of the work at Minnehaha Academy Upper School, he and the MMI Superintendent visited the project site to physically see the work that CPEMG wanted to have done. They walked through the work site so that the MMI Journeyman/Pipefitter could become acquainted with the work scope. The MMI Journeyman/Pipefitter took measurements from the new meters, which CPEMG had previously mounted on the outside rear (west) wall of the Minnehaha Academy building (Figure 8). The MMI Journeyman/Pipefitter established the tie-in point on the inside of the building while planning the route of the new customer piping and developed a material list for the job. Following the meeting, the MMI Journeyman/Pipefitter proceeded to purchase the materials and secure his core-drill and other tools needed for the work that was expected to begin the next day.[34] The materials included a blind flange, gasket, and nuts which were found in the utility bunker post-accident. The investigative team reviewed the piping in the utility bunker and found that these materials would only fit the outlet of the 3-inch Walworth plug valve (see Evidence #5, Section 10.4).[35]

7.2.4 Meter Relocation Permit

On June 7, 2017, the City of Minneapolis Department of Labor and Industry (development services) issued work permit # BLDG659466 to MMI for the work at Minnehaha Academy. The work permit scope was for "Gas Piping and Hooking Up Meter."[36]

[34] Interview of the MMI Journeyman/Pipefitter

[35] Interview of MMI Helper

[36] Source: Attachment 11 - DCA17MP007 – Permit – City of Minneapolis Property Information

Figure 8 – Two new gas meters assemblies mounted on the west rear wall of the Minnehaha Academy building by CPEMG on June 29, 2017; the planned new location. Source: CPEMG.

8 OPERATIONAL PROCEDURES AND QUALIFICATION OF PERSONNEL

8.1 TRAINING REQUIREMENTS

CPEMG developed an operator qualification (OQ) program as required by 49 CFR Part 192, Subpart N, "Qualification of Pipeline Personnel." 49 CFR 192.805, "Qualification program," states, in part, that:

> Each operator shall have and follow a written qualification program. The program shall include provisions to:
>
> (a) Identify covered tasks;
>
> (b) Ensure through evaluation that individuals performing covered tasks are qualified;
>
> (c) Allow individuals that are not qualified pursuant to this subpart to perform a covered task if directed and observed by an individual that is qualified;

49 CFR 192.801(b) defines which tasks are considered "covered tasks," as follows:

> (b) For the purpose of this subpart, a covered task is an activity, identified by the operator, that:
>
> (1) Is performed on a pipeline facility;
>
> (2) Is an operations or maintenance task;

(3) Is performed as a requirement of this part; and

(4) Affects the operation or integrity of the pipeline.

The CPEMG OQ program required that all individuals who perform covered tasks on the pipeline system should be qualified whether they are CPEMG employees, contractors, sub-contractors, or any other entity performing a covered task on behalf of CPEMG.[37] MMI employees that worked on the service line leading to this accident were not OQ qualified as defined in 49 CFR Part 192, Subpart N. CPEMG neither reviewed nor maintained records of training received by the MMI employees.[38] CPEMG does not routinely review training records for contractors that are not OQ qualified.

8.2 ABNORMAL OPERATING PROCEDURES

CPEMG's OQ program required that employees and contractors completed training before performing covered tasks on their DOT-jurisdictional pipeline. The program also outlined how employees and contractors would be evaluated regarding their ability to perform covered tasks and to recognize and react to abnormal operating conditions.[37]

Since MMI was not OQ qualified, CPEMG did not require that MMI follow its abnormal operating condition and emergency response procedures. MMI had a General Safety Plan, which identified company safety rules and procedures that were to be followed by employees.[39] According to CPEMG records, Minnehaha Academy Upper School gas service had not experienced any abnormal events or accidents in the five years prior to this accident.[40]

8.3 MMI JOURNEYMAN/PIPEFITTER QUALIFICATIONS[41]

The Journeyman/Pipefitter had been licensed as a "Journeyworker Pipefitter" by the State of Minnesota, Department of Labor and Industry, since April 24, 2013. The City of Minneapolis had issued the Journeyman/Pipefitter a "Certificate of Competency" as a "Journeyman Gasfitter" in 2017. He also held "Steam-Pipefitter" membership in the United Association (Union), Local 455, since November 5, 2008. He had completed various training courses, including: Socket & Outlet Fusion Installer Qualification for polypropylene pipe and fittings (May 11, 2017); Supervisor's Drug and Alcohol Abuse Recognition (July 15, 2016); Aerial Work Platform Safety Course (November 18, 2014); Butt Welding

[37] Source: CPEMG Operator Qualification Program – Effective date: February 8, 2017; Page 6

[38] Source: Attachment 20 - DCA17MP007-Minnehaha OQ Records Statement

[39] Source: MMI General Safety Plan

[40] Source: DCA17MP007-Minnehaha Doc Req 01 Item 012 CNP Accident History

[41] Source: Attachment 19 - Journeyman/Pipefitter Training Records

Installer Qualification for polypropylene pipe and fittings (February 29, 2012); and Construction Safety & Health Training Course (December 6, 2009).

The licensed Journeyman/Pipefitter was trained to meet the state and local requirements required for a pipefitter, but this training did not authorize working on DOT-jurisdictional piping. None of the MMI employees were authorized to work on DOT-jurisdictional piping based on state and federal requirements.

8.4 MMI HELPER QUALIFICATIONS

The MMI Journeyman/Pipefitter and Helper indicated that the Helper assisted the Journeyman/Pipefitter as required.[34,35] The local Union had an Apprentice program which prepared employees for independent pipefitting work over about a five year period. According to local Union requirements, "no apprentice shall work as journeyman until certified as a journeyman by the Joint Apprenticeship Committee." Additionally, "no apprentice shall work alone but will always be under the supervision of a journeyman."[42] The MMI Helper was not registered as an Apprentice through the local Union.

The Helper acknowledged the receipt of MMI General Safety Plan on June 4, 2015.[43] The safety plan required the Helper to: always follow safety rules; not perform unsafe acts; listen to the supervisor in charge of each operation who has been instructed to familiarize employees with safe operations and practices. It also indicated that each employee is responsible for his or her performance and for following safety rules and regulations.[39]

The MMI Helper was not qualified to work on DOT-jurisdictional piping.

9 EVENTS LEADING UP TO THE ACCIDENT

CPEMG and MMI were working together on the meter relocation project. MMI was contracted by CPEMG to extend the customer firm and interruptible gas meter piping from the gas meter room in the basement to the new meters' location outside the building. CPEMG was to conduct excavation outside the building wall to enable MMI to core-drill holes through the wall and to connect customer gas piping to the new meters which were not tied into the gas service yet.

On August 1, 2017, the CPEMG Foreman and crew were onsite to conduct excavation on the side of the building wall by hand digging. However, they determined that a vacuum truck would be required due to the size and depth of the excavation that was

[42] Source: Working Agreement between Pipefitters Local Union No. 539 and Minnesota Mechanical Contractors Association, May 21, 2016.

[43] Source: Attachment 21 - Master Mechanical Helper Training Records

needed. The vacuum truck would not be available until the next day. The CPEMG Foreman informed his supervisor about the change.[44]

On August 2, 2017, the MMI Journeyman/Pipefitter and Helper, arrived at the Minnehaha Academy Upper School at about 7:00 a.m. At about 8:00 a.m., they started working to fabricate customer piping to go from the inside of the building, through the wall below grade to be connected to the meter sets that CPEMG had mounted to the wall outside. MMI needed to core-drill two holes below grade for the new customer piping.[34]

The CPEMG Foreman stated he was on-site at about 8:30 a.m. on August 2, 2017. At about 10:00 a.m., during the MMI Journeyman/Pipefitter and Helper's morning break, the CPEMG Foreman informed the MMI crew that the vacuum truck would be late to the site.[44] The MMI Journeyman/Pipefitter decided to perform work inside the building since the vacuum truck was delayed and the core-drilling could not be performed.[34]

According to the MMI Journeyman/Pipefitter, the construction of the customer piping to the new meters located outside the building would require welding a 3-inch pipe extension to achieve the required length. The MMI Journeyman/Pipefitter stated that he wanted to move the interruptible meter to get it out of the way to weld. The MMI Journeyman/Pipefitter told the NTSB investigators that, to perform their work safely, it was necessary to isolate and remove the interruptible meter gas supply. During the interview, the MMI Journeyman explained that CPEMG normally removes the meters for such projects; however, MMI had previously moved meters out of the way for CPEMG. The Journeyman/Pipefitter indicated that piping to the interruptible meter was going to be installed ahead of time to reduce the time the customer would be without gas.[34]

The MMI Journeyman/Pipefitter told investigators that he knew that the 3-inch Walworth plug valve was in the shut-off position when he went downstairs to remove the interruptible meter based on his observation that the valve handle was positioned perpendicular to the direction of flow. He stated that this valve position would typically indicate the valve being in the closed position. He did not know who had shut the gas off. When asked, "What were you doing when you went into the boiler room," the MMI Journeyman/Pipefitter responded, in part, "And I tried to open it and close it [the Walworth plug valve], to exercise it to make sure that they're closed all the way, and I could not budge it. It was, it was closed. It was not moving." When asked whether the valve was firmly closed, the MMI Journeyman/Pipefitter responded, "Yeah, I couldn't budge it open." When asked whether the valve was in the closed position, the MMI Journeyman/Pipefitter responded, "Yeah, I'm pulling on it. It's - - you know, if you exercise them, sometimes you can -- you know, but it wasn't moving and - -." He further stated, "I couldn't budge it. I generally will try to open and close them, just to exercise them… And I -- this one was stuck closed." The Journeyman/Pipefitter took no further action to determine if the line was energized or to purge the line had it been de-energized.[34] No CPEMG employee was involved in the work that MMI was performing within the building at this time and the MMI crew did not contact CPEMG to request that

[44] Interview of CPEMG Foreman

the gas supply be turned off. The nearest CPEMG employee was in his truck about a block off the road, waiting for the vacuum truck to arrive.[34,44]

Believing that the valve was closed and gas was shut-off, the MMI Journeyman/Pipefitter stated that he proceeded to loosen four downstream threaded bolts and nuts at the flanged connection of the valve as well as the four bolts and nuts on the next flange connection downstream.[34] The Journeyman/Pipefitter and the Helper stated that they did not note any smell or sound of escaping natural gas immediately after the flange-threaded connections of the steel spool segment to the 3-inch Walworth plug valve and interruptible meter regulator were loosened. According to the Journeyman/Pipefitter and Helper, the Journeyman/Pipefitter directed the Helper to start the "demo" or remove the adjoining piping downstream of the 3-inch Walworth plug valve while the Journeyman/Pipefitter went back outside to continue with fabrication of customer piping.[34,35]

The Helper stated that he used a screwdriver to pry apart the first flanged connection downstream of the valve after he removed the bolts and nuts. Once the pried piping came apart, natural gas began to escape. The Helper stated that he tried with all his strength to place the dislodged pipe segment to its original position, however, he was unable to perform any level of reassembly. He then ran up the stairs and out of the basement to inform the Journeyman/Pipefitter of the situation. Working in tandem, they both made an additional attempt to reassemble the piping. They were unsuccessful and the room continued to fill with natural gas. The Journeyman/Pipefitter told the Helper to leave while he attempted to stop the escaping gas.[34,35] Convinced from previous attempts to exercise the valve that the valve was closed and failing, the Journeyman/Pipefitter did not attempt to exercise the valve again.[34]

Following additional attempts to reassemble the piping the Journeyman/Pipefitter left the utility room. He too ran up the stairs and out of the building shouting "gas, gas, gas" telling anyone in line of sight to exit the building.[34]

During the interview of the Minnehaha Academy North Campus Building Supervisor, he stated that he had heard a "vacuuming/hissing sound" for a moment, but thought it was from the vacuum truck for the excavations outside. He went to investigate the source of the noise. This led him to look outside where he thought the CPEMG crew would be working. He did not see any vacuum truck, however, the noise continued to resonate. He realized the noise was from the boiler room area in the basement. He then went down the stairwell to the boiler room and past the boiler room into the gas meter room where he observed 3-inch open pipe [3-inch Walworth plug valve outlet]. The MMI Journeyman/Pipefitter yelled at the Minnehaha Academy North Campus Building Supervisor to "get out of the building, there's a gas leak."[31]

The Minnehaha Academy North Campus Building Supervisor, then ran back into the building, through the rear (west side) doorway located over the sidewalk/concrete roof top of the utility room, to the gas meter room (Figure 3). He then went upstairs and continued to yell "clear the building, there is gas leak." He ran into the main executive offices, went pass

the switchboard along the hallway. He stated that he thought the building was going to explode and that it was only a matter of time. He was located about 40 feet away from the explosion when it occurred.[31]

The Helper stated that he ran out of the building to shut off the welding machine in the van. The Helper stated he got to the van, shut off the welder, then turned around and saw a man standing next to the boiler room doors, and a woman going into the doors to the school. The Helper started going towards them and screamed at them to "move," while putting his hand up. The Helper stated that he did not see the MMI Journeyman/Pipefitter exit the building. The Helper stated that he was launched twenty feet past the van then got up and ran back towards the school into the rubble.[35]

The MMI Journeyman/Pipefitter stated he came out of the building and attempted to run to the CPEMG truck parked on 32nd Street to ask them to attempt shutting off the gas; the CPEMG Foreman noted this to occur at about 10:22 a.m.[44] Shortly thereafter, the Minnehaha academy connection building exploded. The MMI Journeyman/Pipefitter did not reach the nearby CPEMG C&M crew to inform them of the gas leak before the explosion occurred.[34,44]

10 POST-ACCIDENT ACTIVITIES

The natural gas explosion destroyed the Academy's connection building superstructure, as well as the basement and bunker areas of the building. The accident resulted in the death of two Minnehaha Academy employees and injuries to nine others. In addition, the accident caused damage to two other Academy buildings. The portion of DOT-jurisdictional service line between the plug valve and the interruptible gas meter which was removed while at pressure is shown tilted on the right and seated on the floor in Figure 9.

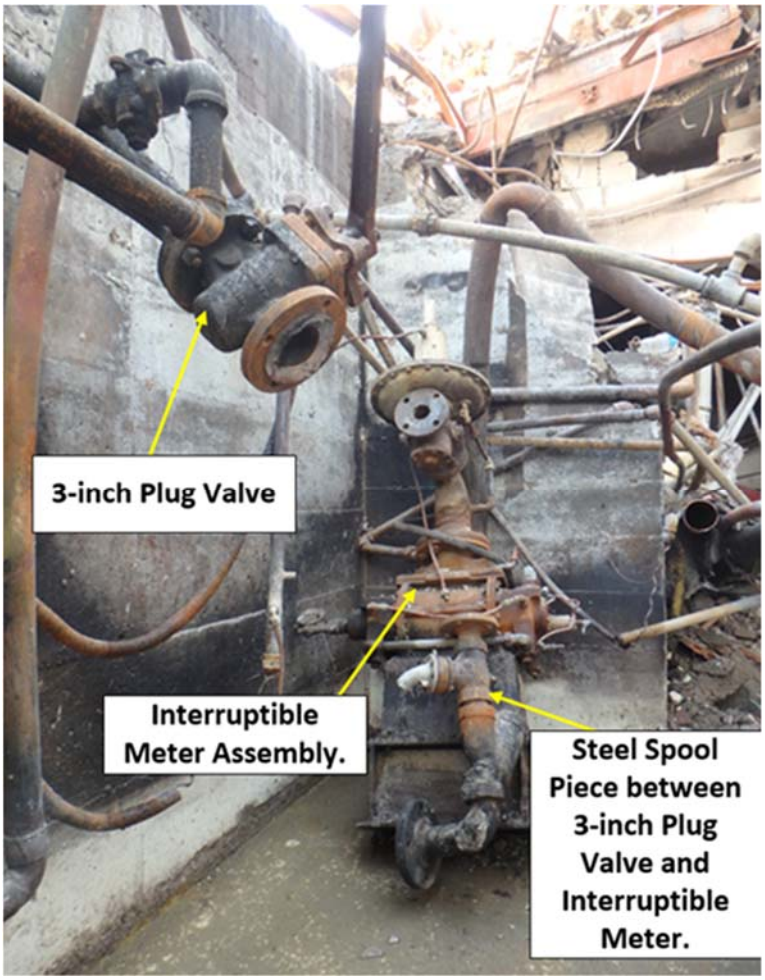

Figure 9 – 3-inch Walworth plug valve (involved in accident) on upper left and a spool between this valve and the interruptible gas meter resting against the interruptible meter on the floor right.

10.1 POST-ACCIDENT DRUG AND ALCOHOL TESTING

CPEMG stated that they did not require drug and alcohol tests for the two MMI contractor employees. CPEMG indicated that their contract agreement with the MMI did not include work on the DOT-jurisdictional pipeline.[45]

The PHMSA requirements promulgated in 49 CFR 199.105, "Drug tests required," state, in part:

> (b) *Post-accident testing*. (1) As soon as possible but no later than 32 hours after an accident, an operator must drug test each surviving covered employee whose performance of a covered function either contributed to the accident or cannot be

[45] Source: Attachment 24 - DCA17MP007-Minnehaha- Item 049 Drug and Alcohol Testing

> completely discounted as a contributing factor to the accident. An operator may decide not to test under this paragraph but such a decision must be based on specific information that the covered employee's performance had no role in the cause(s) or severity of the accident.

Similarly, the PHMSA requirements promulgated in 49 CFR 199.225, "Alcohol tests required," state, in part:

> Each operator must conduct the following types of alcohol tests for the presence of alcohol:
>
> (a) *Post-accident*. (1) As soon as practicable following an accident, each operator must test each surviving covered employee for alcohol if that employee's performance of a covered function either contributed to the accident or cannot be completely discounted as a contributing factor to the accident. The decision not to administer a test under this section must be based on specific information that the covered employee's performance had no role in the cause(s) or severity of the accident.
>
> (2)(i) If a test required by this section is not administered within 2 hours following the accident, the operator shall prepare and maintain on file a record stating the reasons the test was not promptly administered. If a test required by paragraph (a) is not administered within 8 hours following the accident, the operator shall cease attempts to administer an alcohol test and shall state in the record the reasons for not administering the test.

The MMI drug and alcohol policy required post-accident drug and alcohol testing. The company policy required all employees to submit to drug and alcohol testing following an accident which involves extensive personal injury, requires medical treatment, where the damage involved is at least $1,000.00 to a property, or when any moving violation or any safety rule violation occurred. The employees involved in any of the conditions were required to be readily available, submit to post-accident tests, and refrain from the use of alcohol or controlled substances for eight hours and/or until the test has been conducted (except with proven medical professional authorization for a subscription medicine). The MMI drug and alcohol policy did not specify a maximum time before which the drug and alcohol tests must be completed.[46]

The Journeyman/Pipefitter specimen was collected for drug and alcohol tests at a laboratory on August 4, 2017 at 7:40 p.m. and was tested for: amphetamines, barbiturates,

[46] Source: Attachment 25 - DCA17MP007 - Minnehaha - #11 - MMI Drug and Alcohol Policy

benzodiazepines, cocaine, marijuana, methadone, methaqualone, opiates, phencyclidine (PCP) and propoxyphene. The tests results came back negative.[47]

The Helper specimen was collected for drug and alcohol tests at a laboratory on August 4, 2017 at 7:30 p.m. and was tested for; amphetamines, barbiturates, benzodiazepines, cocaine, marijuana, methadone, methaqualone, opiates, phencyclidine (PCP) and propoxyphene. The tests results came back negative. However, the test result indicated that the specimen tested for the Helper was dilute.[48]

MMI did not ensure that the drug and alcohol tests were conducted in a timely manner. The MMI employees' drug and alcohol tests were conducted about 57-hours after the accident.

10.2 POST-ACCIDENT LEAK SURVEYS AND INTEGRITY TESTS

Following the accident, leak surveys and integrity tests were conducted. No issues were identified based on the results.

- Leak Survey: Beginning approximately one hour after the accident, CPEMG conducted bar hole tests over the gas main, near the service line, and around the perimeter of the Minnehaha Academy building. No gas leaks were found.[49]
- Gas Odorant Checks: At approximately 12:00 p.m. on the day of the accident, 12:40 p.m. and 6:00 p.m., gas odor checks were conducted at two test points. Gas odor levels were confirmed to meet the federal requirements found in 49 CFR 192.625(a).[50]
- Pressure Tests: On August 7, 2017, the service line was pressure tested and passed; no integrity issues were identified.[51]
- Flow Tests: On August 7, 2017, the service line was flow tested. While no integrity issues were identified, the flow tests were concluded prior to reaching full flow capacity at the operating pressure. The operating conditions could not be replicated due to limitations with the test equipment.[52]

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[47] Source: Attachment 26 - Drug and alcohol test for Journey/Pipefitter

[48] Source: Attachment 27 - Drug and alcohol tests for Helper

[49] Source: DCA17MP007-Minnehaha Post-Accident Leak Survey Item 039 3100 WEST RIVER PKWY and Timeline compiled by CPEMG.

[50] Source: DCA17MP007-Minnehaha Odorant Sniff Test Check_2

[51] Source: Post-accident pressure test results

[52] Source: CPEMG Flow Calculations

10.3 SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) INFORMATION

The SCADA readings for the area near Minnehaha Academy indicated that the operating pressure at the time of the accident was about 10 psig. According to CPEMG, the normal pressure range was between 8 and 10 psig, the maximum operating pressure was 15 psig, and the maximum allowable operating pressure was 25 psig.[6,53] Pipeline over pressurization was evaluated and not considered a factor in this accident

10.4 EVIDENCE ANALYZED BY NTSB INVESTIGATIVE TEAM AND LABORATORY

A section of the service pipeline involved in the accident was completely exposed and extracted after excavation of the building collapsed materials. After the fire was put out and the building structural debris was removed, the NTSB investigative team examined the damaged equipment and found:

1. The 3-inch service outlet gas piping from the interruptible meter was corroded, bent and damaged.
2. The gas service outlet piping components from the firm meter were damaged and broken off.
3. The gas service piping, 3-inch Walworth plug valve and meters sets were corroded.
4. The alloyed metal and relief device attached to the spool between the 3-inch Walworth plug valve and the regulator attached to the interruptible meter and small diameter service piping had melted during the fire.
5. The 3-inch Walworth plug valve was in the complete open position.

The investigation team observed that the plug valve had a removable arm (handle) that was not keyed to the valve stem. The handle could be oriented in at least four positions. The only locking mechanism for this handle was a bolt that tightened against the stem. This bolt could also be completely untightened, allowing removal of the valve handle. The bolt was loose enough immediately after the fire that the plug valve handle could be removed from the plug valve without further loosening of the bolt. CPEMG indicated that their meter installers are instructed to securely tighten the set screw on valve handles to ensure that they will not move while operating the valve.[15]

After the accident, the following evidence was sent to the NTSB laboratory for further examination:

- Five feet of steel pipe consisting of a section of 4-inch, 4 by-3-inch transition and 3-inch Walworth plug valve (Evidence #1)

[53] Source: CPEMG Pipeline class operating pressures

- Two feet of 3-inch piping, overpressure shut off and 3 by-2-inch transition to a flange (Evidence #2)
- One gasket, a flange, 10 bolts & nuts and a wrench found by the evidence materials (Evidence #5)

In addition to the 3-inch Walworth plug valve involved in the accident, a similar exemplar valve from the same manufacturer was provided by CPEMG to the NTSB for laboratory tests. The exemplar valve had been put into service in 1960. According to CPEMG records, the exemplar valve was likely operated in 1998, 2014, and 2017 (operated with an 18" crescent wrench during removal prior to sending to the NTSB). It may have been operated and/or lubricated at other times during its operational life, as an ancillary part of routine maintenance.[54]

Briefly summarized, the NTSB Laboratory report indicated [1] the valve wrench was found oriented perpendicular to the valve body; [2] the "valve plug" was oriented in the open position; [3] a "witness mark" was found on two surfaces of the valve stem that were consistent with contact by a valve wrench set screw; [4] the valve stem collar had embossed arrows indicating the state of the valve (open or closed), in which the arrows were oriented parallel to the direction of flow, which was consistent with the valve being in the open state; [5] a measurement of 344 and then 152 foot-pounds of torque was required to rotate the valve wrench (handle) of an exemplar plug valve; [6] a measurement of 721 foot-pounds of torque that was applied to the wrench (handle) of the accident plug valve with a four-foot extension attached, resulting in no rotation.[55] Based on discussions with the accident plug valve manufacturers' representative, the force of 721 foot-pounds of torque was not unusual for a valve of this type following exposure to fire.[56]

Observation of the plug valve after the accident indicated that the valve operator stop was in contact with the valve body stop; thereby, preventing any rotation of the valve handle in the counterclockwise direction (a downward rotation). To fully close the valve would require the operator to push upward and rotate the valve handle clockwise by 90 degrees.

[54] Source: Exemplar Valve Maintenance History

[55] NTSB Materials Laboratory Factual Report 17-095

[56] Source: Telephone conversation between NTSB Investigator-In-Charge and a valve engineer at The Valve Company (TWC) in Stafford, Texas on October 1, 2019

Figure 10 – Plug valve handle positioned perpendicular to the direction of gas flow. Source: NTSB, Taken: 6Aug2017

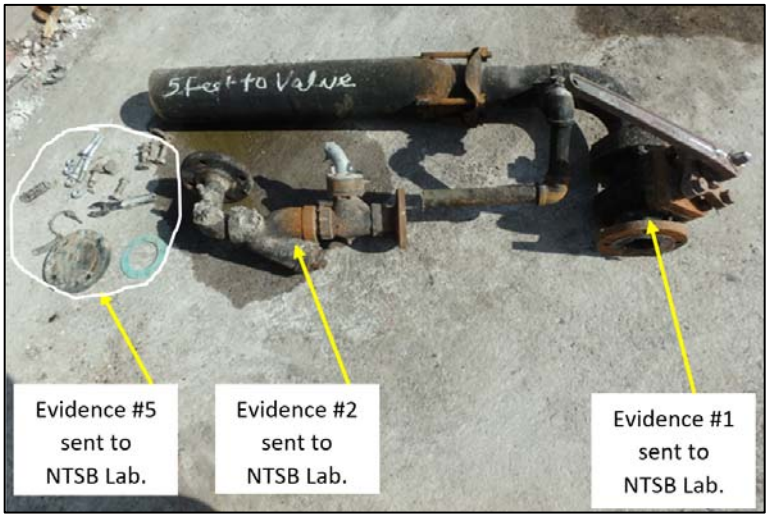

Figure 11 -- Evidence collected at the accident site and sent to NTSB laboratory. Source: NTSB, Taken: 6Aug2017

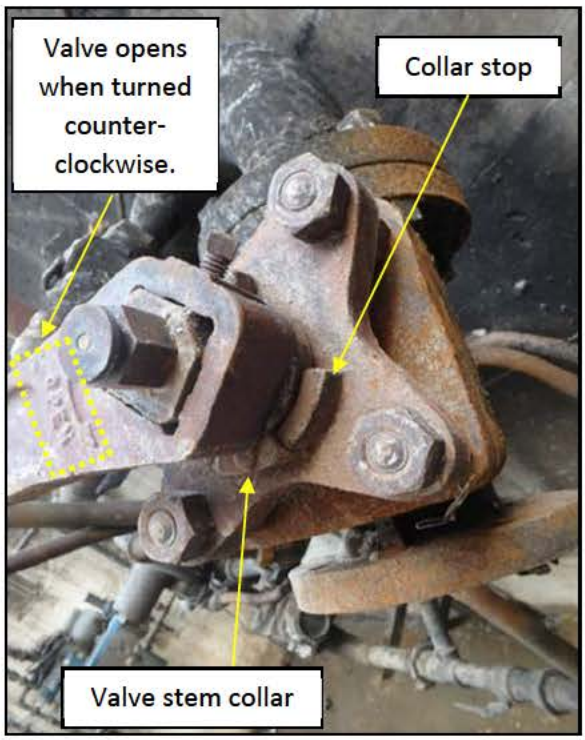

Figure 12 -- The fully open 3-inch plug valve by Walworth involved in the accident shows the arrow on the handle indicating the open direction, pointing toward the stopper location. Source: NTSB, Taken: 6Aug2017

10.5 Post-Accident Regulatory Enforcement Actions.

10.5.1 Occupational Safety and Health Administration (OSHA)[57]

OSHA opened an inspection of MMI on August 3, 2017, regarding activities at Minnehaha Academy Upper School, Minneapolis, MN. The inspection has not been indicated as closed, but two violations have been issued. The violations cited 29 CFR 1926.21 "Safety training and education" and Minnesota Administrative Rule 5207.0600 *Construction—Lockout Devices*:

> [29 CFR 1926(b)(2)] The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.[58]

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[57] OSHA Inspection 1252391.015 – 95735 – Master Mechanical Inc

[58] https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10607 (Retrieved on: February 20, 2018)

> [5207.0600] Subparagraph 5. Individual lockouts. Where more than one employee is engaged in working on machinery or equipment, each employee shall affix the employee's individual lockout device or lock to the disconnect switch or power supply.[59]

10.5.2 Minnesota Office of Pipeline Safety (MNOPS)[60]

On November 29, 2017, MNOPS issued a letter to CPEMG, itemizing violations related to the accident at Minnehaha Academy. The violations cited 49 CFR 192.13(c), 192.703(a), 192.747, 191.9, 192.605(b), and 192.727(d):

> [49 CFR 192.13(c)] Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and programs that it is required to establish under this part.
>
> [192.703(a)] No person may operate a segment of pipeline, unless it is maintained in accordance with this subpart.
>
> [192.747 (violation later rescinded by MNOPS)] Valve maintenance: Distribution systems.
>
> (a) Each valve, the use of which may be necessary for the safe operation of a distribution system, must be checked and serviced at intervals not exceeding 15 months, but at least once each calendar year.
>
> (b) Each operator must take prompt remedial action to correct any valve found inoperable, unless the operator designates an alternative valve.
>
> [191.9] Distribution system: Incident report.
>
> (a) Except as provided in paragraph (c) of this section, each operator of a distribution pipeline system shall submit Department of Transportation Form RSPA F 7100.1 as soon as practicable but not more than 30 days after detection of an incident required to be reported under §191.5.
>
> (b) When additional relevant information is obtained after the report is submitted under paragraph (a) of this section, the operator shall make supplementary reports as deemed necessary with a clear reference by date and subject to the original report.
>
> (c) Master meter operators are not required to submit an incident report as required by this section.

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[59] https://www.revisor.mn.gov/rules/?id=5207.0600 (Retrieved on: February 20, 2018)

[60] Source: MNOPS letter to CenterPoint dated April 17, 2019. Case No. 20170004-3; Legacy Case: 145744454-3

> [192.605(b)] Maintenance and normal operations. The manual required by paragraph (a) of this section must include procedures for the following, if applicable, to provide safety during maintenance and operations.
>
> [192.727(d)] Whenever service to a customer is discontinued, one of the following must be complied with:
>
> (1) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator.
>
> (2) A mechanical device or fitting that will prevent the flow of gas must be installed in the service line or in the meter assembly.
>
> (3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

Based in part on interactions with MNOPS, CPEMG revised its process for company-initiated commercial meter moves from inside-to-out and implemented the revised process in coordination with MNOPS. CPEMG also updated its procedures with respect to abandonment and deactivation of facilities, in consultation with MNOPS.

Authorship

// s //

_____ Date: November 20, 2019

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_____ Date: November 20, 2019

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