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## **Introduction**

At approximately 11:20 a.m. on Friday October 30, 1998, a 24-inch diameter natural gas main operated by Peoples Gas Light and Coke Company (Peoples Gas or Peoples) serving an area near 1507 North Clybourn Avenue was damaged by excavating equipment. The escaping natural gas ignited approximately 40 minutes later, causing major fire and heat damage to the upper floors of the nearby Flannery Building, a 15-story high-rise apartment building owned and operated by the Chicago Housing Authority (CHA). Peoples Gas' emergency response activities stopped the flow of natural gas at approximately 1:19 p.m., or about 80 minutes after the gas ignited.

Quick action by City of Chicago fire and police personnel resulted in the complete evacuation of approximately 500 occupants, mostly senior citizens, from the CHA high-rise building during the 40-minute period prior to the ignition of the escaping natural gas. Five fire and police personnel received minor injuries as a result of their efforts to contain the fire. The injured were treated and released without hospitalization.

Damage to the Peoples Gas facilities, plus the value of the lost gas, has been estimated to be \$22,280. The damage to the excavation equipment owned by Harrington Excavating and Construction Corporation ("Harrington")<sup>1</sup>, has been estimated at \$85,000. The structural damage to the CHA property and the losses suffered by the tenants have not yet been calculated.

Illinois Commerce Commission Pipeline Safety Inspector, Mr. James Watts, was performing a field audit in the Southern District of Peoples Gas' service territory when he was informed of the incident. ICC Chairman Richard Mathias visited the scene to observe efforts to control the fire and the flow of natural gas. The Commission also dispatched two Staff from the ICC's Springfield office, Gene Beyer and Robert Bishop, to observe the incident site as one of the first steps in the Commission's comprehensive investigation.

Staff's first contact with Peoples Gas was made at the Peoples Gas Division Street Headquarters where Staff attempted to determine what had occurred and to obtain directions to the incident site. Staff was informed by Peoples Gas personnel that an excavation contractor had damaged a Peoples Gas 24-inch cast iron gas main and that the escaping gas had ignited. At that time, there were no reports of serious injuries.

Staff arrived at the incident site at approximately 2:00 p.m., and immediately met with Peoples Gas representatives. By this time, the gas flow had been stopped, and the fire extinguished. Peoples Gas crews were installing two line stops on the gas main to ensure complete closure. Mr. Jim Robinson, Peoples Gas Distribution Manager, Central Division Headquarters, informed Staff that the Fire Department had turned the incident site over to an Occupational Safety & Health Administration (OSHA) investigator.

Staff observed that the southwest corner of the CHA Flannery Building had suffered intense heat damage. Due to the danger of loose bricks falling from the building, access to the area was restricted. The CHA retained the services of Brandenburg Construction to evaluate the structure and ensure the safety of the site, allowing Peoples

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<sup>1</sup> Harrington Excavating and Construction Corporation, 4246 W. 124<sup>th</sup> Place, Alsip, Illinois.

Gas personnel and investigators to observe the damaged section of gas main and take the action needed to return gas service to customers affected by the outage.

By 2:00 a.m. on October 31, 1998, Brandenburg Construction crews had moved the sewer line contractor's track-hoe and had made the site accessible. With the incident site deemed safe, the damaged gas main could be observed and Peoples Gas began preparing for the removal and replacement of the damaged segment. Excavation for the removal began at approximately 8:00 a.m. on October 31. Service was restored to the gas main at approximately 8:00 a.m. on November 1.

The cause of the incident was third-party damage resulting from sewer construction excavation activities near the Peoples Gas facilities. Construction site design plans show the sewer main's proposed route being parallel with the 24-inch natural gas main. A survey of the site conducted during the investigation revealed the installed sewer main was not parallel with, but rather was at an angle toward, the gas main.

This report summarizes the results and findings of an Illinois Commerce Commission Staff investigation into the cause and circumstances of the October 30, 1998 North Clybourn Avenue incident and presents recommendations to ensure customer safety and to prevent or reduce the possibility of similar incidents in the future.

### **Scope of ICC Staff's Report**

The primary purpose of Staff's investigation is to fulfill the Commission's obligations under state and federal law as referenced in the next section of this report.

This report is based upon an investigation conducted by the ICC Pipeline Safety Staff during the eight months following the North Clybourn Avenue incident. Information contained in this report was obtained through on-site observations, witness interviews and document reviews. During the course of its investigation, Staff reviewed the events and circumstances surrounding the October 30, 1998, incident, including Peoples Gas' pipeline locating and marking procedures and emergency response activities as well as records pertaining to locating requests and valve maintenance. Staff also conducted interviews with Peoples Gas locating and supervisory personnel. Additional interviews were conducted with the excavating and general contracting personnel. Construction site plans were reviewed, and a survey of the site was prepared.

### **ICC Gas Pipeline Safety Responsibilities**

The Secretary of the U.S. Department of Transportation regulates pipeline facilities for the safe transportation of natural gas via pipelines on an *interstate* basis, and the ICC similarly oversees the pipeline facilities on the *intrastate* level. In this regard, the Commission has adopted the same minimum federal safety standards set forth by the Federal Natural Gas Pipeline Safety Act. The Illinois Gas Pipeline Safety Act, 220 ILCS 20/1 et seq., (the "Illinois Act"), provides the Commission with statutory authority to establish and enforce these safety standards.

Federal authority to enforce minimum safety standards does not extend to intrastate pipeline transportation when a state agency regulates these same standards and practices, and submits an annual certification to the Secretary. **One of the requirements for the annual certification is a summary of investigations into the cause and**

**circumstances surrounding all intrastate pipeline or facility accidents resulting in death, personal injury requiring hospitalization and/or property damage of \$50,000 or more.**

As such, Pipeline Safety Staff also investigate all reportable accidents, prepare reports of their findings, and recommend further actions, if any, that are deemed necessary.

Therefore, pursuant to both federal and state gas pipeline safety acts, the North Clybourn Avenue incident was investigated by the ICC Staff to determine the probable cause and circumstances surrounding the incident.

**Peoples Gas Facilities**

The natural gas piping involved in the incident was a 24-inch cast iron gas main installed in 1955 (Exhibit A). This gas main has a maximum allowable operating pressure of 25 pounds per square inch gauge (“psig”). The gas main was operating at approximately 20 psig at the time of the incident (Exhibit B). The gas main had approximately 5 feet of ground cover at the location of the damage. During Staff’s investigation on October 31, 1998, it was determined that the centerline of the 24-inch cast iron gas main was located approximately 42 feet south of the CHA building damaged during the fire (Exhibit C).

According to Peoples Gas’ records, Peoples conducted a flame ionization<sup>2</sup> gas leakage survey of the 24-inch cast iron gas main on June 25, 1998. The survey was performed over the 24-inch gas main located between 438 and 799 West Blackhawk Street, which includes the natural gas piping crossing the North Clybourn Avenue development site. Staff’s review of the survey documentation found that no leakage was reported during the survey (Exhibit D), and that a leakage survey had been conducted annually in accordance with Peoples Gas’ Operation and Maintenance Plan, Section on Safety Inspection Programs Exhibit 4. This frequency of leakage surveys exceeds the Minimum Federal Safety Standards for the Transportation of Natural Gas, which require gas system operators to survey at least once every three years. 49 C.F.R. § 192 (1997).

Peoples Gas’ valve maintenance records show that of the 12 valves used in the shutdown of the 24-inch gas main, 11 had been inspected in 1998, and the remaining valve, N-00766, was scheduled for inspection in November 1998. When the crews arrived to shut off valve number N-00766, it was found covered as a result of street resurfacing performed some time after the 1997 valve inspection. After the valve box lid was uncovered, the valve was found to be operable. Peoples Gas Operations’ personnel involved in the shutdown found that all valves were operable. A review of valve documentation determined that all valves used during the shutdown were inspected annually, as required under the Minimum Federal Safety Standards for the Transportation of Natural Gas. 49 C.F.R. § 192 (1997).

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<sup>2</sup> A flame ionization unit is an instrument used to detect natural gas in the air by drawing a sample and exposing it to a flame inside the unit. The burning of the natural gas emits ions which are measured to determine the concentration of the gas in air.

## **Utility Facilities Locating Activities and Sewer Main Installation**

Activities occurring prior to the incident which were subjected to Staff's analysis included the sewer line contractor's locate calls to the Chicago Utility Alert Network ("DIGGER"), Peoples Gas locating activities, and the sewer line contractor's siting and installation of the sewer main.

Because the North Clybourn Avenue activities were part of an ongoing construction project, numerous requests for the marking of facility locations ("locates") were initiated by the sewer line contractor. On September 16, 1998, Peoples Gas received a proposed excavation notification from DIGGER. The notice requested utility locates for 1485 North Clybourn Avenue, with a dig start date of September 18, 1998. Locate request #1432875<sup>3</sup> was made by Harrington, which requested the marking of facility locations for the proposed street pavement openings in conjunction with water and sewer line work on North Clybourn Avenue.

On September 17, 1998, a second DIGGER request, #1433089, was made by Harrington. The utility locate request gave various addresses on North Clybourn Avenue. The notice requested locating and staking of utilities over the entire project site. The addresses on the ticket were 1458, 1487, 1419, 1495, 1499, and 1501 North Clybourn Avenue with an excavation starting date of September 21, 1998.

Peoples Gas locator, Charles DiGiacomo, wrote on a Contractor-Utility Location Request Form<sup>4</sup> that he marked the approximate location of 24-inch and 4-inch gas mains in response to the locate requests. Mr. DiGiacomo's Daily Time Report<sup>5</sup> shows that six work units<sup>6</sup> were located.

On September 21, 1998, Peoples Gas received a DIGGER request, #1433858, from Tropic Construction Corporation ("Tropic")<sup>7</sup> for a locate at 1400 North Ogden Avenue with a start date of September 23, 1998. Mr. DiGiacomo's Daily Time Report indicates the locate notice was answered on September 22, 1998. His Contractor-Utility Location Request Form showed that gas facilities were not involved at 1400 North Ogden Avenue. However, on September 22, 1998, there was another entry on a second Contractor-Utility Location Request Form for 1501 North Clybourn Avenue, i.e., the accident site area. Mr. DiGiacomo wrote that he located mains and services for Tropic. His Daily Time Report for September 22, 1998, has a job code number 124 that identifies the locate as a follow-up inspection that covered 10 work units.

On September 23, 1998, Tropic requested another locate at 1501 North Clybourn Avenue, and this was also recorded on Mr. DiGiacomo's Daily Time Reports as a follow-

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<sup>3</sup> Each locate request received by DIGGER is issued a dig number allowing the locate request to be tracked if problems arise.

<sup>4</sup> Peoples' Contractor-Utility Location Request Form provides information regarding the request for the locate and the action taken by Peoples Gas. See Exhibit F.

<sup>5</sup> Peoples' Daily Time Report is used to track the man hours spent to perform various job functions.

<sup>6</sup> A work unit is defined in Peoples Gas Distribution Department's Procedure manual. Under Procedures and Policies for the Prevention of Damage to Underground Gas Company Facilities Order 0.800, it states that a unit is a gas main segment 50 feet in length or a service line.

<sup>7</sup> Tropic Construction was the project's general contractor.

up site visit (code 124). The report identifies the work performed as locating gas mains and services covering six work units.

On October 20, 1998, Mr. DiGiacomo, during a follow-up site visit, was requested by Harrington to locate gas mains in the vicinity of 1500 North Clybourn Avenue. This request was recorded on a Contractor-Utility Location Request Form and the work was documented on Mr. DiGiacomo's Daily Time Report. The work performed was identified as marking the approximate locations of the gas mains in the vicinity of 1500 North Clybourn Avenue, covering six work units.

On October 22, 1998, Mr. DiGiacomo conducted a follow-up inspection of the construction site. The Peoples Gas Contractor-Utility Location Request Form shows that he provided locates for the gas mains and services in the vicinity of 1500 North Clybourn Avenue. His Daily Time Report states that four units of work were covered to complete the locates.

Peoples' records indicate that on October 27, 1998, Peoples Gas received an emergency locate request originated by Harrington for 1416 North Clybourn Avenue. According to Mr. DiGiacomo, upon his arrival, Harrington had already begun excavation on North Clybourn Avenue to install the sewer main, and was preparing to excavate the sidewalk area on the northeast side of the street. The sewer main was to continue in a northeasterly direction paralleling the 24-inch cast iron gas main. Mr. DiGiacomo said he then requested that his supervisor, Mr. Matesi, photograph the placement of the gas main location markings. The photographs taken by Mr. Matesi show that the 24-inch gas main was marked with yellow paint in the roadway and on the sidewalk. In addition, the photographs show the approximate location of a 2-inch gas main and valve box, also marked with yellow paint and yellow flags. The photographs show a grass and dirt area adjacent to the sidewalk on the northeast side of North Clybourn Avenue. The valve box was located just to the left of the 24-inch medium pressure cast iron gas main markings. The only markings observed in the photographs in the dirt area were flags in the distance which appeared to be staggered (Exhibit E).

According to Peoples Gas' records, i.e., the Contractor-Utility Location Request Forms and Daily Time Records, Mr. DiGiacomo conducted another follow-up visit on October 28, 1998. These records show he returned to the construction site and provided markings for the approximate location of the 24-inch and 2-inch gas mains in the vicinity of 1500 North Clybourn Avenue.

Peoples Gas' records show that on the morning of the incident, at approximately 10:00 a.m., Mr. DiGiacomo revisited the construction site at 1500 North Clybourn Avenue and again verified the markings for the approximate location of the 24-inch medium pressure gas main and the 2-inch gas main (Exhibit F). He left the site at approximately 10:30 a.m.

At approximately 11:20 a.m., Peoples Gas received notice that the 24-inch medium pressure gas main had been damaged causing a release of natural gas.

## **ICC Staff Investigation of Utility Facilities Locating Activities and Sewer Main Installation**

The ICC Staff investigation included a review of Peoples' utility facility locating activities conducted prior to the incident, DIGGER request notifications, Contractor-Utility Location Request Forms and locator's Daily Time Reports. The investigation also included a review of the as-proposed and as-constructed combination sewer<sup>8</sup> main, the location of Peoples' 24-inch natural gas main, photographs, videos, site maps related to the sewer construction project and Peoples Gas maps of its gas facilities. Staff also conducted interviews with the sewer line contractor and Peoples Gas employees, and participated in OSHA interviews of the sewer line contractor's site surveyor.

Staff requested and received a copy of the construction site plans from Harrington which were used during the installation of the sewer main (Exhibit Y-1), a copy of the site plans from Tropic and a copy of site plans provided by the Chicago Sewer Department through Peoples Gas. All construction site plans reviewed indicated that the proposed sewer main was to run parallel with the Peoples Gas 24-inch gas main. However, a subsequent survey conducted by Hanson Engineers Incorporated ("Hanson"), on behalf of the Commission, shows that the sewer main was not installed parallel with the gas main, but rather at an angle toward the gas main. The construction site plans also show approximately 10 feet<sup>9</sup> of separation between the gas main and the proposed sewer main. The Hanson survey indicates, however, that the actual location of the gas main was approximately 5 feet closer to the proposed sewer main route than was indicated on the construction site plans.

The Hanson survey also shows the installed sewer main is approximately two feet farther north than was proposed on the construction site plans. Thus, the total distance between the installed sewer main and gas main near the sidewalk at North Clybourn Avenue is approximately 7 feet. This distance of 7 feet diminished as construction of the sewer main progressed not parallel with, but rather at an angle toward, the gas main. The pertinent portion of the Hanson site survey is attached as Exhibit Z.

### **1. Peoples Gas Light and Coke Company**

Staff's preliminary discussions with personnel at the site revealed differences between the sewer line contractor and Peoples Gas concerning the placement of the flags marking the 24-inch gas main. Interviews were scheduled with Mr. DiGiacomo, locator for Peoples Gas, and Mr. Matesi of Peoples Gas on November 5, 1998, and December 16, 1998, and with the sewer line contractor's employees on December 15, 1998.

Mr. DiGiacomo stated that he initially found the general location of the 24-inch cast iron gas main using measurements from atlas pages<sup>10</sup>. After finding the general location of the facilities, he then used a pipe locating device<sup>11</sup> to determine the approximate location of the piping as described in Peoples Gas Procedures and Policies

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<sup>8</sup> A combination sewer carries storm water and sanitary sewage in the same sewer main.

<sup>9</sup> Measurement between utility facilities uses center line points to calculate separation.

<sup>10</sup> Atlas pages are maps showing the location of Peoples Gas' gas system facilities.

<sup>11</sup> A pipe locating device is an instrument used to determine the approximate location of underground facilities. The transmitter sends a signal onto the facility and uses the receiver to detect the signal, determining the approximate location of the facility.

for the Prevention of Damage to Underground Gas Company Facilities Order 0.800. This Order specifies that gas facilities shall be initially located by using dimensions obtained from informational sources such as atlas pages. However, the Order also requires that the actual locating of Peoples Gas facilities shall be determined by using a pipe locating device such as an M-Scope or metal detector. The Peoples Gas procedures do not require the use of a pipe locating device for follow-up visits to re-mark or refresh earlier locates.

Mr. DiGiacomo stated he used a pipe locating device during the initial locates. As the approximate location of the 24-inch gas main was determined, yellow paint was used to mark the location in the street and on the sidewalk. These markings were observed and verified by Staff during its on-site investigation. He further stated that he marked the 2-inch plastic gas main and the 24-inch cast iron gas main in the dirt area using yellow flags. Mr. DiGiacomo stated the 24-inch gas main marking was completed by placing yellow flags in a staggered pattern to identify the approximate location of both sides of the gas main. In addition, he stated that when the sewer line contractor crossed the 2-inch plastic gas main, he, Mr. DiGiacomo, observed the partially exposed 24-inch gas main. To him, this confirmed that his locates on the sidewalk were accurate at this point.

During Staff's onsite investigation, Staff visually lined up the location of the hit on the gas main with the marks on North Clybourn Avenue and on the sidewalk and found the marks were accurate representations of the approximate location of the 24-inch gas main. This was also confirmed with the topographical survey performed in conjunction with Peoples Gas Company's investigation and with the topographical survey conducted by Hanson for the Commission.

During Staff's initial interview of Mr. DiGiacomo, he stated that, on the morning of October 30, 1998, he straightened some of the existing flags that had been knocked down by work site traffic, and installed new flags to the northeast along the 24-inch medium pressure gas main. He did not use a pipe locator when refreshing the markings. After refreshing the markings for the gas main, he gained the attention of the Harrington track-hoe operator and pointed out the flags. After the track-hoe operator acknowledged the flagging, Mr. DiGiacomo left the job site at approximately 10:30 a.m.

During the second interview of Mr. DiGiacomo on December 16, 1998, he looked at news videos of the incident which showed the yellow flag markings of the location before the ignition of the escaping gas. He was asked by Staff if the flags shown in the video accurately represented his placement of the flags along the 24-inch gas main. Mr. DiGiacomo stated it did not, i.e., the flags he installed were placed closer laterally to the excavation site.

During the initial interview of Peoples Gas Supervisor, Mr. Matesi, Staff asked why Mr. DiGiacomo requested photographs of the locates before the excavation work near the 2-inch gas main. Mr. Matesi stated that Mr. DiGiacomo was aware that the 2-inch gas main had been hit a year earlier, during the first stage of the construction project, and thus wanted documentation that the gas main had been marked. Mr. Matesi stated that he took the photographs and spoke with a Harrington employee to make sure the sewer line contractor's employees were aware that a 24-inch gas main was in the utility easement right-of-way. Staff later determined during the interviews that the Harrington

employee Mr. Matesi spoke with was only present at the job site early that morning and was then transferred to another job site.

The photographs taken by Mr. Matesi on October 27, 1998, show flags near the area of the hit. However, the photos do not clearly depict whether the gas main had been marked correctly prior to the incident (Exhibit E).

Staff requested Peoples Gas to review its third party damage reports for the 12-month period prior to the incident to determine if Mr. DiGiacomo had been involved in any locates which resulted in damage to Peoples Gas facilities. Staff was advised that Mr. DiGiacomo was not involved with any third party damage to Peoples Gas facilities due to mismarked locates. Mr. DiGiacomo has been a Corporation Inspector for 18 years and has worked on and around the gas facilities for a total of 38 years. Based upon records provided, it appears that Mr. DiGiacomo received appropriate training, possesses adequate experience and has a good record regarding locating.

In trying to determine what types of facilities Mr. DiGiacomo located, i.e., gas mains and/or services, Staff reviewed documentation completed by Mr. DiGiacomo for the locates performed in conjunction with the North Clybourn Avenue Project. The review determined that Mr. DiGiacomo performed initial locates at the site approximately one week in advance of the sewer line construction excavation, and that he maintained contact with the sewer line contractor's representatives by conducting follow-up site visits and performing the locating necessary to maintain markings ahead of the sewer line contractor. However, his descriptions of what facilities were located, as recorded on the Contractor-Utility Location Request Forms, were not detailed enough to provide certain information. For example, in reviewing the Contractor-Utility Location Request Forms and Mr. DiGiacomo's Daily Time Reports<sup>12</sup>, Staff could not determine how many services and how many feet of gas main were located after completion of each locate request.

Upon review of Peoples Gas records, it was determined that once notification was received, Mr. DiGiacomo responded to each of the DIGGER requests and marked the approximate location of the facilities in a timely manner in accordance with Peoples' procedures.

## **2. Harrington Excavating and Construction Corporation**

Five Harrington employees were interviewed on December 15, 1998, at the law offices of Harrington's outside legal counsel, Sudekum, Rosenberg & Cassidy. The individuals interviewed were Mike Harrington (President); Allan Cassidy (Track-hoe Operator) and Foreman, who was in charge of the excavation, including proper placement of the manhole structures, establishing the correct sewer main route and lowering the sewer main into the hole after excavating; Vincent Lynn (Laborer), who was in charge of ensuring that the sewer main was being installed to proper grade; John Schultz (Loader Operator), who carried prepared sewer main to the track-hoe to be lowered into the excavation and performed back filling of installed sewer main; and Tom Fennell (Laborer), who installed sewer main gaskets. These five employees were present during the excavation activities on October 30, 1998, at the North Clybourn Avenue incident site.

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<sup>12</sup>Peoples' Daily Time Report is used to track the man hours spent to perform various job functions. Using this form and the remarks area on a Contractor-Utility Location Request Form allow one to make a determination of the number of services and feet of main that were located during the locate request.

During these interviews, Staff learned that Mr. Allan Cassidy was the person who determined the alignment of the manholes and sewer main. He stated that the alignment was based on the staking installed by Mr. Olson of Certified Construction Services Incorporated (Certified Construction).<sup>13</sup> Mr. Cassidy and Mr. Lynn both said that they remembered a single row of flags marking the gas main location being approximately 7 feet southeast from the point where the gas main was damaged. This contrasts with Mr. DiGiacomo's description of the placement of the flags, i.e., two rows in a staggered pattern. Mr. Cassidy stated that, according to the location of the flags, he was excavating parallel with and several feet away from the 24-inch gas main. He also recalled that the flags were approximately 3 feet outside the track-hoe tracks. All of the Harrington employees interviewed were asked if they saw anyone or were involved in moving the yellow locate flags. All responded that they did not see anyone move the flags and that they were not involved in moving the flags. Staff requested Harrington's photos, video and other documentation pertaining to the incident. Duplicates of the above information were received and reviewed. One photo (Exhibit E1) shows the three yellow marking flags present on the evening of the incident as being approximately 7 feet from the side of the excavation.

During Staff's October 31, 1998, on-site investigation work, Staff had discussions with Mr. Overstreet of the Orchard Park Limited Partnership ("Orchard Park")<sup>14</sup> who stated that he was in a second story townhouse to the northwest of the incident site when he heard the blowing noise caused by the escaping gas shortly after the gas main was damaged. He recalled seeing the yellow marking flags approximately 3 feet beyond the track of the excavation equipment as stated by Mr. Cassidy. Staff attempted to follow-up with Mr. Overstreet, but no calls were returned.

During a second interview of Mr. Allan Cassidy, conducted at the OSHA headquarters in Calumet City on February 12, 1999, Mr. Cassidy was asked to describe how he positioned the manhole structures and determined the route of the sewer main. He stated that he set the first manhole and then set the transit on top of the manhole. A plumb bob was lowered into the flow line channel on the floor of the manhole. The transit sight was then used to line up with the second manhole center point stake. According to Mr. Cassidy, using the transit sight in conjunction with a line laser would prevent the sewer main from varying off the established course.

After discussing the chosen route for the sewer main, the OSHA representative showed Mr. Cassidy the Peoples Gas topographical survey. The survey indicates that the sewer main was not being installed in accordance with the construction site plans. Mr. Cassidy reiterated that he believed he had properly lined up the first manhole with the second manhole survey stake and had properly lined up the sewer main. (Exhibit G).

Staff's review of DIGGER requests determined that Harrington did notify the DIGGER system before excavating.

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<sup>13</sup> Certified Construction Services Incorporated, 6415 North Caldwell, Chicago.

<sup>14</sup> Developer of Orchard Park Townhouses on North Clybourn Avenue.

### **3. Certified Construction Services Incorporated**

Mr. Olson of Certified Construction Services Incorporated (Certified Construction), who was the site surveyor, was interviewed by OSHA on February 1, 1999. Staff attended that interview and also interviewed Mr. Olson. According to Mr. Olson, the sewer line project had been previously surveyed and staked. Due to the length of time between the initial survey and the proposed sewer installation, Tropic requested Mr. Olson to confirm the manhole locations along with the associated drop boxes<sup>15</sup> prior to the start of excavation. Although he could not verify the date, Mr. Olson stated he re-staked the three sewer manhole locations and also set two offset stakes at each manhole location approximately three weeks prior to the day of the incident. He then added stakes for the associated drop box locations. At that time, he also discussed the site survey with Mr. Cassidy. Mr. Cassidy requested that he double check the stakes to ensure that none had been disturbed or moved. The stakes previously set by Mr. Olson were resurveyed and had blue identification tape plus written verification posted on each stake as to the position being represented.

During his interview, Mr. Olson was asked to examine the topographical survey performed after the incident by Donald W. Bing on behalf of Peoples Gas. After his review of the survey information, he stated that, based on the Peoples Gas survey, it appeared that the sewer main was not being installed properly, and that the sewer main construction equipment made contact with the gas main before reaching the second manhole.

### **Peoples Gas Emergency Response and System Shutdown**

Staff reviewed Peoples Gas' Emergency Notification Procedure IV - 1 through 20. These procedures were followed in response to this emergency and in stopping the flow of gas.

At approximately 11:20 a.m., on October 30, 1998, Peoples Gas received a call from the 9-1-1 Emergency Response System informing them of escaping gas at 1507 North Clybourn Avenue (Exhibit H).

At approximately 11:22 a.m., John Wardzala, Senior Service Specialist, was dispatched to investigate the report. Mr. Wardzala arrived at the excavation site and contacted the Chicago Fire Department Chief at the scene. Mr. Wardzala then tried to move closer to the escaping gas to determine if there was a valve near the damaged section of gas main. Finding no valve, he radioed for assistance, contacting Mr. Rich Matesi, Mr. Mario Alday, and the dispatcher. Mr. Wardzala was then informed by Mr. Allan Cassidy of Harrington that the valve in the street was a shut-off for the 24-inch gas main. Mr. Wardzala and Fire Department personnel began closing the valve. However, before the valve could be closed, Mr. Asay, a Peoples Gas Mechanic-Operator, arrived at 11:45 a.m., and informed them that this valve would not shutdown the 24-inch gas main. Mr. Asay began consulting the atlas pages to see which valves needed to be closed (Exhibits I and J).

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<sup>15</sup> A drop box is a structure associated with a curb drain inlet. The drop box structure is then tied into the combination sewer main with lateral tile installations.

At 11:50 a.m., Mr. Matesi arrived at the scene and began assessing the situation. He contacted Mr. Rocus, Superintendent of Gas Operations, and requested that two fully equipped crew trucks respond to the incident site. Mr. Matesi then began reviewing the atlas pages to determine which valves needed to be closed to stop the flow of gas (Exhibit K). Between Mr. Matesi's and Mr. Asay's field reviews of the atlas pages and Mr. Rocus' review of the Peoples Gas Emergency Operations Plan ("EOP") maps at the Division Street office, crews were dispatched to close system valves (Exhibit L).

At approximately 12:03 p.m., the escaping natural gas ignited and the flames immediately reached a height of approximately 150 feet (Exhibit M). Prior to that time, Chicago fire and police personnel had initiated the evacuation of the CHA building. Their quick thinking and decisive actions resulted in the complete evacuation of the high-rise building prior to the ignition.

At or about this same time, Mr. Rocus and Mr. Matesi were relaying the shutdown information to the field crews who were attempting to reach the emergency valves situated in various locations in the general vicinity. Access to these valves was obstructed due to traffic congestion. Peoples Gas crews were unable to maneuver their vehicles to reach the locations of the emergency valves. In several cases, because heavy traffic would not permit access to Peoples Gas vehicles, individual crew members left their vehicles and on foot carried the tools necessary to gain access to the underground vaults and to operate valves. In some cases, crews diverted or stopped traffic flow or requested that motorists move their vehicles to allow safe access to the valves.

The valves closed during the shutdown are listed below (Exhibit N).

- 9122: a 31-turn 24-inch butterfly valve located at Blackhawk and Hudson.
- 7513: a 31 ¼-turn 12-inch butterfly valve located at Blackhawk and Hudson.
- 11048: a ¼-turn 2-inch plug valve located at Blackhawk and Laramie.
- 0665: a 50-turn 24-inch gate valve located at Kingsbury and Blackhawk.
- 6348: a ¼-turn 4-inch pe ball valve located at North Clybourn and Ogden.
- 6349: a ¼-turn 4-inch pe ball valve located at North Clybourn and Ogden.
- 5235: a 7 ½-turn 2-inch gate valve located at North Clybourn and Blackhawk.
- 1063: a 67 ¾-turn 16-inch gate valve located at Blackhawk and Fremont.
- 1130: a 68-turn 16-inch gate valve located at Blackhawk and Fremont.
- 4042: a 2-turn 2-inch gate valve located at alley west of Fremont between Fremont and Kingsbury.
- 0766: a 9 ¾-turn 4-inch gate valve located at Dayton and Blackhawk.
- 11296: a 19-turn 6-inch gate valve located at Blackhawk and Hudson.

According to Mr. Matesi, when valve 0665 was closed, the flames came away from the 15-story CHA building. When valves 1063 and 1130 were closed, the flames dropped to approximately 20 feet below the roof line of the building. When valve 0766 was closed, the flames reduced to approximately 25 feet above the ground. When valve 11296 was closed, the flow of gas was stopped (Exhibits O, P - P2 and Q).

Throughout the shutdown, Peoples Gas Operations personnel were in constant contact with field personnel to determine the status of the fire. At 1:19 p.m., they were advised that the fire was out and that the flow of gas was stopped. The Chicago Fire Department then allowed Mr. Matesi access to the incident site just long enough to observe the damage to the Peoples Gas facilities.

To ensure a gas-free working environment while removing the damaged section of gas main, two line stops were installed to prevent seepage that might have occurred through the closed valves. One line stop was placed on the west side of North Clybourn Avenue and the other was installed on the east side of the damaged section of gas main. The two line stop installations were completed late on the evening of October 30, 1998.

### **ICC Staff Investigation of Emergency Response and System Shutdown**

The ICC Staff investigation included a review of Peoples Gas' response to the emergency situation, the shutdown of the system, a review of past valve maintenance records, dispatch records, videos and photographs, atlas pages and Emergency Operation Plan maps and emergency procedures. The investigation also included a roundtable review on November 6, 1998, with the Peoples Gas Operations and Distribution personnel to discuss each employee's activities during the emergency.

It is Staff's opinion that Peoples Gas did initiate and follow established emergency procedures. Its Gas Operations and field personnel, using the Emergency Operation maps and atlas pages, responded promptly to identify the proper valves which needed to be closed. When the first responder reached the site, he contacted the on-scene Fire Department officials and maintained contact throughout the shutdown. As the valves were identified, Peoples Gas Field Supervisors and Operations personnel dispatched crews to the valve sites. The only delays in shutting down the system were due to traffic congestion, and in one instance because an asphalt street overlay performed sometime after a November 1997 inspection had covered one of the valve vaults.

A review of Peoples Gas valve maintenance records indicated that all valves used for the shutdown of the system had been inspected in accordance with Minimum Federal Safety Standards for the Transportation of Natural Gas. 49 C.F.R. § 192 (1997).

A review of Peoples Gas' Public Education section of the emergency plan disclosed that Peoples issues an annual letter warning excavators about working in proximity to underground natural gas facilities. The letter defines the obligations of the contractor or excavator when working near natural gas facilities. The annual review and issuance of a letter is a requirement under the Minimum Federal Safety Standards for the Transportation of Natural Gas. 49 C.F.R. § 192 (1997). Peoples' education program meets this requirement by conducting an annual review of excavators who are listed in the yellow pages in the City of Chicago, and receives a listing of excavators who have used JULIE outside the city limits of Chicago. These excavators are sent a letter reminding them to use DIGGER and JULIE before excavating.

Staff asked Peoples Gas to review its annual mailing list of excavators to determine if Harrington Excavating was on the list. Peoples Gas responded that Harrington Excavating and Construction Corporation, the sewer line contractor, was not on the list of companies scheduled to receive the annual warning letter.

## **ICC Staff Investigation of Post Incident Events**

Activities occurring after the incident, which were investigated by Staff, included removal of the damaged section of gas main for metallurgical analysis, installation of the new section of gas main, and Peoples Gas' leak survey of the area.

Staff reviewed Peoples Gas' procedures for determining the condition of and plan for replacement of the cast iron gas main. Peoples Gas maintains a main ranking system which measures the condition of cast iron piping while in service. The section of cast iron involved in the incident was identified as having no history of cracks or breaks resulting in leakage on the 2,410 foot segment of gas main.

Court proceedings were conducted to allow the release of the damaged segment of gas main for metallurgical analysis. The metallurgical examination of the damaged section of pipe was conducted in accordance with a pre-established protocol approved by the ICC's Pipeline Safety Section. The protocol was agreed to by all interested parties. The testing was performed by Engineering Systems Inc. (ESI) in Aurora, Illinois.<sup>16</sup> In ESI's report entitled **The Peoples Gas Light and Coke Company, Mechanical & Metallurgical Testing of Subject Pipe Section, 1507 N. Clybourn Avenue** (dated August 3, 1999), ESI addressed the following points:

- The cause and origin of the fracture of the subject pipe section.
  - The ESI report states, in part, on page 2, "The results of our testing and examinations are consistent with the fracture of the subject pipe section having been caused by a very powerful strike from the subject Komatsu excavator bucket. The physical and mechanical conditions of the subject pipe section are exceptionally good and had nothing to do with the cause of the fracture."
- An estimate of the force required to fracture the subject pipe section.
  - The ESI report states, in part, on page 2, "The subject pipe section would have to be struck with considerable force to cause a fracture. In the Ring Tests we conducted, 6-1/2 to 7-1/2 tons (i.e., 13,000 to 15,000 pounds) of force were needed to fracture the Ring Test

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<sup>16</sup> Attached as Exhibit AA is the Introduction and Conclusions section of the mechanical and metallurgical report prepared by ESI. The full ESI report includes photographs and seven appendices which are not attached to this ICC Staff report.

specimens of the subject pipe section....Thus, in our opinion, a force in excess of 6-1/2 to 7-1/2 tons was necessary to fracture the subject pipe section. From our inspection of the Komatsu excavator and a review of literature describing the unit, we note that the Komatsu excavator involved in this incident...is capable of exerting a digging force of over 21 tons (i.e., 42,000 pounds).”

- Any evidence that the subject pipe section had been hit or scraped at locations other than the fracture site.
  - The ESI report states, in part, on page 3, “The visual examination of the outer surface of the subject pipe section reveals several areas other than the fracture site where the outer surface of the pipe had been struck with high loads from a strong metallic component, leaving marks consistent with those that would be created by a tooth on an excavation bucket (“witness marks”). Recent strikes involving significant force were noted at several points along the north side (i.e., the side facing the sewer trench excavation) of the subject pipe section....The metallographic examination of the surface contact, strike-type of markings confirmed that while they did not play any role in the origin of the fracture of the subject pipe section, a considerable force was required to cause these contact markings. Their presence supports the conclusion that the subject pipe section had been struck very hard with a tooth-like object at several locations. The strike marks designated as B3 and N1 were obviously fresh.”
- Evidence of graphitic corrosion.
  - The ESI report states, in part, on pages 3 and 4, “There was no evidence that graphitic corrosion had a role in the fracture of the subject pipe section. ESI undertook a detailed visual examination of the cleaned fracture surfaces of the triangular fracture area....No portions of these fracture surfaces were affected to any significant degree with graphitic corrosion. In examining the exterior surface of the subject pipe section, as well as the various cross sections on the mechanical test specimens, ESI observed that some spots of graphitic corrosion were present at various points on the outer surface of the subject pipe section. Those spots were both small in surface area affected (i.e., about 2 to 3 inches in diameter), as well as depth of penetration into the pipe wall thickness (i.e., about 10 percent nominal). ESI also undertook a metallographic examination of the subject pipe section by first removing various metallographic

specimens from several different locations....None of the specimens revealed any significant level of graphitic corrosion....The overall testing and examinations conducted on the subject pipe section showed that the spots of graphitic corrosion were substantially less than that allowed by that ANSI/ASME Manual, both in terms of the size (i.e., area and length) of the affected spots and the depth of penetration.”

- Whether the subject pipe section meets the specifications appropriate to its manufacture, including standards relating to thickness, strength and ductility.
  - The ESI report states, in part, on page 5 regarding Wall Thickness, “The average wall thickness of the subject pipe section was found to be 0.79 inches thick which is consistent with the specification for the wall thickness class painted on the pipe section. This ultrasonic thickness examination also represents a volumetric examination of the subject pipe section. The ultrasonic examination did not detect any areas where corrosion either on the outer diameter or inner diameter surfaces had caused any significant effect on the measurements.”
  - The ESI report states, in part, on page 5 regarding ASA Specifications, “Remarkably, the subject pipe section after 44 years in the ground still met almost every one of the pipe specifications for both types of manufacture, and those that it did not meet, did not cause or contribute to the fracture.”
- ESI concludes on page 7 of their report, “In ESI’s opinion, the subject pipe section was fractured as a result of a very powerful blow from an excavator being operated by Harrington Excavating and Construction Corp., at 1507 N. Clybourn Avenue, Chicago, Illinois. As a result of our examinations and testing, ESI found that the overall condition of the subject pipe section, both mechanically and metallurgically, was exceptionally good. The subject pipe section was very strong. This pipe section contained sufficient toughness to withstand the effects of less than exceptional loadings without causing a fracture to occur. While ESI observed some spotty graphitic corrosion on the subject pipe section, the small size of these spots, both in surface area and depth of corrosion, clearly indicates that they were of no consequence in the fracture of this pipe section.”

The CHA building sustained major heat damage to the top seven floors on the southwest corner (Exhibit R). The heat had caused the brick ties<sup>17</sup> to melt and the concrete blocks behind the brick veneer to lose their structural integrity. A representative from OSHA performed inspections of the structure and found it to be unsafe. It was determined that a demolition crew would be required to remove the block and brick damaged by the fire. Brandenburg Construction was called in late on October 30, 1998, to perform the work necessary to make the site safe.

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<sup>17</sup> A flat strip of metal secured behind the brick which is then folded flat in a grout joint to keep the brick from pulling away from the support wall to which it is fastened.

At approximately 2:00 a.m., on October 31, 1998, the removal of the brick veneer and associated concrete blocks had been completed and the site was deemed safe for Peoples Gas to observe the damage and begin planning the repair process (Exhibits S - S1). At approximately 8:30 a.m., on October 31, 1998, the damaged section of 24-inch cast iron gas main was further excavated to reveal the location of the two bell joints<sup>18</sup>. At approximately 6:00 p.m., on October 31, 1998, the damaged segment of gas main had been cleaned and three cuts<sup>19</sup> were completed. After removal of a narrow spool piece approximately 2 feet long, the damaged segment of gas main with the bell joints on each end was removed (Exhibits T - T2).

The gas main removed from the ditch was visually inspected by Peoples Gas and Staff. During the visual inspection, it was observed that a large triangular piece of cast iron was missing (Exhibit U). The missing piece or pieces have never been recovered. There was also an indication that the gas main had been scraped at one bell joint approximately 4 feet from the damaged section of gas main. The scrape mark on the side of the bell joint was facing the sewer main, and was located on the end of the gas main segment ahead of (nearer to North Clybourn Avenue) the damaged area of the gas main. In the scraped area, bare metal had been exposed. Scratch marks were also present on the exposed bare metal. The depth of the scrape is at its maximum at the west end of the bell. The depth of the scrape decreased as it progressed to the east, i.e., towards the excavation equipment (Exhibits V - V1).

After completing the visual inspection and photographing of the gas main, the damaged area was wrapped with a white nylon tarp and the ends were sealed with clear plastic bags. The bags and tarp were secured in place with tape. The damaged section of gas main was loaded onto a Peoples Gas flat bed trailer and taken to the Peoples' Division Street offices for storage until it could be released by the court for metallurgical analysis.

On November 1, 1998, Peoples Gas' Claims Department took additional photographs and measurements of the damaged 24-inch segment of cast iron gas main. The photographs and measurements indicate that the missing piece from the cast iron gas main is triangular in shape, approximately 34 inches long and 9 inches wide at the widest point. The photographs also show what appear to be stress cracks at the narrow end of the triangular-shaped opening in the damaged gas main (Exhibits W - W5).

The damaged segment of cast iron gas main was replaced with a 19-foot segment of pre-tested, 24-inch steel gas main. The steel gas main was connected to the existing cast iron using mechanical compression couplings. After completing the tie-in connections, the gas main was purged of air and pressurized with natural gas.

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<sup>18</sup> A bell joint is a hub located on one end of a pipe section. To complete the joining of the pipe the male end of the next segment of pipe is inserted into the hub. Packing material is installed to seal and complete the joint.

<sup>19</sup> The three cuts were necessary to allow removal of the damaged segment of gas main. A cut was made on the west end just past a bell joint and the second cut was made just east of the second bell joint. The third cut was made approximately 2 feet further east of the second bell joint which allowed a short cylinder to be removed to allow the damaged section to be lifted out of the hole without removal of the two shoring boxes necessary to work in the excavation.

Peoples Gas performed a bar hole leakage survey<sup>20</sup> on October 31, 1998, using a GasScope brand combustible gas indicator (“CGI”). During the leakage survey, a leak was discovered at a valve box<sup>21</sup> where a 2-inch gas main ties into the 24-inch gas main. The 2-inch gas main runs along the east edge of the sidewalk on the northeast side of North Clybourn Avenue and supplies the Orchard Park Townhouses which were occupied at the time. A Leak Indication Record revealed that the damage to the 2-inch gas main connection resulted from outside forces (Exhibit X). Subsequent surveys performed after the repair of the 2-inch PE gas main revealed no further leakage (Exhibit Y).

Staff reviewed the construction site plans used by the sewer line contractor to lay out the sewer project (Exhibit Y-1) and compared the plan to the actual location of the existing gas main and the sewer main as indicated by separate surveys conducted by Peoples Gas and Staff. Based upon this comparison, it appears that the sewer main was not being installed in accordance with the construction site plans. See pages 7 and 8 of this report which discuss the Hanson survey.

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<sup>20</sup> A bar hole survey is conducted by probing holes in the soil at regular depths and intervals. Air samples are taken from the holes by inserting a hollow probe attached to a combustible gas indicator. A combustible gas indicator is an instrument that measures the percentage of gas in air.

<sup>21</sup> A valve box is a hollow cylinder or vault that extends from the valve to the surface of the soil that allows access to the valve.

## **The Chicago Fire and Police Departments**

The heroic efforts of the Chicago Fire and Police Departments' personnel were acknowledged and praised by the Illinois Commerce Commission in the following resolution.

### **Resolution**

By the Commission:

WHEREAS, on the morning of Friday, October 30, 1998, a 24-inch main located near 1507 North Clybourn Avenue in Chicago was ruptured and allowed the escape of a massive volume of natural gas; and

WHEREAS, the break point on that pipeline was in close proximity to a Chicago Housing Authority multi-storied apartment building; and

WHEREAS, the experience, foresight and courage of the fire and police leadership on the scene produced a swift and firm decision to evacuate the residents; and

WHEREAS, the rapid and efficient execution order cleared the nearby apartment building prior to a tremendous explosion, thus moving vulnerable individuals from harm's way; and

WHEREAS, the prevention of injury and fatalities resulting from the superior teamwork of fire and police professionals is most deserving of wide public knowledge and appreciation;

NOW THEREFORE, BE IT RESOLVED that the ICC extends its deep appreciation to the Chicago fire and police personnel for their heroic efforts to preserve life under the most threatening of circumstances.

ADOPTED by the Commission this 3<sup>rd</sup> day of February, 1999.

Chairman

## **Conclusions and Recommendations**<sup>22</sup>

### **Item 1. Sewer Line Contractor's Calls for Locates to the DIGGER System and Peoples Gas Locating Activities**

#### **Conclusions**

- Staff's review of DIGGER requests determined that Harrington did notify DIGGER before excavating in accordance with state law.
- A review of Peoples Gas records determined that its locator, Mr. DiGiacomo, responded to each of the DIGGER requests in a timely manner in accordance with Peoples' procedures.
- Staff's review determined that Mr. DiGiacomo was experienced and had received the necessary training required by Peoples Gas. Based upon Peoples Gas' review of damaged facility reports for the 12 months prior to the incident, it was determined that Mr. DiGiacomo was not involved in any missed locates resulting in damage to Peoples Gas facilities.
- Staff's observation of the locate marks on North Clybourn Avenue and on the sidewalk indicate that the gas main had been properly marked at those locations.
- Staff was unable to determine if Peoples Gas' yellow locate flags were properly placed along the gas main in the dirt area beyond North Clybourn Avenue and the sidewalk. Information received by Staff during the investigation is inconclusive on this issue due to conflicting recollections between Harrington and Peoples Gas employees, and also due to disruption of the work site by construction and emergency vehicles.
- During a review of the locate request forms, Staff noted that the reference to "units" located, instead of identifying specific facilities located, provided insufficient information to determine what facilities were located. When service locates were included with gas main locates, the remarks sections of the Contractor-Utility Location Request Forms did not specify how many services nor how many feet of gas main were located.
- During Staff's review of Peoples Gas' mailing list of excavators to receive an annual reminder letter to use DIGGER and JULIE, it was determined that the list did not include Harrington Excavating and Construction Corporation.

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<sup>22</sup> Peoples Gas' written response to Staff's conclusions and recommendations is due within 30 days of receipt of this report as specified in Staff's transmittal letter accompanying this report.

### **Recommendations**

- Staff recommends that Peoples Gas develop and implement a record-keeping system which specifies and documents the facilities located when completing a Contractor-Utility Location Request Form. The locate activity and the forms used to record the activity should be specific as to the number of services and the length of gas main included in the locate.
- Based upon a review of Peoples Gas Distribution Department General Order 0.800 Procedures and Policies for the Prevention of Damage to Underground Gas Company Facilities, Staff recommends that Peoples Gas review and revise its Procedure and Policy for Marking Underground Gas Facilities to require that any subsequent locating or re-marking of an excavation site be performed using a locating device to aid in determining the approximate location of Peoples Gas facilities.
- Staff recommends that Peoples Gas develop specific guidelines for determining the level of monitoring required for excavation activities including those excavation projects which may require little monitoring as well as those excavating activities which may require constant monitoring. The guidelines should consider, but not be limited to, the location of a proposed excavation in relation to Peoples Gas facilities, the size and operating pressure of its facilities, the proximity to high concentrations of population and the potential for an accident involving life or property.
- Staff recommends Peoples Gas should request and review construction plans to assess the plans' accuracy in identifying the location of Peoples' facilities, and to assist Peoples in determining the level of project monitoring required.
- Staff recommends that Peoples Gas review the mailing list of excavators to receive its annual reminder letter to provide assurance that it includes all excavators in their operating territory.

## **Item 2. Peoples Gas Emergency Response and System Shutdown**

### **Conclusions**

- Staff determined that Peoples Gas did initiate and follow established emergency procedures. Its Operations and Distribution personnel responded promptly in identifying the proper valves and dispatching personnel to shutdown the system. When the first responder reached the site, he made contact with on-site fire officials and maintained contact throughout the shutdown. The only delays in shutting down the system were caused by traffic congestion, and one valve vault that had been covered during a recent asphalt street overlay.

- A review of Peoples Gas' valve maintenance records indicated that all valves used for the shutdown of the system had been previously inspected in accordance with Minimum Federal Safety Standards for the Transportation of Natural Gas. 49 C.F.R. § 192 (1997).

**Recommendations**

- Identify valves made inaccessible due to street overlays or other causes, then clear the obstruction to make them accessible.
- Formulate a preventive plan with entities involved in street overlays or other construction projects to minimize interference with access to utility facilities.

**Item 3. Condition of the Damaged Gas Main**

**Conclusions**

- The gas main removed from the ditch was visually inspected by Staff. During the visual inspection, it was observed that a large triangular piece of cast iron was missing from the gas main wall. The missing piece or pieces have never been recovered. There was also an indication that the gas main had been scraped at a bell joint ahead of the damage where the gas main failed.
- Metallurgical testing of the damaged sections of gas main was required to provide additional information regarding its condition and the impact or impacts which caused the damage.
- In ESI's opinion,<sup>23</sup> the gas main was fractured as a result of a very powerful blow from an excavator being used in the sewer project along North Clybourn Avenue.
- ESI's metallurgical tests found the overall condition of the damaged section of gas main, both mechanically and metallurgically, was exceptionally good.

**Recommendations**

- None.

**Item 4. Sewer Main Siting**

**Conclusions**

- Staff's review of the construction site plans revealed that the sewer main was to be installed by the sewer line contractor parallel with, not at an angle toward, the 24-inch gas main.

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<sup>23</sup> ESI (Engineering Systems Inc.) was engaged by Peoples Gas to conduct a metallurgical examination of the subject pipe section.

- The site survey conducted by Hanson indicates that the sewer main was not installed parallel with the gas main, but at an angle toward the gas main.
- The Hanson site survey also indicates the distance between the installed sewer main and Peoples' 24-inch gas main near the sidewalk at North Clybourn Avenue is approximately 7 feet, not ten feet as indicated by the construction site plans.

**Recommendations**

- The ICC has no jurisdiction over private contractors. Only Peoples Gas activities are subject to the ICC's jurisdiction. See prior recommendations for Item 1, above.

## **List of Exhibits**

- A. Peoples Gas Pipe Information as described in the Cast Iron Main Ranking Program.
- B. Peoples Gas Pressure Charts from the 20 psig system indicating the operating pressure on the day of the incident.
- C. Staff's site investigation as to the location of the 24-inch pipe using the building as a reference point.
- D. Peoples Gas Leakage Survey Documentation.
- E. Peoples Gas photos taken on October 27, 1998, showing flags in the background.
- E1. Photo taken by Harrington indicating the distance between the gas main and the marking flags location.
- F. Peoples Gas Contractor-Utility Location Request Form addressing the October 30, 1998 locate.
- G. Peoples Gas Site Survey Performed by Mr. Donald Bing of Gewalt Hamilton Associates.
- H. Peoples Gas Unusual Condition Report.
- I. Peoples Gas Atlas page # 26.
- J. Peoples Gas Atlas page # 27.
- K. Peoples Gas Atlas page # 28.
- L. Peoples Gas Emergency Operations Map.
- M. Mr. Matesi's interview (transcript pages 54 and 55).
- N. Peoples Gas inspections of valves used during the shutdown.
- O. Photos taken by Peoples Gas showing the height of flames after ignition.
- P-P2. Photographs taken by Peoples Gas showing flames decreasing in intensity as the valves were being closed.
- Q. Photograph taken by Peoples Gas showing the fire was extinguished.
- R. Photograph taken by Peoples Gas showing structural damage to the CHA building.
- S-S1. Photographs taken by Peoples Gas on site on October 30, 1998, after receiving permission to enter the accident site.
- T-T2. Photographs taken by Peoples Gas indicating the cut out of the 24-inch gas main.
- U. Photograph taken by Peoples Gas showing the triangular opening in the damaged 24-inch pipe.
- V-V1. Photographs taken by Peoples Gas showing the depth of the scrape.
- W-W5. Photograph taken by Peoples Gas showing the measurements of the triangular opening and the stress cracks.

**List of Exhibits (cont'd)**

- X Leak repair record showing the repair of the leak found during the post incident survey.
- Y. Final leak survey after correcting the leak found on the 2-inch valve tee.
- Y-1 Copied insert from Orchard Park Townhomes Unit 2, Utility Plan C-3 prepared by Erickson Engineering Associates, LTD.
- Z. Site survey map prepared by Hanson after completing the site survey performed on May 6, 1999.
- AA. The Introduction and Conclusions section of the mechanical and metallurgical report prepared by ESI. The full ESI report includes photographs and 7 appendices which are not attached to this ICC Staff report.