



Oregon Public Utility Commission
Salem, Oregon

Incident Investigation Report

Incident Number:	2016-10-19 NWN NW 23 rd & NW Glisan
Type of System:	Gas Distribution
Incident Type:	Pipeline Damage, Explosion and Fire
Location:	Portland, Oregon
Date of Failure:	October 19, 2016
Time:	9:38 a.m.
Owner/Operator:	Northwest Natural Gas
Fatalities:	None
Injuries:	1
Property Damage and Losses:	\$17,220,182 ¹
Material Released:	Natural Gas
Pressure:	50 psig
Type of Failure:	Excavation Damage
Component Affected:	1-inch steel service line
Root Cause of Incident:	Insufficient Notice to the Oregon Utility Notification Center by Loy Clark Pipeline Co.

Purpose

The purpose of this report is to present the results of the Oregon Public Utility Commission (OPUC) Natural Gas Safety Program Staff's (Safety Staff) investigation of the October 19, 2016 incident involving Northwest Natural Gas Company's (NW Natural or Company) gas distribution system. The scope of this report encompasses safety standards for transporting natural gas by pipeline administered by the United States Department of Transportation, Pipeline and Hazardous Material Safety Administration (PHMSA) provided by Code of Federal Regulations (CFR) Title 49 Chapter 1, subchapter D – Pipeline Safety. These standards are federal regulations designed to ensure safety in the design, construction, testing, operation and maintenance of pipeline facilities. The OPUC participates in a PHMSA certification program to administer federal minimum pipeline safety requirements.² Under this certification pursuant to 49 U.S.C. § 60105, the OPUC assumes inspection and enforcement responsibility with respect to intrastate gas pipeline facilities under its jurisdiction granted by Oregon Revised Statute (ORS) 757.039(3). This report will serve as the incident investigation required by PHMSA as part of the OPUC's annual certification requirements.

The primary objective of an investigation into pipeline failures has two parts: one, is to minimize the possibility of recurrence of this operator and other operators under Oregon's jurisdiction; and two institute enforcement action where noncompliance with the safety standards has occurred. Safety Staff's investigation of the October 19, 2016 event included an examination of applicable PHMSA safety standards, and NW Natural's compliance with those standards. In particular, Safety Staff examined whether NW Natural is in compliance with 49 CFR parts 191 and 192, and whether the Company

¹ This amount is the number provided in NW Natural's Incident Report to PHMSA F 7100.1. Safety Staff has not calculated property damage and losses resulting from the incident.

² Federal statutes allow PHMSA to delegate authority over the intrastate gas and hazardous liquid pipelines to each state through Certifications and Agreements. See 49 U.S.C. §§ 60105-60106.

followed its own procedures for emergency response and failure investigation.³ Further inspection of maintenance activities was conducted by Safety Staff on the pipeline distribution system for the area where the incident occurred. Safety Staff also evaluated NW Natural's operation activities, including its damage prevention program, related to participation in a one-call system provided by the Oregon Utility Notification Center (OUNC or Center).⁴

OUNC is a separate state agency that operates a "one-call" utility notification center. In accordance with ORS 757.557, all operators of underground facilities are required to subscribe to OUNC. In addition, a person that intends to engage in excavation is required to notify the OUNC at least two (2) business days, but not more than ten (10) business days in advance of any proposed excavation. The excavator must notify OUNC of the location, date of proposed excavation and the type of work to be performed.⁵ After the Center receives a notification, it issues a locate ticket to its members that operate and control underground facilities in the area of proposed work. As requested on the ticket, each subscribing operator is required to indicate the presence or absence of locatable underground facilities with reasonable accuracy within the area of the proposed excavation.⁶ Often, this is in the form of painted marks or flagging. The intent of the notice and marking requirements is to prevent damages to underground facilities.⁷

Summary of the Incident

On October 19, 2016, while installing a junction box in a sidewalk for Comcast⁸ within the city limits of Portland, Oregon, Loy Clark Pipeline Co. (Loy Clark Pipeline), a contractor for Comcast, dug into an unmarked natural gas service line with a backhoe excavator. The service line did not leak where the excavator damaged the pipeline; however, the line was pulled. That action severed a pipe connection to a valve. The broken connection resulted in a release of natural gas that migrated under the sidewalk, through a vault and began to accumulate in the basement of the building located at 500 NW 23rd Avenue. At approximately 9:38 a.m., an explosion originating from the basement, immediately followed by a secondary explosion, destroyed the building and damaged neighboring structures. A third explosion was recorded on the 9-1-1 dispatch log at or near the same time. An emergency responder with Portland Fire and Rescue was injured at the scene and received inpatient hospitalization.

Pre-incident Events

As described more fully below, this incident occurred due to Loy Clark Pipeline, a contractor for a Comcast, giving insufficient notice to the OUNC for the work to be performed on behalf of Comcast.

³ Under 49 C.F.R. § 192.615(a), which OPUC applies to operators, each operator is required to establish written procedures to minimize the hazard resulting from a gas pipeline emergency, and contains minimum requirements for such a plan. Subsection (b) requires the operator to ensure that training materials are distributed, that personnel are trained in accordance with the procedures, and that employee activities are reviewed to determine whether the procedures were effectively followed in each emergency.

⁴ In accordance with 49 C.F.R. § 192.614, NW Natural is required to have program in order to prevent damage to pipeline facilities related to excavation activities.

⁵ See ORS 757.557(2) and OAR 952-001-0050(1).

⁶ OAR 952-001-0070(1) and OAR 952-001-0080 (1).

⁷ ORS 757.552(2).

⁸ This report refers to Comcast, generally. On the City of Portland Permit #65996, the named entity is Comcast West. On the OUNC ticket, the entity with facilities in the area is identified as Comcast.

When Loy Clark Pipeline called the OUNC to provide notice of the excavation to be performed on behalf of Comcast, the person gave notice for work on the south side of NW Glisan Street (see Figure 1). Safety Staff finds the prior work conducted by Loy Clark Pipeline for PGE, in the same area, provides context for the October 19, 2016 incident that is the subject of this investigation.

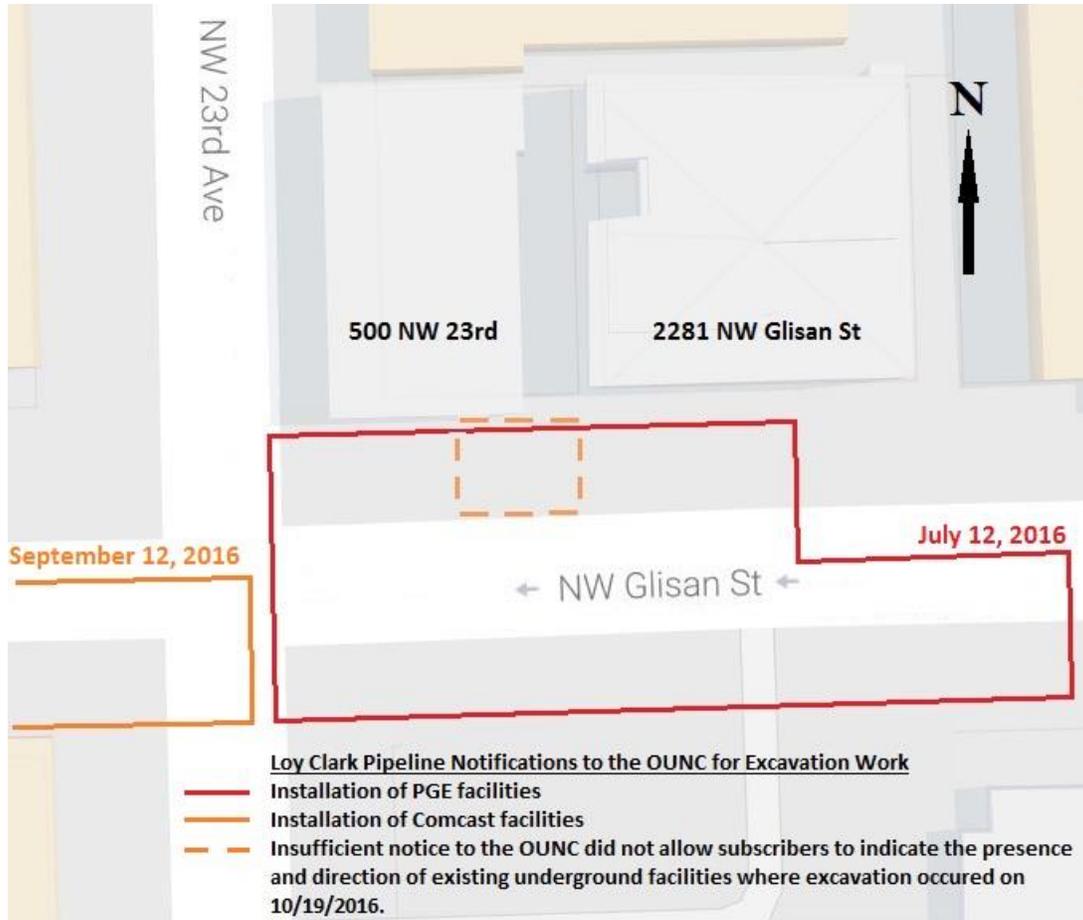


Figure 1

PGE Rerouting of Facilities

Prior to the incident that is the subject of this report, development and improvement projects were underway in the area of the incident that required the rerouting of existing utility facilities. Loy Clark Pipeline performed a portion of work to install underground conduit and vaults for electric primary and service lines on behalf of Portland General Electric (PGE). This work was in conjunction with City of Portland permit #65193 for the installation of four power poles and an electrical line. Representatives from PGE, Loy Clark Pipeline, and the general contractor held a preconstruction meeting to discuss coordination and phasing of work through the OUNC. All project plans and permits stated the requirement of notifying utility operators through the OUNC before excavating in order to have underground facilities located and marked. PGE and Loy Clark Pipeline fulfilled this requirement, prior to opening an excavation for the installation of power poles and electric lines. A photograph was taken by the locate contractor on July 14, 2016, that documents a complete and clearly visible field location of the 1-inch gas service in yellow paint (see Figure 2).

During an evening work shift on July 14, 2016, PGE installed a new pole, “PL-1” next to an existing pole seen in Figure 2.



Figure 2 – Locating Inc. documented completed locates on July 14, 2016 at 2:32 p.m. Above is the sidewalk taken facing north from NW Glisan prior to PGE and Loy Clark Pipeline opening an excavation in conjunction with city permit #65193. The natural gas service line is clearly visible showing a complete field location of the service line between 500 NW 23rd Avenue (building on the left) and 2281 NW Glisan Street (building on the right).

Members of a Loy Clark Pipeline construction crew met with PGE at the start of an open trench excavation on July 19, 2016. During the open trench excavation, sidewalk and street surfaces with yellow paint for the natural gas service line were removed. Loy Clark Pipeline then installed three, 4-inch conduit runs from PL-1 to vault-95 which is near the front entrance of 2281 NW Glisan. These were inspected and approved by PGE for depth, material and backfill. PGE also inspected the trench excavation across NW Glisan Street and noted from vault-95 to PL-1 was backfilled, and paved or plated. At the locations where trenching took place, new concrete sidewalk surfaces were poured, and asphalt patching was done in the street (see Figure 3).

On September 1, 2016, PGE performed a scheduled shutdown for 500 NW 23rd Avenue and 2281 NW Glisan Street. At that time PGE pulled new electric service lines through the conduits under the new concrete sidewalk, placed a transformer bank, rerouted the overhead feed to 500 NW 23rd and energized the system. The remaining conduit risers for electric service on PGE PL-1 were left open and available for future use (see Figure 3).



Figure 3 – Google Street view facing East on NW Glisan – Shows PGE PL-1, risers installed by Loy Clark on the North side of Glisan, Restored street and sidewalk surfaces (highlighted in green) across NW Glisan Street and from PL-1 to PGE Vault – 95 in front of 2281 NW Glisan Street.

Comcast Replacement of Facilities

On September 7, 2016, the City of Portland issued a permit to Comcast that specifies construction or repair of a utility vault and telecommunications lines, permit #65996. The work area provided in the permit included NW Glisan Street between 22nd and 23rd Avenues and NW Glisan Street between 23rd and 24th Avenues. All project plans and permits indicated the requirement of notifying utility operators before excavating. On September 12, 2016, at 10:29 a.m., Loy Clark Pipeline notified the OUNC and provided the following dig site information and location description:

- *Type of Work:* Replace Telecommunications and CableTV mainline
- *Work Being Done For:* Comcast
- *Street:* NW Glisan
- *Intersecting Street:* NW 23rd
- *Location of Work:* Site begins at above intersection marking west approximately 300 feet along the south side of NW Glisan. Area marked in white.

The OUNC asked Loy Clark Pipeline to verify that the above information was correct, and then issued Oregon One-Call ticket #16229204. The OUNC sent a copy of the ticket to Loy Clark Pipeline by email.

Utility operators responded to Oregon One-Call ticket #16229204 by locating and marking the presence or absence of underground facilities. The marking response was completed by a locate contractor on behalf of OUNC subscribers PGE and NW Natural on September 13, 2016, from the “...intersection marking west approximately 300 feet along the *south* side of Glisan. Area marked in white.”⁹ Safety

⁹ Emphasis added.

Staff reviewed the locate contractor’s response documentation including photos of markings from PGE, NW Natural and CenturyLink.¹⁰ Documents and photos reveal clearly visible field locations of underground utilities completed on the *south* side of NW Glisan. Upon completion, CenturyLink’s locate contractor sent an email to Loy Clark Pipeline that included photographs of completed markings on the *south* side of NW Glisan Street.

Day of Incident Events

On the morning of October 19, 2016, Loy Clark Pipeline began to excavate on the *north* side of NW Glisan by removing a section of the sidewalk that was restored around the area of PGE PL-1. Permit #65996 allowed the installation of a junction box, to the left of risers attached to PGE PL -1. The immediate area of this excavation activity was not identified by Loy Clark Pipeline when it notified the OUNC on September 12, 2016. As such, OUNC subscribers did not mark the location of facilities in this area. Consequently, Loy Clark Pipeline did not have clear visible field location information or markings to indicate the presence and direction of all hazards prior to removing the sidewalk. At approximately 30-inches of depth, Loy Clark Pipeline damaged and pulled an unmarked 1-inch steel natural gas service line. According to Loy Clark Pipeline personnel, it notified NW Natural at 8:48 a.m. of the leaking gas. A member of the excavation crew took photographs of the sidewalk and hole adjacent to PGE PL-1. As can be seen in Figure 4, there is a lid over a valve for the gas line. The venting of natural gas was enough to cause the lid to hover over the opening.



Figures 4 and 5 – Photographs obtained from Oregon OSHA, taken by Loy Clark Pipeline after striking the Natural Gas Service line. The valve lid (also in Figure 2) is between two faded markings. Loy Clark Pipeline did not have clear visible field locations in order to identify the presence and direction of the natural gas service line beneath restored section of sidewalk.

¹⁰ Locating Inc. and USIC ticket detail for Oregon One-Call Ticket #16229204, See activity #: 17 and 18 in Appendix A.

NW Natural Emergency Response

On October 19, 2016, the NW Natural Emergency Call Center logged a call from Loy Clark Pipeline at 8:51 a.m. for the damaged and blowing gas line. Another call was received by NW Natural at 8:57 a.m. to report a natural gas odor inside the building at 500 NW 23rd. NW Natural dispatched a field support technician for an Emergency Damage Order on NW 23rd and NW Glisan at 9:00 a.m. An Emergency Assist Order was sent to a NW Natural construction crew with necessary tools and equipment at 9:02 a.m. A customer service field technician was dispatched for the reported natural gas odor inside the building at 9:06 a.m.

Beginning at 9:07:19 a.m., approximately 19 minutes after the service line was pulled that caused a gas leak, the 9-1-1 Bureau of Emergency Communications in Portland received a call from Loy Clark Pipeline. 9-1-1 dispatch sent an alarm notice and informed Portland Fire and Rescue first responders; the caller stated Loy Clark Pipeline had hit a 1-inch steel gas line and heard a loud roaring out of the shutoff valve.

NW Natural's first responders arrived on scene in the order they were dispatched, 9:10 a.m., 9:23 a.m. and 9:25 a.m. respectively. First responders verified with the excavator what took place the moment the underground leak occurred. NW Natural crews began taking prompt actions to assess the extent of the gas leak, mitigate hazardous conditions and started an Incident Command System (ICS).¹¹

Public Official Emergency Response

Portland Fire and Rescue first responders included a Battalion Chief and Firefighters from Engine 15, Engine 3, Engine 6, and Truck 3. While on route the Battalion Chief requested that 9-1-1 Dispatch contact NW Natural and have it send a crew to the scene. Dispatch confirmed NW Natural had already been notified. Truck 3 was first to arrive at 9:12 a.m. and assumed Incident Command at NW Glisan; others arrived soon thereafter. At 9:15 a.m., Engine 3 reported to Incident Command that according to NW Natural, 2281 NW Glisan Street was clear of gas and the building at 500 NW 23rd Avenue had reports of gas and was still in the process of evacuating. Incident Command requested 9-1-1 Dispatch to notify PGE of possibly needing to shut down power to the block. This request was expedited at 9:31 a.m.

Safety Staff Response

Oregon PUC Safety Staff received notice from NW Natural Gas of the incident then dispatched investigators at 10:20 a.m on October 19, 2016. Safety Staff contacted and updated the western region PHMSA Accident Coordinator. PHMSA informed Safety Staff that the National Transportation Safety Administration (NTSB) would not be sending investigators to the scene. Safety Staff was onsite at approximately 11:00 a.m. and received a briefing from NW Natural at that time. Safety Staff began its investigation, an evaluation of NW Natural's compliance with 49 CFR Part 192 requirements for emergency response and incident investigation.

¹¹ ICS is a standardized management system designed to enable efficient response. The size of the ICS is dependent on the nature of the incident. In this case, NW Natural established an ICS for its response. Portland Fire established the overarching ICS assuming the role of Incident Command where all communications were to be directed.

Coordinated Response

Incident Command notified first responders that NW Natural was still getting high gas readings at 500 NW 23rd and extended the evacuation perimeter. Truck 3B liaison reported to Incident Command that NW Natural Gas would like a charged hose¹² line to the excavation hole. Portland Fire and Rescue assigned Engine 3 to charge a line and Engine 15 to serve as backup. At 9:38 a.m., three explosions were recorded on the 9-1-1 dispatch log that caused injury, destroyed the building at 500 NW 23rd, damaged neighboring structures and brought down PGE's overhead primary and secondary conductors. The downed conductors added another safety hazard that Portland Fire and Rescue Incident Command needed to mitigate with PGE during the emergency response. NW Natural's Emergency Assist Crew immediately grabbed their valve key and ran down to shut-off the main feed at NW 22nd and NW Glisan Street. During a post incident review, NW Natural indicated the area was confirmed safe at 9:52 a.m. At 10:43 a.m., Portland Fire and Rescue Incident Command received notification that the power was off for the area. The 9-1-1 Dispatch log states a safety officer with PGE confirmed with Portland Fire and Rescue Incident Command, all lines were dead at 11:20 a.m.

Below is a timeline listing of emergency response activities from Safety Staff's Incident Activity Log.¹³

Timeline	Emergency Response
8:48 a.m.	Loy Clark Pipeline personnel notified NW Natural of the leaking gas
8:51 a.m.	NW Natural Emergency Call Center logs a call from Loy Clark Pipeline for the damaged and blowing gas line
8:57 a.m.	NW Natural Emergency Call Center receives an inside odor complaint at 500 NW 23rd
9:00 a.m.	NW Natural dispatched a field support technician for an Emergency Damage Order
9:02 a.m.	NW Natural dispatched a construction field crew for an Emergency Assist Order
9:06 a.m.	NW Natural dispatched a customer service field technician for the Inside Odor complaint
9:07 a.m.	Loy Clark Pipeline personnel notified 9-1-1 Bureau of Emergency Communications in Portland
9:10 a.m.	NW Natural's first customer service field technician arrives
9:12 a.m.	Portland Fire and Rescue arrive on scene and established ICS, first responders included a Battalion Chief and Firefighters from Engine 15, Engine 3, Engine 6, and Truck 3
9:15 a.m.	Portland Fire and Rescue Incident Command received an update, per NW Natural, 2281 NW Glisan Street clear of gas and 500 NW 23rd Avenue had reports of gas and still in the process of evacuating.
9:23 a.m.	NW Natural Emergency Assist Crew Arrives onsite
9:23 a.m.	Portland Fire and Rescue Incident Command request's PGE be notified to possibly shut down power
9:25 a.m.	NW Natural second customer service field technician arrives onsite

¹² A charged hose means a hose that is filled with water and ready to use.

¹³ Safety Staff's Incident Activity Log was used to examine the events leading up to the incident and emergency response, for a complete reference, see appendix A.

9:31 a.m.	Portland Fire and Rescue Incident Command orders, as recommended per NW Natural, push perimeter back.
9:38 a.m.	9-1-1 dispatch 3 huge explosions – Mayday Alert
9:38 a.m.	NW Natural Emergency Assist Crew grabs valve key and runs down to shut-off main feed at NW 22 nd and NW Glisan Street.
9:42 a.m.	Portland Fire and Rescue Incident Command notified of primary transmission powerlines down onsite.
9:52 a.m.	NW Natural confirms gas off; main and service line isolated.
10:43 a.m.	PGE confirms power has been secured.

Table 1

As discussed more fully below, Safety Staff noted one area of concern related to NW Natural’s ICS, which unless corrected, may lead to violations of pipeline safety rules. Specifically, NW Natural’s ICS was not conveyed to public officials and updates were not communicated to Portland Fire and Rescue first responders.

Post-Incident Examination of Incident

Emergency Response by NW Natural and Public Officials

PHMSA requires all operators that transport hazardous materials by pipeline to develop and follow an emergency plan. 49 CFR § 192.615 requires that plans include, but are not limited to, the following:

- *Receiving, identifying, and classifying notices of events which require immediate response by the operator.*
- *Establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials.*
- *Prompt and effective response to a notice of each type of emergency, including the following:*
 - *Gas detected inside or near a building.*
 - *Fire located near or directly involving a pipeline facility.*
 - *Explosion occurring near or directly involving a pipeline facility.*
 - *Natural disaster.*
- *The availability of personnel, equipment, tools, and materials, as needed at the scene of an emergency.*
- *Actions directed toward protecting people first and then property.*
- *Emergency shutdown and pressure reduction in any section of the operator's pipeline system necessary to minimize hazards to life or property.*
- *Making safe any actual or potential hazard to life or property.*
- *Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency.*
- *Safely restoring any service outage.*
- *Beginning action under §192.617, if applicable, as soon after the end of the emergency as possible.*
- *Actions required to be taken by a controller during an emergency in accordance with §192.631.*
- *Furnish its supervisors who are responsible for emergency action a copy of that portion of the latest edition of the emergency procedures*

In addition, PHMSA’s Office of Pipeline Safety has issued an advisory bulletin to pipeline operators advising them to conduct outreach to owners of electric and other utilities to preplan and coordinate response to pipeline emergencies. This advisory stems from the potential ignition sources with electric utilities and the complications such utilities can pose for responders to a pipeline emergency.

Safety Staff examined NW Natural’s emergency plan and records maintained by the Company and found NW Natural to be in compliance with the CFR and its emergency plan. OPUC Safety Staff also interviewed NW Natural first responders and Portland Fire and Rescue Battalion Chief, Jamie Klum, incident command for this emergency. A review of the 9-1-1 dispatch log and audio recording provided by Portland’s Bureau of Emergency Communications was included in Safety Staff’s Incident Activity Log. This information was collated and evaluated by Safety Staff in order to assess the actual coordinated Emergency Response.

Inspection and Recovery of the Pipeline and Facilities

Safety Staff was present for NW Natural’s post-incident inspection activities. The main and 1-inch service line was isolated from the distribution system. On October 26, 2016, NW Natural Gas performed an air test to examine the uncontrolled flow condition at the time of leak. An air leak at the valve approximately 4-feet away did not allow pressure to build up to the normal operating pressure of 45 – 50 psig. It was determined the air leak was substantial and coming from the underground shutoff valve under the sidewalk.

NW Natural Gas personnel then exposed the service line and valve using non-invasive excavation methods. The damage on the service line measured approximately 38 inches in length at a depth of 30 inches from the top of the sidewalk. It appeared mechanized excavation equipment caused “damage” to the extent the pipe needed to be repaired or replaced due to weakening, partial or complete destruction, including the protective coating (see Figure 6 and 11). The line had been pulled from a connection at the Dresser valve, more than four feet away. It was then revealed the location of the severed valve connection was “upstream” and before the closing mechanism on the Dresser valve body (see Figure 7). This disconnection provided an uncontrolled release of natural gas from the service line.



Figure 6 - Damaged service line



Figure 7 – Severed Dresser valve connection

At the time of damage, the gas likely vented through paths of least resistance: the valve lid and migrated under the sidewalk. During the inspection and recovery of the pipeline, a section of sidewalk was removed and a vault was found in the right-of-way (see Figure 8, 9 and 10 below). The vault’s opening

adjoins the basement at 500 NW 23rd Street the most likely path of travel of natural gas into the building was through cracks and gaps between the vault walls and sidewalk.



Figure 8 – Sidewalk removal revealed vault in the right-of-way

Figure 9 – Bottom of sidewalk was a ceiling surface of vault

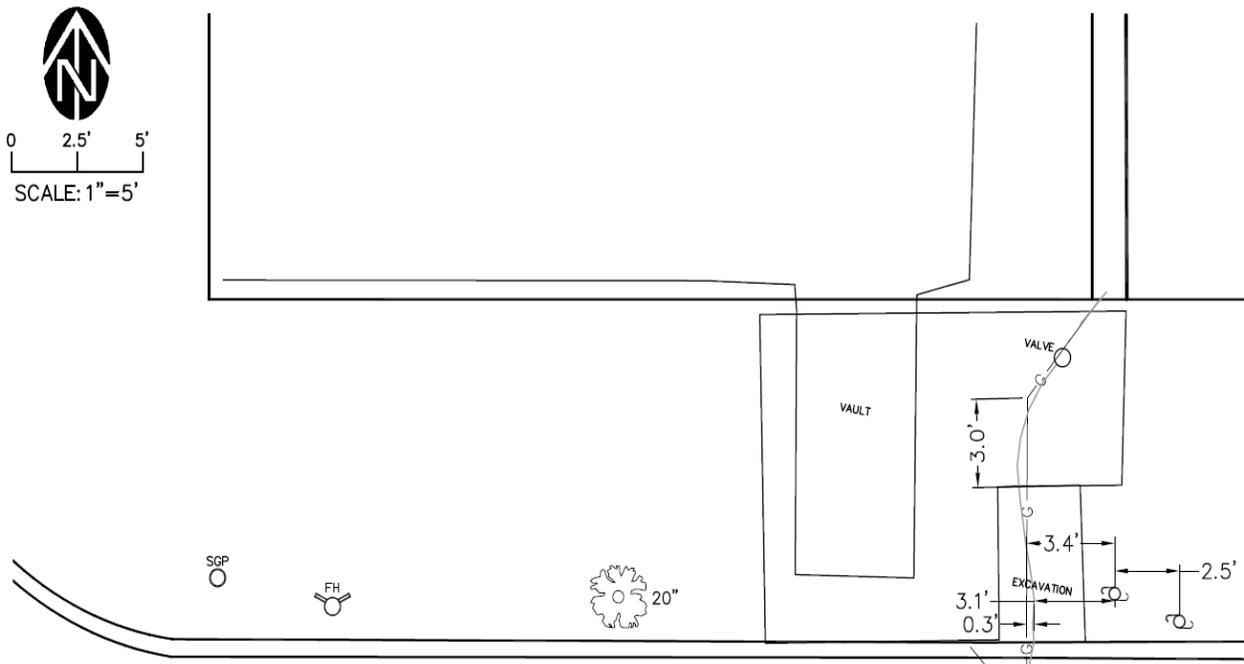


Figure 10 – NW Natural’s site survey of vault, excavation area, valve, and service line.

During the inspection and recovery of the pipeline, the meter bank, damaged service line, and valve were removed by NW Natural. The facilities were transported by NW Natural and secured at its service center until further evaluations could be made.

On November 16, 2016, Safety Staff was present for the inspection of the service line, valve and the meter bank that had been moved to the service center. Safety Staff observed cleaning dirt and debris from the service line (see Figure 11). A closer examination of the service line confirmed the pipe was damaged where excavation had taken place.



Figure 11 - Damaged Service line



Figure 12 – Service line that was severed from the valve connection

Inspection of the valve body showed a manufacture stamp “175 1GTO.” The pipeline surface that was pulled from the fitting was visually examined and measurements were taken. The inserted depth into fitting was measured to be approximately 3-inches (see Figure 7). The outside diameter at the end of the pipe measured 1.316-inches.

Federal and State Safety Requirements

Safety Staff reviewed NW Natural’s operations and incident response in regard to compliance with several state administrative rules and federal regulations. The following is a list of relevant administrative rules and federal regulations:

Oregon PUC Administrative Rule Requirements

The OPUC has enacted several administrative rules regarding gas pipelines safety standards, incident reports, inspection of gas pipeline operator facilities, and enforcement procedures for operators.

- **OAR 860-024-0007** Location of Underground Facilities – operators must comply with Oregon Utility Notification Center rules.
- **OAR 860-024-0020** Gas Pipeline Safety – compliance with federal regulations.
- **OAR 860-031-0005** Inspection of Gas Pipeline Operator Facilities.

Oregon Utility Notification Center Administrative Rule Requirements

The Oregon Utility Notification Center is established under ORS 757.541 through ORS 757.571. The Center and its notification and marking program regulations were established to meet the “one-call” notification system requirements set forth in 49 USC § 60114 and implementing regulations. Specifically, OAR 952-001-0050, provides:

- (1) Except as provided in section (2) of this rule, at least 2 business days, but not more than 10 business days before beginning an excavation, the excavator must notify the Oregon Utility Notification Center of the date and location of the proposed excavation, and the type of work to be performed.*
- (2) The notice requirement of section (1) of this rule does not apply if the excavation is in response to an emergency, or if all of the following apply:*
 - (a) The excavator is a tenant or an owner of private property;*
 - (b) The excavation is on private property of that owner or tenant;*
 - (c) The excavation is less than 12 inches in depth; and*
 - (d) The excavation is not within an established easement.*
- (3) An excavator, when giving notice in compliance with section (1) of this rule, must furnish information as to how the excavator can be contacted.*
- (4) If an excavator intends to perform work at multiple sites or over a large area, the excavator must take reasonable steps to work with the facility operators, including preconstruction meetings, so that the operators may locate their facilities at a time reasonably in advance of the actual start of excavation for each phase of the work.*

Additional requirements related to excavation are set forth in OAR 952-001-0001 through OAR 952-001-0100.¹⁴ Pursuant to OAR 860-024-0007, operators must comply with the requirements of OAR chapter 952 regarding the prevention of damage to underground facilities. Other specific examples include:

- **OAR 952-001-0070** Operators to Mark Underground Facilities or Notify Excavator that None Exist.
- **OAR 952-001-0080** Operators to Respond to Notifications Requesting Design Information.
- **OAR 952-001-0100** Record Keeping Requirements.

Federal Regulations

There are several federal regulations (49 CFR Parts 191 and 192) related to notification and reporting, operations manual, emergency plans, failure investigations, purging of pipelines, qualification of personnel and control rooms involved in emergencies. OAR 860-024-0020, discussed above, implements these federal requirements.

Other safety requirements not reviewed by Safety Staff

The Oregon Occupational Safety and Health Division of the Department of Consumer and Business Services (Oregon OSHA) administers the Oregon Safe Employment Act.¹⁵ Among other standards for workplace safety, OR-OSHA has adopted OAR 437-003-0096 for employees engaged in construction, which incorporates the following OUNC and OPUC laws by reference: ORS 757.541 through ORS 757.571, OAR 952-001-0050 and OAR 860-024-0007. Safety Staff noted Oregon OSHA was onsite at

¹⁴ Per ORS 757.993, the OPUC may seek a civil penalty for violation of an OUNC rule in response to a complaint alleging such a violation.

¹⁵ ORS 654.001 through ORS 654.295.

approximately 11:11 a.m. on October 19, 2016, and opened its inspection related to worker safety and health.

NW Natural Gas Operation and Maintenance Record Review

In addition to NW Natural’s compliance with its Emergency Plan, Safety Staff also reviewed records maintained by the operator for the area of the incident. Safety Staff found NW Natural Gas in compliance with safety standards requirements per Title 49 CFR § 192.605. Below is a listing of NW Natural’s records and Safety Staff’s inspection findings with CFR references.

NW Natural’s Operation and Maintenance Records per Title 49 CFR 192.605.	Safety Staff’s Inspection Findings and Title 49 CFR reference
<i>5 year Leak Survey completed on 12/12/2014</i>	Compliant with Safety Standards; No leaks were identified on the survey for the main; § 192 Subpart M
<i>Service Leakage Survey completed on 01/16/2015</i>	Compliant with Safety Standards; No leaks were identified on the survey for the service; § 192 Subpart M
<i>Atmospheric Corrosion Survey Completed on 1/16/2015</i>	Compliant with Safety Standards; No corrosion was identified survey; § 192 Subpart I
<i>Active Leak History</i>	Compliant with Safety Standards; No active leaks on the main or service line; § 192 Subpart M
<i>As-Built information</i>	Compliant with Safety Standards; line replaced in 1985; § 192 Subpart H
<i>Corrosion Cathodic Protection Records</i>	Compliant with Safety Standards; Readings indicate adequate corrosion protection; § 192 Subpart I
<i>Odorant Records for the last 5 months</i>	Compliant with Safety Standards; Acceptable levels of odorant; § 192 Subpart L
<i>Emergency Response Call list</i>	Compliant with Safety Standards; Timely response to Emergency Calls; § 192 Subpart L
<i>Locate Ticket Details for notifications on 7/12/2016 and 9/12/2016</i>	Compliant with Safety Standards; No issues with response; § 192 Subpart L
<i>Operator Qualification Records for NW Natural Personnel</i>	Compliant with Safety Standards; No issues identified with qualifications; § 192 Subpart N
<i>Field Operation training on Damage Prevention issued to Loy Clark Pipeline on 3/29/2016</i>	Compliant with Safety Standards; Reviewed with training materials; § 192 Subpart L
<i>Integrity Management Identified Threats</i>	Compliant with Safety Standards; Plan identifies Third Party Damages related to Excavation Activity; § 192 Subpart P.
<i>Liaison Overview for Portland Fire and Rescue</i>	Compliant with Safety Standards; Established and maintained liaison with public officials; § 192 Subpart L
<i>Pressure Control maintenance completed on 10/18/2016 and 12/16/2015</i>	Compliant with Safety Standards; No issues identified; § 192 Subpart D
<i>Post Incident Drug Testing for NW Natural First Responders</i>	Compliant with Safety Standards; Results - Negative

Safety Staff had two areas of concern related to NW Natural’s reporting to PHMSA. Both concerns involve determining and reporting root cause for excavation damages, which unless corrected, may lead to future violations of pipeline safety standards. Performance measures, including the number of excavation damages, are reported annually to PHMSA in order to measure effectiveness of integrity management programs per 49 CFR § 192.1007(g).

Below is a listing of NW Natural’s reports to PHMSA followed by Safety Staff’s areas of concern and CFR reference.

NW Natural’s Reports to PHMSA	Safety Staff’s Findings and CFR reference
2015 Annual Report to PHMSA F 7100.1-1; Root Cause Analysis for Part – D	Area of concern; Root cause related categories for “Other” may be inconsistent with PHMSA Annual reporting instructions; 49 C.F.R. §191.11
12/28/2016 Incident Report to PHMSA F 7100.1; Root Cause Part – G3	Area of concern; Root cause related to incident §191.9

Root cause for failures is an integral part of damage prevention. Although not a contributing factor in the October 19, 2016 incident, NW Natural’s identification of root cause is a concern for Safety Staff. NW Natural’s root cause analysis in such reporting needs to be consistent with PHMSA’s damage reporting instructions with the following groupings:

- **One-Call Notification Practices Not Sufficient:** *[no notification made to the One-Call-Center; or notification to one-call center made, but not sufficient; or wrong information provided to One Call Center].*
- **Locating Practices Not Sufficient:** *[facility could not be found or located; or facility marking or location not sufficient; or facility was not located or marked; or incorrect facility records/maps].*
- **Excavation Practices Not Sufficient:** *[failure to maintain marks; or failure to support exposed facilities; or failure to use hand tools where required; or failure to verify by test-hole (pot-hole); or improper backfilling practices; or failure to maintain clearance or other insufficient excavation practices].*
- **Other:** *[Damages resulting from One-Call Center error; or abandoned facility; or deteriorated facility; or previous damage or data not collected; or other].*

Contributing Factors and Root Cause of the Incident

Loy Clark Pipeline gave insufficient notice to the OUNC on September 12, 2016, for the installation of facilities on behalf of Comcast. The excavator requested utilities to be marked out on the *south* side of NW Glisan. Therefore, when work was undertaken on the *north* side of NW Glisan, the actual field location of electrical and natural gas facilities were not identified. The presence and direction of the 1 – inch gas service line was not marked with visible materials, such as paint, prior to the opening of the excavation on the *north* side of NW Glisan between 500 NW 23rd and 2281 NW Glisan. The damage and subsequent pulling on the service line may have been avoided if all operators were given the opportunity to accurately mark underground facilities, including the 1- inch natural gas service line.

Safety Staff Recommendations

In this instance, insufficient notice was given to OUNC prior to excavation. Safety Staff recommends that an excavator confirm correct notice is provided. Before opening an excavation, an excavator should verify that it has identified the correct location and verify the presence of clearly visible field markings noting the presence or absence of underground facilities in the excavation area. Safety staff recommends that utilities emphasize the importance of such verification as a recommended practice when training or communicating with excavators.

NW Natural should ensure all first responders have the skills and experience to quickly identify and actively participate in the Incident Command System that may be established by public officials during emergencies. NW Natural should engage in outreach to electric utilities and other utilities along its pipeline to coordinate emergency response. Roles and responsibilities for communication must be clearly defined for all parties.

We note that under PHMSA's regulations when a pipeline is damaged, and the activity causes a release of any PHMSA regulated gas or substance, the excavator must promptly report the damage to the pipeline operator at the earliest practicable moment following discovery and promptly report the release by calling 911. Under the administrative rules adopted by the OUNC to implement this requirement in Oregon, an excavator must notify an operator immediately of any damage to underground facilities, and, if the damage causes an emergency, notify all appropriate public safety agencies immediately by calling 911 and taking reasonable steps to insure the public safety.¹⁶ In this case, Loy Clark Pipeline immediately notified NW Natural of the damage, and called 911 approximately 19 mins later.

In considering this issue, Safety Staff reviewed the Oregon Utility Notification Center's definition of "emergency" for purposes of damage reporting. Unlike the PHMSA rule, it does not expressly require a call to 911 when excavation damage causes a release of gas. (See OAR 952-001-0010(7) ("Emergency" defined as "an occurrence involving an immediate danger, demanding prompt action to prevent loss of life, or to mitigate damage to property, or to prevent interruption of essential public services (as determined by an emergency response agency or the facility operator) or to prevent a customer service outage (as determined by the facility operator.")). Safety Staff intends to contact the OUNC and request that the Center consider rulemaking to require prompt notification of emergency response authorities whenever there is an unplanned release from a gas pipeline subject to ORS 757.039.

¹⁶ See OAR 952-001-0090(4).