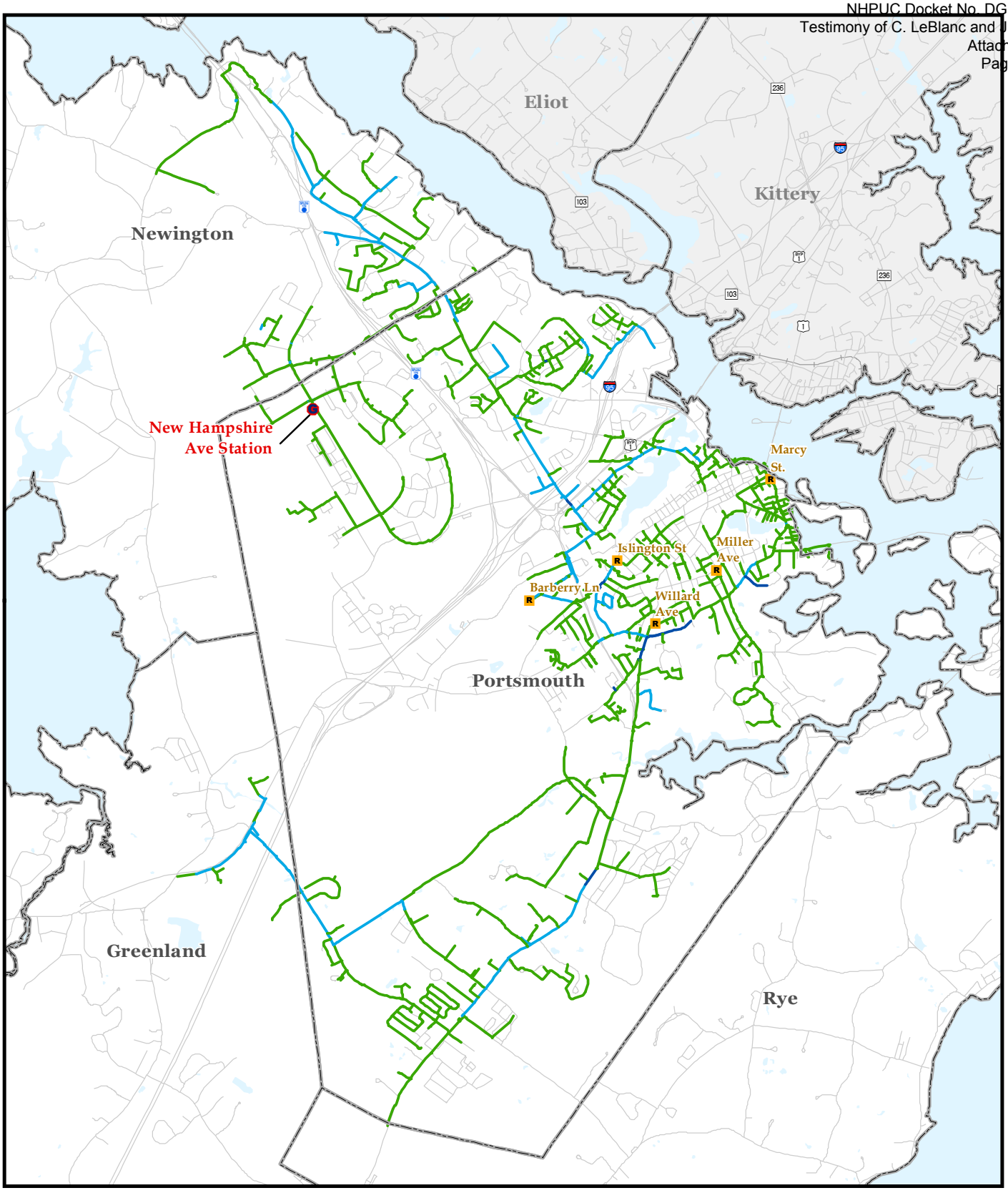


Distribution Main
- Bare Steel
- Cast Iron
- Coated Steel
- Plastic
- Wrought Iron

- Gate Station
- Meter
- Regulator
- Roads
- Water

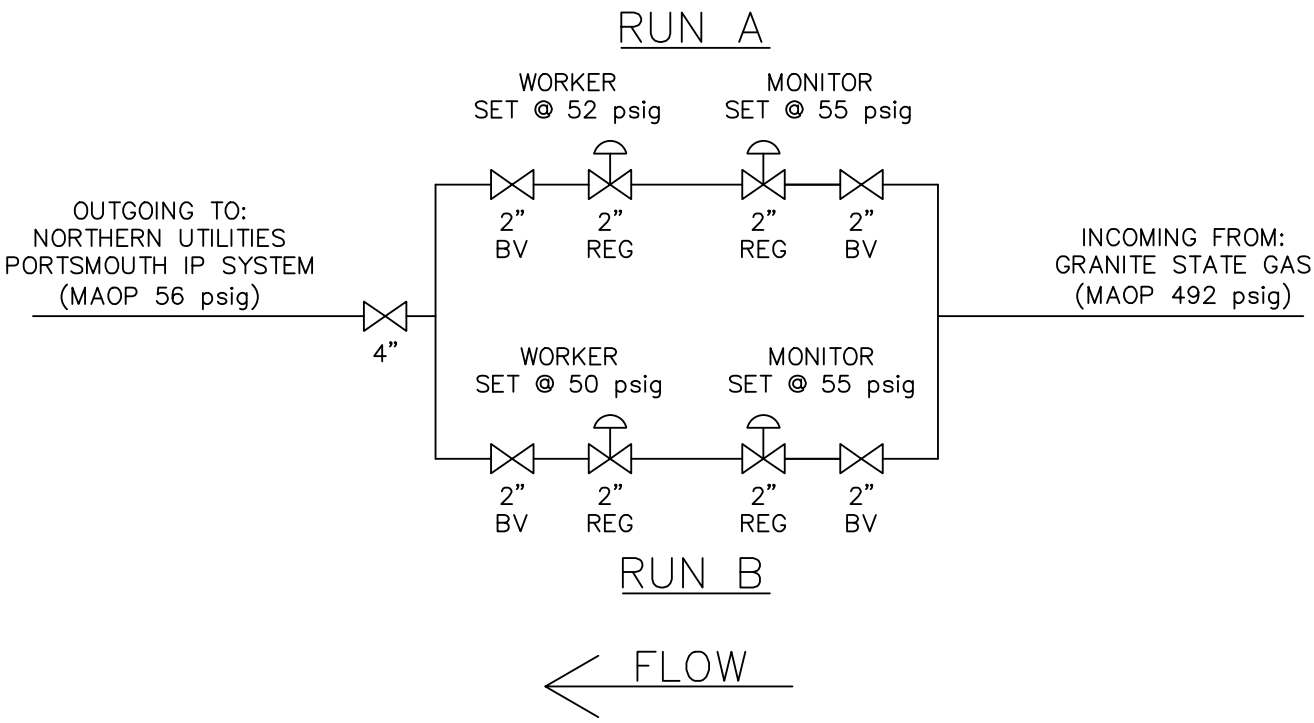
Portsmouth IP
Gas Distribution System

Disclaimer: Unitil has prepared these maps based on best available information. The information provided is not warranted for accuracy and may be incomplete. Field verification is advised for all information shown on the maps.

SCALE 0 700 1,400 2,800 Feet

DATE 8/10/2015

Unitil



REV.	DESCRIPTION	BY	DATE	CHK	APR

REVISIONS

DRAWN

CHECKED

APPROVED

Unitil

Northern Utilities

SIMPLIFIED ONE-LINE DIAGRAM
NH AVE REGULATOR STATION
NEWINGTON, NH

SCALE	DATE	SHEET	DRAWING NO.
N/A	08/04/15	1 OF 1	

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR data is current as of August 5, 2015

Title 49 → Subtitle B → Chapter I → Subchapter D → Part 192 → Subpart L → §192.619

Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart L—Operations

---

§192.619 Maximum allowable operating pressure: Steel or plastic pipelines.

(a) No person may operate a segment of steel or plastic pipeline at a pressure that exceeds a maximum allowable operating pressure determined under paragraph (c) or (d) of this section, or the lowest of the following:

(1) The design pressure of the weakest element in the segment, determined in accordance with subparts C and D of this part. However, for steel pipe in pipelines being converted under §192.14 or uprated under subpart K of this part, if any variable necessary to determine the design pressure under the design formula (§192.105) is unknown, one of the following pressures is to be used as design pressure:

(i) Eighty percent of the first test pressure that produces yield under section N5 of Appendix N of ASME B31.8 (incorporated by reference, *see* §192.7), reduced by the appropriate factor in paragraph (a)(2)(ii) of this section; or

(ii) If the pipe is $12\frac{3}{4}$ inches (324 mm) or less in outside diameter and is not tested to yield under this paragraph, 200 p.s.i. (1379 kPa).

(2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows:

(i) For plastic pipe in all locations, the test pressure is divided by a factor of 1.5.

(ii) For steel pipe operated at 100 p.s.i. (689 kPa) gage or more, the test pressure is divided by a factor determined in accordance with the following table:

	Factors[1], segment—		
Class location	**Installed before (Nov. 12, 1970)**	**Installed after (Nov. 11, 1970)**	**Converted under §192.14**
1	1.1	1.1	1.25
2	1.25	1.25	1.25
3	1.4	1.5	1.5
4	1.4	1.5	1.5

[1]For offshore segments installed, uprated or converted after July 31, 1977, that are not located on an offshore platform, the factor is 1.25. For segments installed, uprated or converted after July 31, 1977, that are located on an offshore platform or on a platform in inland navigable waters, including a pipe riser, the factor is 1.5.

(3) The highest actual operating pressure to which the segment was subjected during the 5 years preceding the applicable date in the second column. This pressure restriction applies unless the segment was tested according to the requirements in paragraph (a)(2) of this section after the applicable date in the third column or the segment was uprated according to the requirements in subpart K of this part:

Pipeline segment	**Pressure date**	**Test date**
—Onshore gathering line that first became subject to this part (other than §192.612) after April 13, 2006	March 15, 2006, or date line becomes subject to this part, whichever is later	5 years preceding applicable date in second column.
—Onshore transmission line that was a gathering line not subject to this part before March 15, 2006		
Offshore gathering lines	July 1, 1976	July 1, 1971.
All other pipelines	July 1, 1970	July 1, 1965.

(4) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressure.

(b) No person may operate a segment to which paragraph (a)(4) of this section is applicable, unless over-pressure protective devices are installed on the segment in a manner that will prevent the maximum allowable operating pressure from being exceeded, in accordance with §192.195.

(c) The requirements on pressure restrictions in this section do not apply in the following instance. An operator may operate a segment of pipeline found to be in satisfactory condition, considering its operating and maintenance history, at the highest actual operating pressure to which the segment was subjected during the 5 years preceding the applicable date in the second column of the table in paragraph (a)(3) of this section. An operator must still comply with §192.611.

(d) The operator of a pipeline segment of steel pipeline meeting the conditions prescribed in §192.620(b) may elect to operate the segment at a maximum allowable operating pressure determined under §192.620(a).

[35 FR 13257, Aug. 19, 1970]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §192.619, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov.*

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR data is current as of August 5, 2015

Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart M—Maintenance

---

§192.739 Pressure limiting and regulating stations: Inspection and testing.

(a) Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected at intervals not exceeding 15 months, but at least once each calendar year, to inspections and tests to determine that it is—

(1) In good mechanical condition;

(2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;

(3) Except as provided in paragraph (b) of this section, set to control or relieve at the correct pressure consistent with the pressure limits of §192.201(a); and

(4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

(b) For steel pipelines whose MAOP is determined under §192.619(c), if the MAOP is 60 psi (414 kPa) gage or more, the control or relief pressure limit is as follows:

If the MAOP produces a hoop stress that is:	**Then the pressure limit is:**
Greater than 72 percent of SMYS	MAOP plus 4 percent.
Unknown as a percentage of SMYS	A pressure that will prevent unsafe operation of the pipeline considering its operating and maintenance history and MAOP.

[35 FR 13257, Aug. 19, 1970, as amended by Amdt. 192-43, 47 FR 46851, Oct. 21, 1982; Amdt. 192-93, 68 FR 53901, Sept. 15, 2003; Amdt. 192-96, 69 FR 27863, May 17, 2004]

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Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart D—Design of Pipeline Components

---

§192.195 Protection against accidental overpressuring.

(a) *General requirements.* Except as provided in §192.197, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of §§192.199 and 192.201.

(b) *Additional requirements for distribution systems.* Each distribution system that is supplied from a source of gas that is at a higher pressure than the maximum allowable operating pressure for the system must—

(1) Have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the event of failure of some portion of the system; and

(2) Be designed so as to prevent accidental overpressuring.

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ELECTRONIC CODE OF FEDERAL REGULATIONS

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Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart D—Design of Pipeline Components

---

§192.197 Control of the pressure of gas delivered from high-pressure distribution systems.

(a) If the maximum actual operating pressure of the distribution system is 60 p.s.i. (414 kPa) gage, or less and a service regulator having the following characteristics is used, no other pressure limiting device is required:

(1) A regulator capable of reducing distribution line pressure to pressures recommended for household appliances.

(2) A single port valve with proper orifice for the maximum gas pressure at the regulator inlet.

(3) A valve seat made of resilient material designed to withstand abrasion of the gas, impurities in gas, cutting by the valve, and to resist permanent deformation when it is pressed against the valve port.

(4) Pipe connections to the regulator not exceeding 2 inches (51 millimeters) in diameter.

(5) A regulator that, under normal operating conditions, is able to regulate the downstream pressure within the necessary limits of accuracy and to limit the build-up of pressure under no-flow conditions to prevent a pressure that would cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(6) A self-contained service regulator with no external static or control lines.

(b) If the maximum actual operating pressure of the distribution system is 60 p.s.i. (414 kPa) gage, or less, and a service regulator that does not have all of the characteristics listed in paragraph (a) of this section is used, or if the gas contains materials that seriously interfere with the operation of service regulators, there must be suitable protective devices to prevent unsafe overpressuring of the customer's appliances if the service regulator fails.

(c) If the maximum actual operating pressure of the distribution system exceeds 60 p.s.i. (414 kPa) gage, one of the following methods must be used to regulate and limit, to the maximum safe value, the pressure of gas delivered to the customer:

(1) A service regulator having the characteristics listed in paragraph (a) of this section, and another regulator located upstream from the service regulator. The upstream regulator may not be set to maintain a pressure higher than 60 p.s.i. (414 kPa) gage. A device must be installed between the upstream regulator and the service regulator to limit the pressure on the inlet of the service regulator to 60 p.s.i. (414 kPa) gage or less in case the upstream regulator fails to function properly. This device may be either a relief valve or an automatic shutoff that shuts, if the pressure on the inlet of the service regulator exceeds the set pressure (60 p.s.i. (414 kPa) gage or less), and remains closed until manually reset.

(2) A service regulator and a monitoring regulator set to limit, to a maximum safe value, the pressure of the gas delivered to the customer.

(3) A service regulator with a relief valve vented to the outside atmosphere, with the relief valve set to open so that the pressure of gas going to the customer does not exceed a maximum safe value. The relief valve may either be built into the service regulator or it may be a separate unit installed downstream from the service regulator. This combination may be used alone only in those cases where the inlet pressure on the service regulator does not exceed the manufacturer's safe working pressure rating of the service regulator, and may not be used where the inlet pressure on the service regulator exceeds 125 p.s.i. (862 kPa) gage. For higher inlet pressures, the methods in paragraph (c) (1) or (2) of this section must be used.

(4) A service regulator and an automatic shutoff device that closes upon a rise in pressure downstream from the regulator and remains closed until manually reset.

[35 FR 13257, Aug. 19, 1970, as amended by Amdt. 192-1, 35 FR 17660, Nov. 7, 1970; Amdt. 192-85, 63 FR 37503, July 13, 1998; Amdt. 192-93, 68 FR 53900, Sept. 15, 2003]

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Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart D—Design of Pipeline Components

---

§192.199 Requirements for design of pressure relief and limiting devices.

Except for rupture discs, each pressure relief or pressure limiting device must:

(a) Be constructed of materials such that the operation of the device will not be impaired by corrosion;

(b) Have valves and valve seats that are designed not to stick in a position that will make the device inoperative;

(c) Be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be tested for leakage when in the closed position;

(d) Have support made of noncombustible material;

(e) Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;

(f) Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;

(g) Where installed at a district regulator station to protect a pipeline system from overpressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the overpressure protective device and the district regulator; and

(h) Except for a valve that will isolate the system under protection from its source of pressure, be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative.

[35 FR 13257, Aug. 19, 1970, as amended by Amdt. 192-1, 35 FR 17660, Nov. 17, 1970]

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Subpart D—Design of Pipeline Components

---

§192.201 Required capacity of pressure relieving and limiting stations.

(a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:

(1) In a low pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

(2) In pipelines other than a low pressure distribution system:

(i) If the maximum allowable operating pressure is 60 p.s.i. (414 kPa) gage or more, the pressure may not exceed the maximum allowable operating pressure plus 10 percent, or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower;

(ii) If the maximum allowable operating pressure is 12 p.s.i. (83 kPa) gage or more, but less than 60 p.s.i. (414 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 6 p.s.i. (41 kPa) gage; or

(iii) If the maximum allowable operating pressure is less than 12 p.s.i. (83 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 50 percent.

(b) When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulator or compressor, or any single run of lesser capacity regulators or compressors in that station, will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.

(c) Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low-pressure distribution system, with a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected and properly adjusted gas utilization equipment.

[35 FR 13257, Aug. 19, 1970, as amended by Amdt. 192-9, 37 FR 20827, Oct. 4, 1972; Amdt. 192-85, 63 FR 37503, July 13, 1998]

Need assistance?

ELECTRONIC CODE OF FEDERAL REGULATIONS

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Title 49: Transportation
PART 192—TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
Subpart D—Design of Pipeline Components

---

§192.141 Scope.

This subpart prescribes minimum requirements for the design and installation of pipeline components and facilities. In addition, it prescribes requirements relating to protection against accidental overpressuring.

Need assistance?

2-L Systems Operations

Unitil Safety Manual Version 5.1 - May 30, 2015

1.0 GENERAL

2.0 OPERATION OF BYPASS VALVES

3.0 VISUAL INSPECTIONS

4.0 INSPECTING STOP VALVES

5.0 INSPECTING PRESSURE REGULATING EQUIPMENT

6.0 INSPECTING AND TESTING RELIEF DEVICES

7.0 INSPECTION OF VAULTS

8.0 TELEMETERING AND RECORDING GAUGES

9.0 INSPECTION OF OTHER DEVICES AND EQUIPMENT

10.0 CHARTS AND PRESSURE RECORDS

11.0 MEASUREMENT, IN NEW HAMPSHIRE ONLY

OPERATOR QUALIFICATION TASKS REQUIRED FOR THIS PROCEDURE

1.0 GENERAL [192.739(a)] [192.749(a)]

(a) This procedure applies to *gas* pressure regulating stations operated and maintained by Unitil.

(b) Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment *shall* be inspected and tested at intervals not exceeding 15 months, but at least once each calendar year to *determine* that it is:

(1) In good mechanical condition;

(2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;

(3) Set to function at the correct pressure; and

(4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

(c) In New Hampshire, each pressure regulating station shall be inspected

monthly to ensure proper operation and to confirm the proper operation of the regulating equipment.

(d) Personnel shall follow the Confined Space Entry Procedure when entering a regulator station where applicable. (See Procedure 1-D, Section 17.0)

(e) The following pressure limitations apply to pressure limiting devices specified below. [192.201(a)(2)]

(1) *Control Regulator:* The outlet set pressure *shall not* exceed the established *maximum allowable operating pressure* (*MAOP*). The outlet pressure of the control regulator will be set below the setpoint of the monitor regulator or other overpressure protection device to ensure proper operation of the pressure regulating system.

(2) *Monitor Regulator and/or Overpressure Protection Devices:*

(a) Monitor regulators shall be set to ensure that the outlet of the pressure regulating station does not exceed system maximum allowable operating pressure (MAOP).

(b) Relief Valves used for overpressure-protection shall be set to ensure that the outlet of the pressure regulating station does not exceed the system maximum allowable operating pressure (MAOP) plus the allowable buildup pressure limites in Table 2-L-1.

Table 2-L-1 - Allowable Pressure Buildup in Other than Low Pressure Distribution Systems*

MAOP	Allowable Buildup
Less than 12 psig	MAOP + 50%
12 psig or greater but less than 60 psig	MAOP + 6 psig
60 psig or greater	MAOP + 10% or 75% of *SMYS*, whichever is lower

* In a low pressure distribution system, the pressure *may not* cause the unsafe operation of any connected and properly adjusted gas utilization equipment.

2.0 OPERATION OF BYPASS VALVES

When it is necessary to maintain gas flow through a manually controlled bypass in order to inspect or test station components, the manual bypass valve shall be operated by personnel who are *qualified* by training and experience to control the pressure in the downstream system at or below its MAOP. The pressures shall be continuously monitored and the valve adjusted to prevent an overpressure

condition. The manual bypass valve *should* be clearly marked showing the direction it is to be turned to either open or close the valve.

3.0 VISUAL INSPECTIONS

Visual inspections should be made to determine that a satisfactory condition exists which will allow proper operation of the equipment. The following will be included in the inspection, where appropriate.

(a) Station piping supports, pits, vaults, buildings, and fencing for general condition and indications of ground settlement.

(b) Station doors and gates, and *pit* and vault covers to ensure that they are functioning properly and that access is adequate and free from obstructions.

(c) Ventilating equipment installed in station buildings or vaults for proper operation, and for evidence of accumulation of water, ice, snow, or other obstructions.

(d) Control, sensing, and supply lines for conditions which could result in a *failure*.

(e) All locking devices for proper operation and security.

(f) Posted station schematics for correctness.

(g) All piping that is exposed to the atmosphere for evidence of *atmospheric corrosion*. If atmospheric corrosion is found, remedial action shall be taken in accordance with Procedure 2-O, Section 5.2. [192.481]

(h) Facility markers installed and in good condition.

4.0 INSPECTING STOP VALVES

An inspection or test of stop valves should be made to ensure that the valves will operate and are correctly positioned. See Procedure 2-E, Section 1.2, Field Inspection. Caution should be used to avoid any undesirable effect on system pressure during operational checks. The following valves should be included in the inspection or test.

(a) Station inlet, outlet, and bypass valves.

(b) Relief device isolation valves.

(c) Control, sensing, and supply line valves.

5.0 INSPECTING PRESSURE REGULATING EQUIPMENT

5.1 General

5.2 Special Conditions

5.3 Annual Regulator Performance Test

5.4 Internal Inspection of Regulators at Gate Stations

5.5 Internal Regulator Inspection at Regulator Stations

5.1 General

If practical, inspection and testing of pressure regulating equipment should be performed during times of low station throughput or when the station can be taken out of service. Each pressure regulator used for pressure reduction or for pressure limiting shall be inspected or tested. The inspection will ensure that each regulator:

(1) Is in good working order;

(2) Controls at its set pressure;

(3) Operates or strokes smoothly; and

(4) Shuts off within expected and accepted limits.

5.2 Special Conditions

(a) Regulator bodies which are subjected to erosive service conditions may require visual internal inspection.

(b) More frequent inspection or additional inspections may be required as a result of *construction* and hydrostatic testing upstream.

(c) More frequent inspections or additional inspections may be required as a result of abnormal changes in operating conditions or unusual flows or velocities.

(d) Whenever abnormal pressures are imposed on pressure or flow devices, the event should be investigated and a determination made as to the need for inspection or repairs.

(e) If there are indications of abnormally high or low pressure, the regulator and the auxiliary equipment shall be inspected and the necessary measures employed to correct any unsatisfactory operating conditions. [192.741(c)]

5.3 Annual Regulator Performance Test

1. General

Each year, each regulator shall be subjected to a systematic performance test to determine that it is in proper operating condition.

2. Performance Test

The test shall include the following.

(a) Record the inlet pressure.

(b) Record the outlet pressure.

(c) Visually check the condition of the regulator and *observe* for proper functioning.

(d) Check the regulator for lock-up:

(1) On a self-operated regulator, change the setting and determine if the regulator will lock up.

(2) On a pilot-operated regulator, change the setting on the pilot regulator and determine if the *main* regulator will lock up.

(e) Check the pressure recording chart for indications of "stitching" or other regulator malfunction at stations where pressure recorders are installed.

(f) Reset the regulator and verify that it is set for the correct operating pressure.

(g) Check *vent* and control lines for blockage.

(h) Clean all filter elements.

(i) *Record Keeping.* Record the test on the appropriate form.

5.4 Internal Inspection of Regulators at Gate Stations

1. Scope

This procedure applies to maintenance and inspection of regulators at gate stations. Refer to and follow the manufacturer's procedures for each regulator.

2. General

Each year, each regulator shall be inspected to determine that it is properly installed and protected from dirt, liquids, or other conditions that might prevent the proper operation of the regulator. An internal inspection shall be conducted and the necessary parts repaired or replaced.

3. Inspection Procedure

The inspection shall be conducted in accordance with the following procedure.

(a) Notify Dispatch of the planned work.

(b) Monitor pressures during the inspection.

(c) If a bypass valve exists, open it as necessary to maintain outlet pressure while the inspection is being conducted (see Procedure 2-L, Section 2.0).

(d) Isolate the regulator by closing appropriate main line shutoff and control line

valves in the appropriate sequence. Follow the manufacturer's instructions for taking the regulator out of service. Test to be sure that the regulator has been completely isolated by opening a vent valve or, as a last resort, by disconnecting a static line before disassembling equipment.

(e) Remove inspection plates or disassemble the regulator body and the pilot regulators to inspect gas flow restricting devices (e.g., orifices, valve discs, "O" rings, tubes) and diaphragm link for wear.

(f) Pressure test or visually inspect diaphragms for tightness.

(g) Check regulator vent lines, control lines, and differential control restricting devices (e.g., needle valves, adjustable variable orifices) for blockage.

(h) Reassemble the regulator.

(i) After reintroducing gas to the regulator, check the regulator for leakage.

(j) Follow the manufacturer's instructions for putting the regulator into service. Open the appropriate control lines and main line valves in the appropriate sequence.

(k) Set the regulator to the desired pressure.

(l) If a bypass exists and is in use, close the valve.

(m) Check the regulator’s setting to function at the correct operating pressure.

(n) For a pilot-operated regulator, change the setting on the pilot regulator and determine if the main regulator responds and locks-up.

(o) Reset the regulator to the desired operating pressure.

(p) Notify Dispatch at the completion of the inspection.

(r) *Record Keeping.* Note the results of the inspection and work performed on the appropriate forms.

5.5 Internal Regulator Inspection at Regulator Stations

1. General

Every five years, each regulator shall be inspected to determine that it is properly installed, protected from dirt, liquids, or other conditions that might prevent the proper operation of the regulator. An internal inspection shall be conducted and the necessary parts repaired or replaced.

2. Inspection Procedure

The inspection shall be conducted in accordance with the following procedure.

(a) Notify Dispatch of the planned work.

(b) Monitor pressures during the inspection.

(c) If a bypass valve exists, open it as necessary to maintain the outlet pressure while the inspection is being conducted (see Section 2.0).

(d) Isolate the regulator by closing the appropriate main line shutoff and control line valves in the appropriate sequence. Follow the manufacturer's instructions for taking the regulator out of service. Test to be sure the regulator has been completely isolated by opening a vent valve or, as a last resort, by disconnecting a static line before disassembling equipment.

(e) Remove inspection plates or disassemble the regulator body and the pilot regulators to inspect gas flow restricting devices (e.g., orifices, valve discs, "O" rings, tubes) and diaphragm link for wear.

(f) Pressure test or visually inspect diaphragms for tightness.

(g) Check regulator vent lines, control lines, and differential control restricting devices (e.g., needle valves, adjustable variable orifices) for blockage.

(h) Reassemble the regulator.

(i) After reintroducing gas to the regulator, check the regulator for leakage.

(j) Follow the manufacturer's instructions for putting the regulator into service. Open appropriate control lines and main line valves in the appropriate sequence.

(k) Set the regulator to the desired pressure.

(l) If a bypass exists and is in use, close the valve.

(m) Check the regulator setting to function at the correct operating pressure.

(n) For a self-operated regulator, change spring setting and determine if regulator responds and locks-up.

(o) For a pilot-operated regulator, change the setting on the pilot regulator and determine if main regulator will follow change and lock off.

(p) Reset the regulator to the desired operating pressure.

(q) Notify Dispatch at the completion of inspection.

(r) Record Keeping. Note the results of the inspection and work performed on the appropriate forms.

6.0 INSPECTING AND TESTING RELIEF DEVICES

6.1 Annual Relief Valve Testing and Inspection

6.2 Test for Correct Set Pressure

6.3 Review and Calculation of Capacity

6.1 Annual Relief Valve Testing and Inspection

1. General

Each year, each relief valve shall be subjected to a systematic inspection and test in accordance with the following procedure.

2. Inspection Procedure

(a) The inspection shall consist of a check to ensure that the relief valve is:

(1) In good mechanical condition. (free of obstruction and not mechanically "frozen")

(2) Set to function at the correct pressure. (See Section 6.2 below)

(3) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed. (See Section 6.3)

(4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

(b) Relief valve testing in place, **if feasible**, shall consist of the following.

(1) Check records for pressure at which valve should relieve.

(2) Isolate the relief valve from the system it is designed to protect. In most cases, this can be done by unlocking and closing the isolation valve ahead of the relief valve.

(3) Connect a temporary line from a pressure supply to the piping between the relief valve and the now closed isolation valve. This pressure supply may be existing gas pressure before a regulator, an air tank, a nitrogen bottle, or other device with a pressure greater than the relief pressure. A pressure gauge should be installed on the temporary supply line.

(4) Turn on the pressure supply and operate the relief valve. Take note of the pressure at which the valve relieves. Any serious deviation from the desired relief pressure should be corrected.

(5) Shut off the supply pressure and observe the gauge connected to the piping before the relief valve. A constant pressure *reading* on the gauge indicates a positive seal on the relief valve.

(6) Disconnect the temporary supply line from the relief valve piping and close the outlet valve in the piping.

(7) Open the isolation valve ahead of the relief valve and lock, or tag, with a warning to prevent a change of position.

(c) **If relief valve testing in place is not feasible**, determination of capacity can be performed by removing the relief valve and bench testing using the procedure above or by capacity review and calculation. Capacity review and calculation shall consist of the following.

(1) Calculation of the required capacity of the relieving device at each station shall be conducted at intervals not exceeding 15 months but at least once each calendar year and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it operates.

(2) After initial calculations, subsequent calculations are not required if the review demonstrates that operating parameters have not changed in a manner that would cause the capacity to be less than required.

(3) If the relieving device is of insufficient capacity, a new or additional device shall be installed to provide the additional capacity required.

(d) Record Keeping. A record of the inspection or test and all changes or repairs shall be completed utilizing the appropriate form or in the Compliance Management System. The records will be maintained for the life of the device.

6.2 Test for Correct Set Pressure

One of the methods below may be used to test for correct set pressure. Tests connections should include a gauge or deadweight tester so arranged that the pressure at which the device becomes operative may be observed and recorded.

(a) The pressure may be increased in the segment until the device is activated. During the tests, care should be exercised to ensure that the pressure in the segment protected by the relief device does not exceed the allowable buildup pressure in the second column of Table 2-L-1 above.

Use of this procedure may require two personnel with a reliable method of communications between them, such as by electronic means.

(b) The pressure from a secondary pressure source may be added to the pilot or control line until the device is activated; or

(c) The device may be removed and transported to a shop for testing and then returned to service. When the device is to be shop-tested or otherwise rendered inoperative, adequate overpressure protection of the affected segments shall be maintained during the period of time the relief device is inoperative.

6.3 Review and Calculation of Capacity [192.743]

(a) It may not be feasible to physically test the capacity of relief valves in place due to environmental, noise, operational, and economic reasons.

(b) If a relief valve is used as the required overpressure protection device to protect certain facilities, a review and calculation of the required capacity of the relief valve shall be made each calendar year, at intervals not exceeding 15 months. The required capacity shall be compared with the rated relieving capacity of the relief valve for the operating conditions under which it operates. After the initial calculations, subsequent calculations are not required if the review documents that parameters have not changed in a manner that would cause the capacity to be less than required.

(c) If the relieving device is of insufficient capacity, a new or additional device shall be installed to provide the additional capacity required.

(d) If more than one regulating station supplies a *pipeline*, the required relief capacity at each station based on a complete failure of the largest capacity regulator or any single run of lesser capacity regulators at the station such that pressures in any part of the pipeline will not exceed those for which the pipeline was designed, or against which it is protected, whichever is lower.

(e) If a relief valve does not serve as the required overpressure protection device, calculation and review of its capacity is not required. An example of this is a relief valve installed in addition to a monitor regulator, where the monitor regulator serves as the primary overpressure protection device.

7.0 INSPECTION OF VAULTS [192.749]

(a) Refer to the confined space entry procedures in Procedure 1-D, Section 17.0.

(b) Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet (5.66 cubic meters) or more, shall be inspected at intervals not exceeding 15 months, but at least once each calendar year, to determine that it is:

(1) In good physical condition, and

(2) Adequately ventilated.

(c) If gas is found in the vault,

(1) The equipment in the vault shall be inspected for leaks, and

(2) Any leaks found shall be repaired.

(d) The ventilating equipment shall also be inspected in accordance with Section 3(c) above.

(e) Each vault *cover* shall be inspected to ensure that it does not present a hazard to public safety.

8.0 TELEMETERING AND RECORDING GAUGES

(a) Gas Control will monitor the status of telemetered pressure alarms on

transmission lines and in distribution systems.

(b) Systems Operations will maintain the pressure recording equipment at pressure-reducing stations operated and maintained by Unitil.

(c) Systems Operations personnel who change charts should promptly report to their supervisor any unusual condition observed, including excursions above the MAOP.

(d) The Systems Operations supervisor should review the charts for operational inconsistencies.

(e) The Systems Operations supervisor shall be responsible for initiating any corrective action.

(f) Unusually low pressures should be brought to the attention of gas engineering.

(g) If there are indications of abnormally high or *low pressure*, the regulator and the auxiliary equipment shall be inspected. Necessary measures shall be taken to correct any unsatisfactory operating conditions. [192.741(c)]

(h) Recording charts which provide a redundant or secondary means of monitoring system pressure (e.g., seasonal charts) should be changed periodically.

(i) Instruments used for telemetering and recording pressures should be inspected, tested, and calibrated in accordance with manufacturer's instructions.

(j) Pressure recording charts should be changed in accordance with the established schedule.

(k) For information regarding the determination of the number and location of telemetering and recording gauges, see Procedure 4-D, Section 17.2.

9.0 INSPECTION OF OTHER DEVICES AND EQUIPMENT

Other devices and equipment that are installed at the pressure regulating stations should be inspected according to the manufacturer's recommendations. Such additional equipment might include heaters, cleaners, filters, or separators.

10.0 CHARTS AND PRESSURE RECORDS

(a) Pressure records from telemetering or recording pressure gauges shall be retained for 5 years, plus the current year.

(b) The results of inspections on pressure control equipment or facilities shall be recorded on the appropriate form or in PMTS, as appropriate.

(c) In New Hampshire, Unitil shall retain the following.

(1) Station records of the operation of its plant to show the characteristics and performance of each unit; and [NH Puc 507.01]

(2) The layout of all principal metering and regulator stations and production plants to show size, location and character of all major equipment, pipe lines, connections, valves and other equipment used. [NH Puc 507.03(c)]

(3) These stations records shall be preserved by Unitil for a period of 5 years. Unitil shall make such records available to the commission or its staff upon request at the Unitil's New Hampshire office. [NH Puc 507.05]

11.0 MEASUREMENT, IN NEW HAMPSHIRE ONLY

In **New Hampshire**, Unitil shall comply with the following with regard to gas supply measurement records. [NH Puc 507.03]

(1) Unitil shall install a suitable measuring device at each source of supply in order that a record may be maintained of the quantity produced.

(2) Unless sufficient information is furnished by the *utility* supplying the gas, Unitil shall maintain adequate instruments and meters to obtain complete information as to gas purchases.

New Hampshire Public Utilities Commission
Safety Division

Pressure Regulation & Relief Module

Inspector	**David Burnell**	**Start Date**	**6/25/14**
Operator	**Unitil Northern Utilities**	**Completion Date**	
Station Location	**Borthwick Ave Barberry Lane**		

Briefly describe the purpose of the station:

1) Borthwick Ave Gate station is located in Portsmouth and is fed off GSGT interstate transmission system. Its purpose is to feed a small lateral named Portsmouth Lateral which is less than a mile and operates at 270 psig MAOP
2) Barberry Lane District Regulator station is located downstream of the Portsmouth Lateral and Borthwick Ave Gate Station. It is a District reg station that feeds Portsmouth intermediate pressure system (56 psig MAOP)
3) New Hampshire Ave Gate station is located in Portsmouth and is fed off GSGT interstate transmission system. Its purpose is to also feed Portsmouth intermediate pressure system (56 psig MAOP)

Installation Date:

Borthwick Ave Gate Station 2007
Barberry Lane District Reg Station 1956
New Hampshire Ave Gate Station not asked

Date of last major modification:

Not Checked

Describe the purpose of the Modifications:

Borthwick Ave was installed to reduce pressure in this line segment to less the 20% SMYS so that the regulations of gas transmission Integrity Management (IMP) (see Sub Part O) would not have to be applicable. This would eliminate need to for installation of receivers and launchers for ILI and external corrosion direct assessments.

MAOP of Inlet System:

Borthwick Ave 492 psi
Barberry Lane 270 psi
New Hampshire Ave 492 psi

MAOP of Outlet System:

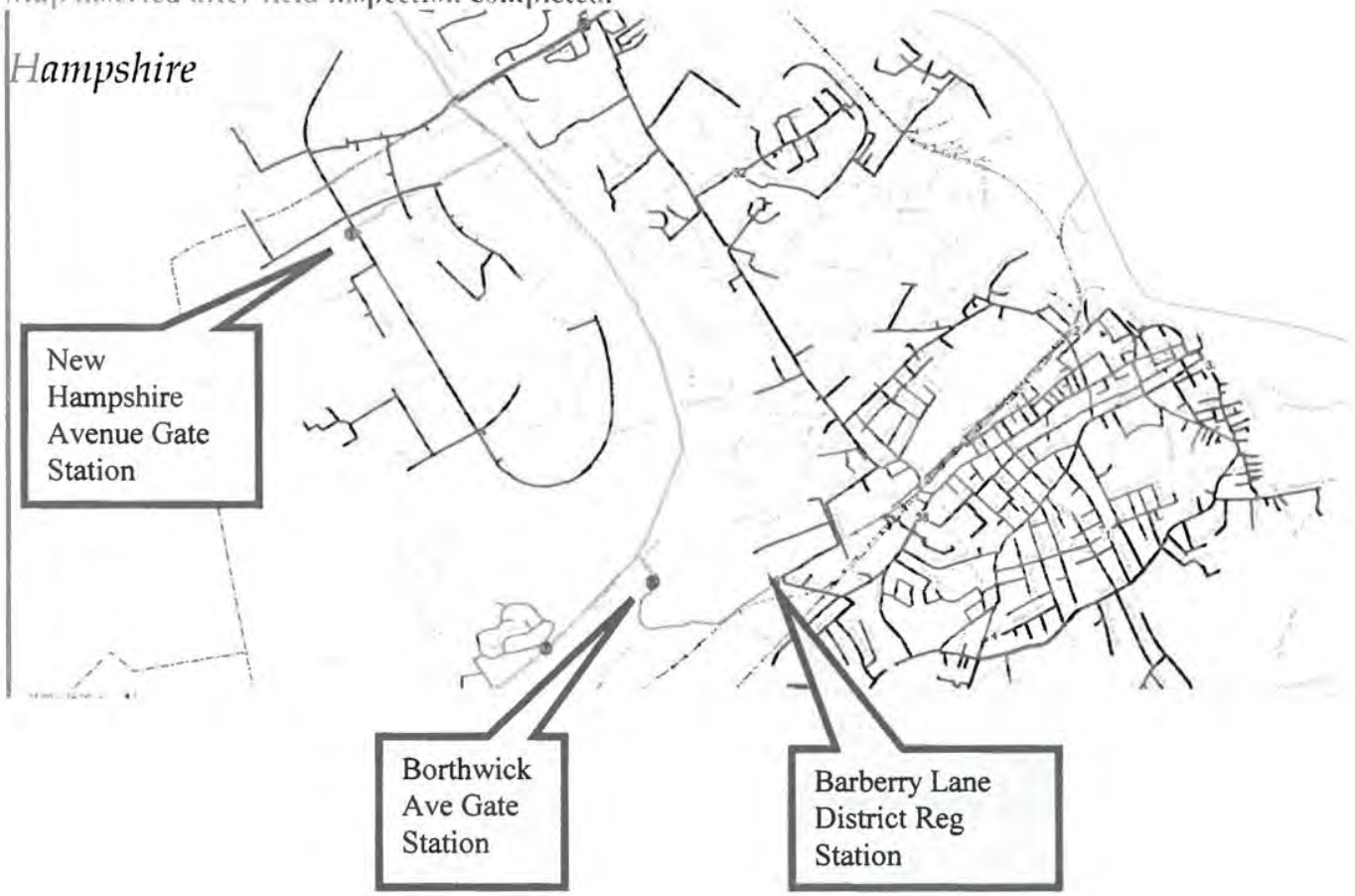
Borthwick Ave 270 psi
Barberry Lane 56 psi
New Hampshire Ave 56 psi

Method of Over-Pressure protection:

Borthwick Ave Monitor
Barberry Lane Monitor
Rebuild outlet header upgrade to 12 inch in fall of this year (2014)
New Hampshire Ave Monitor

Rick Ahirn of Unitil stated that Unitil does not set monitor above MAOP 1 psi below in all cases

Map inserted after field inspection completed.



SECTION A

Code	Description	S/U/NA/NC
'192.739(a)	**Each pressure limiting and regulating station, relief device (except ruptured disc), and pressure regulating station and its equipment must be subjected at intervals not exceeding 15 months, but at least once each calendar year, to inspections and tests to determine that it is (a) in good mechanical condition;**	S
Guidance	Check previous and current inspection dates for compliance, if specified times are exceeded a violation exists	
Remarks	Maintenance preformed on Borthwick Ave 4/18/2013 5/21/14 New Hampshire Ave 7/31/2013 11/26/12	
'192.739(a)(2)	**adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;**	S
Guidance	Operator should be able to provide evidence that the device is adequate by calculation, and demonstrate that the equipment is designed for gas use. Manufacturer specs and load calculations will suffice.	
Remarks	All regulator flows are reviewed annually had a copy 2014 calculations forwarded	
'192.739(a)(3)	**Set to function at the correct pressure;**	U
Guidance	Operator should provide system pressures and manufactures specs to ensure correct regulator pressures.	
Remarks	Received copy of spread sheet with set pressures and flow rate for each regulator station In the field at New Hampshire Ave in Portsmouth the monitor was tested to verify the set pressure. During the test, I witnessed that the set pressure did not hold which resulted in the MAOP being exceeded before the monitor took over. As soon as the monitor took over the pressure dropped to the set pressure of 55 psi	
'192.739(a)(4)	**Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.**	S
Guidance	Have operator produce manufacture specs on proper operation, and explanation of how it is protection from climate and exterior conditions.	
Remarks	Main line filters inspected annually with regulators as well as filters on pilot regulators Regulators are completely rebuilt every five years if no issues are identified in the annual inspection	
'192.741(a)	**Each distribution system supplied by more than one district pressure regulating station must be equipped with telemetering or recording pressure gauges to indicate the gas pressure in the district.**	S
Guidance	Operator must show the systems that are supplied by more than one regulator, then produce the records for the telemetering or gauges for said systems.	
Remarks	2 points on the Portsmouth IM system operating at 51.9 Barberry Lane & Gosling	

Code	Description	S/U/NA/NC
	Rd are covered by existing telemeter system with alarm levels set at high alarm 53 psig and HH alarm 55 psig.	
'192.741(b)	**On distribution systems supplied by a single district pressure regulating station, the operator shall determine the necessity of installing telemetering or recording gauges in the district, taking into consideration the number of customers supplied, the operating pressures, the capacity of the installation, and other operating conditions.**	S
Guidance	Operator shall defend the methods used in determining the necessity of installing telemetering or recording gauges. Produce formulas?	
Remarks	Covered in rules Puc 506.01 (p) and Puc 506.01 (t). require 150 customers by Jan 1, 2016 . Currently all stations have 7 day chart inlet and outlet pressures more than ½ of the station have electronic recorders that capture high & low when unit is reset, inlet and outlet pressures Reviewed Gear RD records	
'192.741(c)	**If there are indications of abnormally high-or low-pressure, the regulator and the auxiliary equipment must be inspected and the necessary measures employed to correct any unsatisfactory operating conditions.**	S
Guidance	Operator must produce records showing low or high pressure readings as well as the records of inspection and any corrective actions taken if necessary.	
Remarks	There have been no abnormal reads to address	
'192.743(a)	**If feasible, pressure relief devices (except rupture discs) must be tested in place, at intervals not exceeding 15 months, but at least once each calendar year, to determine that they have enough capacity to limit the pressure on the facilities to which they are connected to the desired maximum pressure.**	NA
Guidance	Check previous and current inspection dates for compliance, if specified times are exceeded a violation exists	
Remarks	Unitil does not use relief valves for over pressure protection. Unitil uses monitors only.	
'192.743(b)	**If a test is not feasible, review and calculation of the required capacity of the relieving device at each station must be made at intervals not exceeding 15 months, but at least once each calendar year, and these required capacities compared with the rated or experimentally determined relieving capacity of the device for the operating conditions under which it works. After the initial calculations, subsequent calculations are not required if the review documents that parameters have not changed in a manner which would cause the capacity to be less than required.**	NA
Guidance	Produce the review and calculation of required capacity of the relieving device to check dates. Also the manufacturers specs for operating conditions under which it works. Records to indicate whether parameters have changed or not.	
Remarks	Unitil does not use relief valves for over pressure protection. Unitil uses monitors only.	

Code	Description	S/U/NA/NC
'192.743(c)	**If the relieving device is of insufficient capacity, a new or additional device must be installed to provide the additional capacity required.**	NA
Guidance	Show records proving that all relieving devices are adequate and all records showing what was done in the event that a relieving device was not adequate.	
Remarks	Unitil does not use relief valves for over pressure protection Unitil uses monitors only	
'192.749(a)	**Each vault housing pressure regulating and pressure limiting equipment, and having a volumetric internal content of 200 cubic feet or more, must be inspected at intervals not exceeding 15 months, but at least once each calendar year, to determine that it is in good physical condition and adequately ventilated.**	NA
Guidance	Check previous and current inspection dates for compliance, if specified times are exceeded a violation exists	
Remarks	Unitil does not have any vaults that exceed 200 cf	
'192.749(b)	**If gas is found in the vault, the equipment in the vault must be inspected for leaks, and any leaks found must be repaired.**	NA
Guidance	How did you discover there was gas in the vault. Show leak and leak repair records.	
Remarks	These stations are not in vaults	
'192.749(c)	**The ventilating equipment must also be inspected to determine that it is functioning properly.**	NA
Guidance	Review manufacture specs on ventilating equipment and inspection records to ensure functionality.	
Remarks	These stations are not in vaults	
'192.749(d)	**Each vault cover must be inspected to assure that it does not present a hazard to public safety.**	NA
Guidance	Show inspection records for vault covers.	

SECTION B

Remarks	These stations are not in vaults	
	Each underground vault or closed top pit containing either a pressure regulating or	

Code	Description	S/U/NA/NC
'192.187	**reducing station, or a pressure limiting or relieving station, must be sealed, vented or ventilated, as follows:**	NC
'192.187(a)	**When the internal volume exceeds 200 cubic feet:**	NA
'192.187(a)(1)	**The vault or pit must be ventilated with two ducts, each having at least the ventilating effect of a pipe 4 inches in diameter;**	NA
Guidance	Provide records of vault design (schematics?) to prove proper ventilation. OR Visually inspect.	
Remarks	Unitil does not have any vaults that exceed 200 cf	
'192.187(a)(2)	**The ventilation must be enough to minimize the formation of combustible atmosphere in the vault or pit; and,**	NA
Guidance	Provide formulas used to indicate combustible atmosphere and proper ventilation for minimization.	
Remarks	Unitil does not have any vaults that exceed 200 cf	
'192.187(a)(3)	**The ducts must be high enough above grade to disperse any gas-air mixtures that might be discharged.**	NA
Guidance	Provide vault height and grade height and duct height.	
Remarks	Unitil does not have any vaults that exceed 200 cf	
'192.187(b)	**When the internal volume is more than 75 cubic feet but less than 200 cubic feet:**	NC
'192.187(b)(1)	**If the vault or pit is sealed, each opening must have a tight fitting cover without open holes through which an explosive mixture might be ignited, and there must be a means for testing the internal atmosphere before removing the cover;**	NC
Guidance	Check the specs on the vault cover and have operator provide records for how they test for internal atmospheric pressure. OR Visually inspect.	
Remarks	These stations are not in vaults	
'192.187(b)(2)	**If the vault or pit is vented, there must be a means of preventing external sources of ignition from reaching the vault atmosphere; or**	NC
Guidance	Provide the methods used in preventing external sources of ignition and their success/failure scenarios.	
Remarks	These stations are not in vaults	
'192.187(b)(3)	**If the vault or pit is ventilated, paragraph (a) or (c) of this section applies.**	NC
Guidance	If pit is ventilated what method '192.187(a) or '192.187(c) is used?	
Remarks	These stations are not in vaults	

Code	Description	S/U/NA/NC
'192.187(c)	If a vault or pit covered by paragraph (b) of this section is ventilated by openings in the covers or gratings and the ratio of the internal volume, in cubic feet, to the effective ventilating area of the covers or grating, in square feet is less than 20 to 1, no additional ventilation is required.	NC
Guidance	Provide formulas for producing a 20 to 1 ratio to back up the method of vault or pit cover used.	
Remarks	These stations are not in vaults	
'192.195	Protection against accidental over pressuring	
' 192.195(a)	General requirements. Except as provided in '192.197, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of '192.199 and '192.201.	S
'192.195(b)	Additional requirements for distribution systems. Each distribution system that is supplied from a source of gas that is at a higher pressure than the maximum allowable operating pressure for the system must	S
'192.195(b)(1)	Have pressure regulation devices capable of meeting the pressure, load, and other service conditions that will be experienced in normal operation of the system, and that could be activated in the event of failure of some portion of the system; and	S
'192.195(b)(2)	Be designed so as to prevent accidental over pressuring	S
'192.199	Except for rupture discs, each pressure relief or pressure limiting device must:;	
'192.199(a)	be constructed of material such that the operation of a device will not be impaired by corrosion	S
Guidance	Have operator provide manufacture specs on devices used.	
Remarks	Received spec sheets for all components used in stations	
'192.199(b)	have valves and valve seats that are designed not to stick in a position that will make the device inoperative;	S
Guidance	Have operator provide design specs on valves and valve seats used.	
Remarks	Received spec sheets for the most common valves used	
'192.199(c)	be designed and installed so that it can be readily operated to determine if the valve is free, can be tested to determine the pressure at which it will operate, and can be tested	S

Code	Description	S/U/NA/NC
	for leakage when in the closed position;	
Guidance	**Provide installation design specs, pressure test records and leak records**	
Remarks	Observed operation of inlet valves at two stations Borrthwick & Pease	
'192.199(d)	**Have support made of noncombustible material;**	S
Guidance	**Provide the manufacture specs on the noncombustible material used for the support.**	
Remarks	Inspected steel supports at stations	
'192.199(e)	**Have discharge stacks, vents, or outlet ports designed to prevent accumulation of water, ice, or snow, located where gas can be discharged into the atmosphere without undue hazard;**	NA
Guidance	**Provide design specs showing proper protection**	
Remarks	Unitil does use relief valves for over pressure protection monitors only	
'192.199(f)	**Be designed and installed so that the size of the openings, pipe, and fittings located between the system to be protected and the pressure relieving device, and the size of the vent line, are adequate to prevent hammering of the valve and to prevent impairment of relief capacity;**	NA
Guidance	**Review manufacture specs. Visual inspection to insure consistent w/manufacture specs.**	
Remarks	Unitil does not relief valves as over pressure protection	
'192.199(g)	**Where installed at a district regulator station to protect a pipeline system from over pressuring, be designed and installed to prevent any single incident such as an explosion in a vault or damage by a vehicle from affecting the operation of both the over pressure protective device and the district regulator; and**	S
Guidance	**Visual inspection of Regulator Station**	
Remarks	Stations were fenced in and regulators were separated	

Code	Description	S/U/NA/NC
'192.199(h)	**Except for a valve that will isolate the system under protection from its source of pressure, be designed to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative.**	S
Guidance	Visual inspection of piping configuration	
'192.201(a)	**Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:**	
'192.201(a)(1)	**In a low pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.**	NA
Guidance	Provide the pressure records for the low pressure system, suggesting that they are safe for the equipment they are servicing. What is the MAOP of the system.	
Remarks	Not a low pressure system	
'192.201(a)(2)	**In pipelines other than a low pressure distribution system:**	
'192.201(a)(2)(i)	**If the maximum allowable operating pressure is 60 psig or more, the pressure may not exceed the maximum allowable operating pressure plus 10 percent or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower;**	S
Guidance	Have operator provide MAOP records and the pressure records of the line. Records should show formula used to achieve MAOP and hoop stress of 75% of SMYS.	
Remarks	Barberry Lane systems is 56 psi system Berthwick is 270 psi system MAOP record are in the office	
'192.201(a)(2)(ii)	**If the maximum allowable operating pressure is 12 psig or more, but less than 60 psig, the pressure may not exceed the maximum allowable operating pressure plus 6 psig; or**	S
Guidance	Provide records and formulas used.	
Remarks	MAOP of system is 56 psi at New Hampshire Ave monitor is set at 55 psi	
'192.201(a)(2)(iii)	**If the maximum allowable operating pressure is less than 12 psig, the pressure may not exceed the maximum allowable operating pressure plus 50 percent.**	NA
Guidance	Provide records and formulas used.	
Remarks	Regulator station is a more than 12 psi	

Code	Description	S/U/NA/NC
'192.201(b)	**When more than one pressure regulating or compressor station feeds into a pipeline, relief valves or other protective devices must be installed at each station to ensure that the complete failure of the largest capacity regulator or compressor, or any single run of lesser capacity regulators or compressors in that station, will not impose pressures on any part of the pipeline or distribution system in excess of those for which it was designed, or against which it was protected, whichever is lower.**	S
Guidance	Identify largest regulator in system and demonstrate compliance.	
Remarks	Each Station has a monitor regulator set 1 psi below the MAOP	
'192.201(c)	**Relief valves or other pressure limiting devices must be installed at or near each regulator station in a low pressure distribution system, with a capacity to limit the maximum pressure in the main to a pressure that will not exceed the safe operating pressure for any connected an properly adjusted gas utilization equipment.**	NA
Guidance	Identify the MAOP of low pressure system & have operator demonstrate compliance for each station.(13.8 -1/2lb)	
Remarks	Not low pressure station	
'192.203(a)	**Applicability. This section applies to the design of instrument, control, and sampling pipe and components. It does not apply to permanently closed systems, such as fluid-filled temperature-responsive devices.**	
'192.203(b)	**Materials and design. All materials employed for pipe and components must be designed to meet the particular conditions of service and the following:**	S
'192.203(b)(1)	**Each takeoff connection and attaching boss, fitting, or adapter must be made of suitable material, be able to withstand the maximum service pressure and temperature of the pipe or equipment to which it is attached, and be designed to satisfactorily withstand all stresses without failure by fatigue.**	S
Guidance	Examine component materials for pressure rating and metallurgical criteria.	
Remarks	All components were painted steel or stainless steel	
'192.203(b)(2)	**Except for takeoff lines that can be isolated from sources of pressure by other valving, a shutoff valve must be installed in each takeoff line as near as practicable to the point of takeoff. Blowdown valves must be installed where necessary.**	S
Guidance	Visually inspect for compliance	
Remarks	Each station had a shut off on the inlet and outlet of the station	

Code	Description	S/U/NA/NC
'192.203(b)(3)	**Brass or copper material may not be used for metal temperatures greater than 400EF.**	S
Guidance	Provide materials list/ temp record where practical, or design criteria	
Remarks	Outlet on heater were steel	
'192.203(b)(4)	**Pipe or components that may contain liquids must be protected by heating or other means from damage due to freezing.**	NA
Guidance	Which pipe and/or components contain liquids? What method of heating do you use and provide specs and/or formulas indicating that method is adequate for purpose at hand.	
Remarks	There are no liquid components at each station	
'192.203(b)(5)	**Pipe or components in which liquids may accumulate must have drains and drips.**	NA
Guidance	Visual inspections	
Remarks	Moisture content is very low moisture is not a problem	
'192.203(b)(6)	**Pipe or components subject to clogging from solids or deposits must have suitable connections for cleaning.**	S
Guidance	Show by records the areas earmarked for clogging possibilities and the cleaning methods proposed. Visual inspection.	
Remarks	There are filters on the inlets to the station as well as the pilot lines	
'192.203(b)(7)	**The arrangement or pipe, components, and supports must provide safety under anticipated operating stresses.**	S
Guidance	Visual inspection for support. Will support work if you remove screws?	
Remarks	All supports come up from the ground	

Code	Description	S/U/NA/NC
'192.203(b)(8)	**Each joint between sections of pipe, and between pipe and valves or fittings, must be made in a manner suitable for the anticipated pressure and temperature condition. Slip type expansion joints may not be used. Expansion must be allowed for by providing flexibility within the system itself.**	S
Guidance	Visually inspect joint types at location for compliance.	
Remarks	All joints are welded joints and the station allows for expansion	
'192.203(9)	**Each control line must be protected from anticipated causes of damage and must be designed and installed to prevent damage to any one control line from making both the regulator and the over-pressure protective device inoperative.**	S
Guidance	Visually inspect to see if one incident could render both devices inoperable.	
Remarks	Heavy wall stainless tube is used and was run on the inside of the piping. No run was more than 3 feet	

GENERAL COMMENTS OR CONCLUSIONS:

During the field inspection at New Hampshire Ave. one of the monitor regulators failed to take over pressure control before exceeding the MAOP of 56 psi.
This is a possible violation of 192.619. More research will have to be completed before upgrading to a probable violation. This will be determined after discussions with the operator's engineering department including reviewing design curves, specifications, and performance characteristics of the Moony pilot regulators which are a component of the regulator station design. Information and meetings will follow up this inspection.. A follow up inspection will made once materials, documentation and records are collected.

Unitil d/b/a Northern Utilities, Inc.

DG 15-121
Hearing on Notices of Violations

Northern Utilities Data Requests - Set 1

Date Request Received: 4/28/15 Date of Response: 7/20/15
Request No. Staff 1-22 Respondent: R Knepper

REQUEST:

In the January 23, 2015 NOPV PS1502NU, Staff alleged on page 3 that:

> Safety Division representatives witnessed manual intervention of the regulator on Run A. When the inspector saw that the pressure had climbed to 56.9 psig, he suggested manual intervention. The second test was on Run B which climbed to 57.2 psig and then settled on its own and went back to 55 psig setting. This was what Unitil describes in its letter to PHMSA. The Safety Division believes that the 2.2 psig differential can be accommodated within the parameters of the station design by setting the worker regulator to be 52 psig and the monitor at 53.8 psig (approx. 54 psig). The exact setting depends on how accurate in terms of sensitivity the response is of the regulators.

(a) Please explain the purpose of the inspection described in this excerpt from NOPV PS1502NU.

(b) Please identify the "Safety Division representatives" referenced in the first sentence of this excerpt.

(c) Please identify "the inspector" referenced in the second sentence of this excerpt.

(d) With respect to the second sentence of this excerpt:

i. Please explain in complete detail what "the inspector" said or did to "suggest manual intervention;"

ii. Please identify to whom "the inspector" made this suggestion;
iii. Please explain why "the inspector" intervened when "the inspector saw that the pressure had climbed to 56.9 psig"; and

iv. Please describe all conversations among the "Safety Division representatives," Unitil representatives, and anyone else who was present related to the tests of Run A and Run B described in this excerpt and include in your response what each participant said during each conversation.

RESPONSE:

(a) To satisfy the PHMSA Evaluation of NH State Program requirement of observing field inspection of operator(s) regarding Over pressure Safety Devices;

(b) Safety Division representatives PUC inspector David Burnell and PHMSA Evaluator Glynn Blanton;

(c) PUC Inspector David Burnell.

(d) i. Unitil was asked to simulate a regulator failure to verify if the monitor would operate at the set psi of 55 that was indicated on the nametag;

ii. Rick Ahlin of Unitil;

iii. It was apparent that the monitor regulator was not going to take over pressure control, so the inspector intervened to prevent the pressure from going any higher than the MAOP of 56 psig.

iv. Unitil representative, Rick Ahlin could not explain why the pressure exceeded set pressures. During the test of run B, once the 56 psi was exceeded, Puc inspector David Burnell said that was high enough and should stop. Rick Ahlin stated that he wanted to see where the monitor regulator took over. Rick Ahlin stated that the maintenance had just been performed on May 14th and the regulators operated at that time as they were expected. PUC Inspector David Burnell said that the test did not go well, that MAOP had been exceeded, and that further action would be taken. Unitil was asked to keep the Safety Division informed as to a remedy that would keep the pressure within the MAOP. The PHMSA representative did not add to the conversion, he was there to observe the Safety Division representative. There was a brief discussion between the PHMSA evaluator and PUC Inspector on the ride back to the office and both agreed that the inspection did not go as anticipated.

Unitil

September 5, 2014

SEP 09 2014

Mr. Jeff Wiese
Associate Administrator
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
East Building, 2nd Floor
1200 New Jersey Ave., SE
Washington, DC 20590

Dear Mr. Wiese:

I am writing on behalf of Northern Utilities, Inc. d/b/a Unitil ("Northern") to request an interpretation from the Pipeline and Hazardous Materials Safety Administration ("PHMSA") on two questions regarding the requirements of 49 C.F.R. Part 192 concerning maximum allowable operating pressure ("MAOP"). Our questions relate to MAOP and system pressures during normal operation of a distribution system and during a system emergency caused by the failure of pressure regulating equipment.

We believe some pertinent background on our distribution system configuration and the results of a recent regulator station failure simulation would be helpful to you.

System Configuration

Northern operates a pressure regulating station at the point on its distribution system where it takes gas from Granite State Gas Transmission, Inc.'s ("Granite State") interstate transmission pipeline.[1] Attachment A is a schematic of the station, which I am providing for your reference.

Granite State's system at the point of interconnection is operated at an MAOP of 492 psig. The MAOP of Northern's downstream distribution system is 56 psig.

Northern's facilities at the station are configured as a dual-run. Run 1 on Attachment A is the primary run. Run 2 serves as a back-up if Run 1 were ever to fail in the closed position.

Each Run is equipped with a "worker" regulator and a "monitor" regulator. On Run 1,

[1] Northern and Granite State are wholly owned subsidiaries of Unitil Corporation.

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the set point on the "worker" regulator is 53 psig, which is 3 psig below the Northern system MAOP. The set point on the "monitor" regulator is 55 psig, which is 1 psig below the Northern system MAOP.

This configuration is designed to provide over pressure protection as follows: if the "worker" regulator (set at 53 psig) were to ever fail to control downstream system pressure, the "monitor" regulator would limit the downstream system pressure on Northern's system to 55 psig (1 psig below MAOP).

A pressure gage is installed approximately six feet downstream of the pressure regulation equipment. The Company's SCADA system monitors a pressure sensor that is at the end of the distribution system (in other words, at the furthest point downstream of the regulator station).

Failure Simulation

Recently, a failure of the worker regulator was simulated to assess the operation of Northern's over pressure protection. As the worker regulator was failed the following was observed: the adjacent downstream pressure gauge indicated a gradual increase in pressure to a high of 57.2 psig for approximately one minute, after which the pressure returned to, and remained at, the 55 psig set point of the monitor regulator. At no point during the simulation did the pressure rise above 57.2 psig. Northern believes that the observed pressure increase to 57.2 psig for approximately one minute resulted from the normal build-up pressure due to the mechanical operation of the monitor regulator. Unitil's assessment has been confirmed by the manufacturer of the regulator.

During this simulated failure, the SCADA pressure sensor at the end of the Northern system did not register a pressure increase to 57.2 psig. The SCADA pressure sensor registered a pressure of 53 psig before the failure simulation, and a pressure of 55 psig after the failure simulation until the worker regulator was returned to service at 53 psig.

Questions for Interpretation

Northern requests interpretation from PHMSA on two issues:

> (1) During normal operation (i.e., no system emergency) of a high pressure distribution system with a properly established MAOP of 56 psig, does the operator violate 49 C.F.R. § 192.621(a) if the system is operated above 56 psig?
>
> (2) During a system emergency, such as a failed worker regulator, on a high pressure distribution system with a properly established MAOP of 56 psig, does the operator violate 49 C.F.R. § 192.201(a) if the system pressure does not

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exceed 62 psig?

A. Northern's Position.

Northern believes that the answer to Question 1 is "yes," an operator violates the code if during normal operations it purposefully operates the system above its properly determined MAOP. Although Part 192 does not permit a system to be operated above MAOP, the code does allow system pressures that are slightly above MAOP caused by a failure of pressure regulating equipment. For a high pressure distribution system with an MAOP of 56 psig, Section 192.201(a)(2) allows the maximum system pressure during a system emergency to be no greater than 6 psig over MAOP, or 62 psig. Therefore, Northern believes that the answer to Question 2 is "no," there is not a code violation if the system pressure is 62 psig or lower during a system emergency. The rest of this letter explains Northern's position in greater detail.

B. Code Analysis.

MAOP is defined in 49 C.F.R. § 192.3 (Definitions) as "the maximum pressure at which a pipeline or segment of a pipeline may be operated under this part." Section 192.619 provides the means for determining MAOP for plastic and steel pipelines, Section 192.621 provides the means for determining MAOP for high pressure distribution systems and Section 192.623 provides the means for determining MAOP for low pressure distribution systems. Specifically, Section 192.621(a) begins as follows:

> (a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable . . . .

Section 192.621(a), therefore, prohibits the "operation" of a distribution system at a pressure that exceeds the lowest of several pressures stated in Section 192.621(a). Although "operate" is not defined in Part 192, based on the context in which it is used in Part 192 we believe "operate" refers to the normal day-to-day operation of the system, and is not intended to include a system emergency caused by the failure of a worker regulator. See 49 C.F.R. § 192.605(a) (requiring operators to prepare and follow "a manual of written procedures for conducting operations and maintenance activities and for emergency response); 49 C.F.R. § 192.605(b) (listing procedures that must be included in the O&M manual for "maintenance and normal operations" of system).

Accordingly, we believe that maximum allowablr operating pressure is exactly what it says it is: the maximum pressure at which a system can be operated under normal operating conditions. Therefore, Northern believes that the answer to Question 1 is yes, an operator violates the code if during normal operations it purposefully operates the system above its properly determined MAOP (which is 56 psig in the Northern

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example we have given).

Although MAOP addresses normal operating conditions, Part 192 recognizes that events can happen through component failures that the system must be designed to withstand. For example, Subpart D of Part 192 (Design of Pipeline Components) states that it:

> Prescribes minimum requirements for the design and installation of pipeline components and facilities . . . In addition, it prescribes requirements relating to protection against accidental over pressuring.

49 C.F.R. § 192.141 (Scope of Subpart D).

One of the provisions in Subpart D that relates to protection against "accidental over pressuring" is Section 192.195:

> **§192.195 Protection against accidental over pressuring.**
>
> (a) *General requirements.* Except as provided in §192.197, each pipeline that is connected to a gas source so that the maximum allowable operating pressure could be exceeded as the result of pressure control failure or of some other type of failure, must have pressure relieving or pressure limiting devices that meet the requirements of §§192.199 and 192.201. . . .

Under Section 192.195, when pressure on a pipeline could exceed MAOP due to failure of a pressure control device, the pipeline must have pressure relieving or pressure limiting devices that meet the requirements of Section 192.201. Section 192.201 states:

> **§192.201 Required capacity of pressure relieving and limiting stations.**
>
> (a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:
>
> * * * *
>
> (2) In pipelines other than a low pressure distribution system:
>
> (i) If the maximum allowable operating pressure is 60 p.s.i. (414 kPa) gage or more, the pressure may not

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> exceed the maximum allowable operating pressure plus 10 percent, or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower;
>
> (ii) If the maximum allowable operating pressure is 12 p.s.i. (83 kPa) gage or more, but less than 60 p.s.i. (414 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 6 p.s.i. (41 kPa) gage; or
>
> (iii) If the maximum allowable operating pressure is less than 12 p.s.i. (83 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 50 percent.

Under Section 192.201(a)(2), pressure relief and pressure limiting stations for the protection of high pressure systems must be set to operate at no more than a specified pressure in excess of MAOP. This pressure difference between MAOP and the maximum pressure is determined based on the system's MAOP. For systems with an MAOP between 12 and 59 psig, the pressure regulator used for pipeline protection can be set to achieve a system pressure that is no more than 6 psig above the system MAOP. For a 56 psig high pressure system, the overpressure protection monitor pressure regulator must be set to a set point no greater than 62 psig.

This 6 psig pressure difference is necessary to allow the system to be operated at its MAOP, while also allowing overpressure protection devices to operate properly without interfering with system pressure regulation. In a worker-monitor configuration such as Northern's, there must be enough separation between the set points of the worker regulator and monitor regulator so they do not "fight" for control of system pressure. This "fighting" results from the typical operation of a pressure regulator, including the normal pressure build-up when a regulator takes control of system pressure.[2] When the regulators "fight," the result is unstable system operation, pressure surges, and premature wear of the regulator components (such as diaphragms and springs). When

[2] If the set points for the worker regulator and the monitor regulator are too close, they will fight to control the system pressure due to the normal operating characteristics of pressure regulators. Consider, for example, a system where the set point for the monitor regulator is set only 1 psig higher than the set point for the worker regulator. During normal operation of the worker regulator, it will open and close to maintain pressure at its set point. When the monitor regulator senses the system pressure at its set point, it will begin to close, causing system pressure to decrease and then reopen as it senses the system pressure decrease. The worker, in response to decreasing pressure caused by the monitor closing, will re-open, and the monitor will again begin to close, setting up a cycle where the two regulators alternate back and forth or "fight" for control.

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there is sufficient separation between the set points for the worker and monitor, there is no "fighting" between the two regulators. The worker can do its job maintaining system pressure, and the monitor can stand by ready to regulate system pressure if the worker malfunctions such that it fails to regulate downstream pressure.

Section 192.201(a)(2) allows overpressure protection to be effective and avoids "fighting" regulators. The 6 psig difference for 12-59 psig MAOP systems allows the two regulators to each serve their respective function without interference by the other regulator. If the worker regulator fails to regulate downstream system pressure, the monitor regulator will take control and regulate system pressure at a pressure that could exceed MAOP, but not so much greater than MAOP that it would compromise the safety or integrity of the system while the worker regulator is repaired or replaced.

Finally, it is important to understand that the code recognizes that pressure regulators are mechanical devices that naturally experience "build-up" pressure situations. Section 192.605(b) lists the requirements of an operator's O&M manual. Section 192.605(b)(5) requires the O&M manual to include procedures for:

> (5) Starting up and shutting down any part of the pipeline in a manner designed to assure operation within the MAOP limits prescribed by this part, **plus** the build-up allowed for operation of pressure-limiting and control devices.

Section 192.605(b)(5) takes into consideration that pressure limiting and control devices have "allowed" build-up pressures, and during start up and shut down these pressure build-ups may temporarily result in a system pressure that exceeds MAOP. These build-up pressures are exactly what Northern experienced when the failure of the worker regulator was simulated and the monitor regulator set at 55 psig allowed the system pressure to rise to 57.2 psig for about a minute during pressure build-up before returning the system pressure to the monitor regulator's 55 psig set point (which was still below the 56 psig system MAOP). What Northern experienced was simply the acceptable build-up pressure that is normal for a monitor regulator used to prevent system over pressuring. And, in any event, the pressure on the system never exceeded the allowed 62 psig, even at the pressure gauge that is adjacent to the point of regulation.

For these reasons, Northern believes that the answer to Question 2 is "no," there is no violation of the Code if during a system emergency (such as the failure of a worker regulator) the pressure on a 56 psig MAOP high-pressure system rises above MAOP but does not exceed 62 psig.

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We look forward to your response to the questions we have presented. If you need any further background information, or if anything in this letter needs clarification, I hope you will not hesitate to call me.

Sincerely

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Director, Gas Operations

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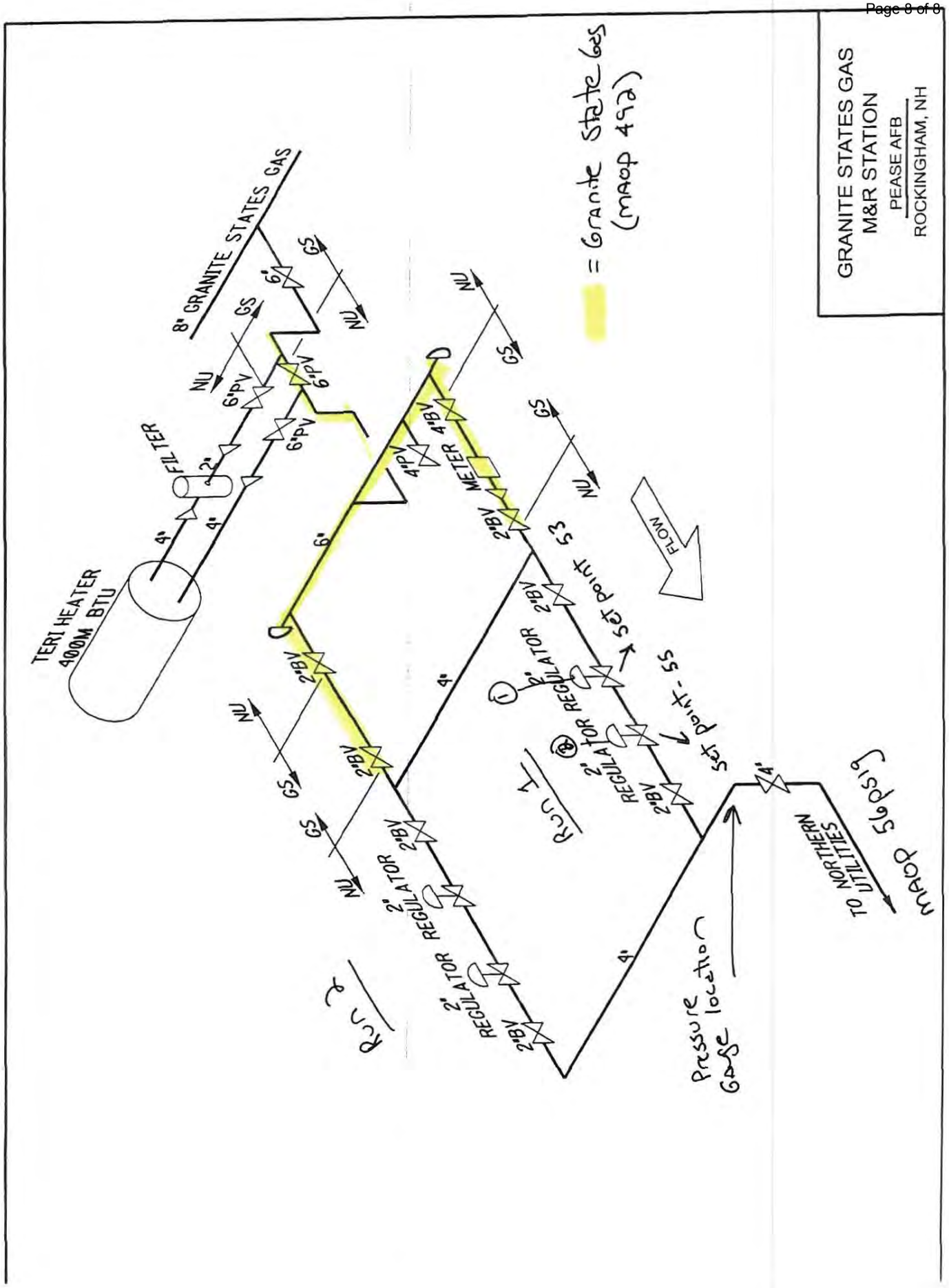
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TO NORTHERN UTILITIES
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Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave, S.E.
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APR 21 2015

Mr. Christopher J. LeBlanc
Director, Gas Operations
Unitil Corporation
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Dear Mr. LeBlanc:

In a letter to the Pipeline and Hazardous Materials Safety Administration (PHMSA) dated September 5, 2014, on behalf of Northern Utilities, Inc. (Northern), Unitil requested an interpretation on the applicability of the Federal gas pipeline safety regulations at 49 CFR Part 192. Specifically, you asked about the requirements for maximum allowable operating pressure (MAOP) and system pressures during normal operation of a gas distribution system and during a system emergency caused by the failure of pressure regulating equipment.

You explained your system as follows: Northern operates a pressure regulating station at the point on its distribution system where it takes gas from Granite State Gas Interstate transmission pipeline.[1] At the point of interconnection, the Granite State pipeline is operated at a MAOP of 492 psig. The MAOP of Northern's downstream distribution system is 56 psig. Northern's facilities at the station are configured as a dual-run. Run 1 is the primary run. Run 2 serves as a back-up if Run 1 were ever to fail in the closed position (diagram of the line was provided). Each Run is equipped with a "worker" regulator and a "monitor" regulator. On Run 1, the set point on the "worker" regulator is 53 psig. The set point on the "monitor" regulator is 55 psig.

A pressure gage is installed approximately six feet downstream of the pressure regulation equipment. The company's supervisory control and data acquisition (SCADA) system monitors a pressure sensor that is at the end of the distribution system (at the furthest point downstream of the regulator station). Recently, a failure of the worker regulator was simulated to assess the operation of Northern's over pressure protection. As the worker regulator failed the adjacent downstream pressure gauge indicated a gradual increase in pressure to 57.2 psig for approximately one minute, after which the pressure returned to and remained at the 55 psig set point of the monitor regulator. At no point during the simulation did the pressure rise above 57.2 psig. Northern believes that the observed pressure increase to 57.2 psig for approximately one minute resulted from the normal build-up pressure due to the mechanical operation of the monitor regulator. This assessment has been confirmed by the manufacturer of the regulator.

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During this simulated failure, the SCADA pressure sensor at the end of the Northern system did not register a pressure increase to 57.2 psig. The SCADA pressure sensor registered a pressure of 53 psig before the failure simulation, and a pressure of 55 psig after the failure simulation until the worker regulator was returned to service at 53 psig.

Based on the above information, Northern requests interpretation on the following two issues:

1. During normal operation (i.e., no system emergency) of a high pressure distribution system with a properly established MAOP of 56 psig, does the operator violate § 192.621(a) if the system is operated above 56 psig?
2. During a system emergency, such as a failed worker regulator, on a high pressure distribution system with a properly established MAOP of 56 psig, does the operator violate § 192.201(a) if the system pressure does not exceed 62 psig?

Section 192.621(a) states:

> (a) No person may operate a segment of a high pressure distribution system at a pressure that exceeds the lowest of the following pressures, as applicable:
> (1) The design pressure of the weakest element in the segment, determined in accordance with subparts C and D of this part.
> (2) 60 psi (414 kPa) gage, for a segment of a distribution system otherwise designed to operate at over 60 psi (414 kPa) gage, unless the service lines in the segment are equipped with service regulators or other pressure limiting devices in series that meet the requirements of § 192.197(c).
> (3) 25 psi (172 kPa) gage in segments of cast iron pipe in which there are unreinforced bell and spigot joints.
> (4) The pressure limits to which a joint could be subjected without the possibility of its parting.
> (5) The pressure determined by the operator to be the maximum safe pressure after considering the history of the segment, particularly known corrosion and the actual operating pressures.

Response 1 – Yes, the operator violates § 192.621(a) if the MAOP is exceeded during normal operating conditions. Under the regulation, operators must use pipeline pressure control equipment sized for pressure control with pressure sensors, actuators and control or relief valves that react in a timely manner and have pressure settings that do not exceed MAOP in accordance with Part 192.

Section 192.201(a) states:

> (a) Each pressure relief station or pressure limiting station or group of those stations installed to protect a pipeline must have enough capacity, and must be set to operate, to insure the following:

The Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety provides written clarifications of the Regulations (49 CFR Parts 190-199) in the form of interpretation letters. These letters reflect the agency's current application of the regulations to the specific facts presented by the person requesting the clarification. Interpretations do not create legally-enforceable rights or obligations and are provided to help the public understand how to comply with the regulations.

(1) In a low pressure distribution system, the pressure may not cause the unsafe operation of any connected and properly adjusted gas utilization equipment.
(2) In pipelines other than a low pressure distribution system:
(i) If the maximum allowable operating pressure is 60 psi (414 kPa) gage or more, the pressure may not exceed the maximum allowable operating pressure plus 10 percent, or the pressure that produces a hoop stress of 75 percent of SMYS, whichever is lower;
(ii) If the maximum allowable operating pressure is 12 psi (83 kPa) gage or more, but less than 60 psi (414 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 6 psi (41 kPa) gage; or
(iii) If the maximum allowable operating pressure is less than 12 psi (83 kPa) gage, the pressure may not exceed the maximum allowable operating pressure plus 50 percent.

Response 2 – No, the operator does not violate § 192.201(a) as long as the MAOP limits are met during a system emergency and the pipeline meets the Subpart D - Design of Pipeline Components requirements. In this case, the emergency operating limit is 62 psi (56 + 6 psi). Emergency operating overpressure conditions are only allowed for the time required to activate the overpressure protection device and are not meant for long term or frequently occurring normal operating or periodic maintenance conditions and, therefore, require immediate response by the operator either to shut down or reduce the operating pressure to the normal operating conditions.

Finally, we would note that based upon your actions described in your letter, there may be some confusion about appropriate testing and maintenance of a pressure limiting or regulator station for buildup and set point. Conducting a simulated test on a pressure limiting or regulator station that is not isolated from the system does not constitute a system emergency. It is a normal operation subject to the limitations described above. The pressure limiting or regulator station should be isolated from the system prior to any testing of buildup and set points.

If we can be of further assistance, please contact Tewabe Asebe of my staff at 202-366-5523.

Sincerely,

John A. Gale
Director, Office of Standards
and Rulemaking

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