# TR 18-35 – Over-Pressurization of Low-Pressure Systems



PRIMARY: 192. 605, 613, 727, 739, 741, 743, 805, 1007, 1015, Subpart P, G-192-7, G-192-8
PURPOSE: Review existing GM and revise as necessary, to address the issues raised by the recent event in the overpressurization that occurred in Massachusetts including the Preliminary Report issued by NTSB (copy attached as an attachment to the TR Package) by the NTSB Reports listed below (copy attached as an attachment to the TR Package) and by the American Gas Association (copy attached as an attachment to the TR Package as well as AGA Gas Engineering and Operations Practices (GEOP) Series: Distribution System Design, Revised 2004, Book D-1, Volume III Chapter 13Regulator Station Design).

1. Over-Pressure Of Peoples Gas Light And Coke Company Low-Pressure Distribution System Chicago, Illinois January 17, 1992 PB93-916501I
2. Boston Gas Company Natural Gas Overpressure, Explosion And Fires East Boston, Massachusetts September 23, 1983 NTSB/Par-84/05
3. Missouri Power And Light Company Natural Gas Fires Centralia, Missouri January 28, 1982 NTSB- Par-82-3
4. Low-Pressure Natural Gas. Distribution System Burlington, Iowa November 6, 1969 NTSB-Par-70-1
5. Low-Pressure Natural Gas Distribution System Gary, Indiana June 3, 1969 Adopted: December 4, 1969
6. AGA Leading Practices to Reduce the Possibility of a Natural Gas Over-Pressurization Event: November 26, 2018 Section 2 except Damage Prevention & Damage Prevention Practices, Section 3 Human Factors and Section 4 Managing the Risk

Add review of ADB 2020-02 to purpose of this TR
RESPONSIBLE GROUP: Operations & Maintenance/Operator Qualification Task Group

***Note:*** *Revisions are shown in yellow highlight and red font.*

## Section 192.195

**2 OVERPRESSURE PROTECTION**

*2.1 Facilities that might at times be bottle-tight. …*

*2.2 High-pressure distribution systems. …*

*2.3 Low-pressure distribution systems.*

(a) Suitable protective devices to prevent overpressuring of low-pressure distribution systems include the following.

~~(a)~~ (1) A liquid-seal relief device that can be set to open accurately and consistently at the desired pressure.

~~(b)~~ (2) See 2.2(b) through 2.2(f) above.

(b) There are several ways that operators can protect low-pressure distribution systems from overpressurization events. Some examples are listed in OPS Advisory Bulletin ADB-2020-02 (85 FR 61097, September 29, 2020; see Guide Material Appendix G- 192-1, Section 2).

(c) Low-pressure distribution systems that use only control lines and ~~regulation~~ regulators as the means to detect and prevent overpressurization are not optimal to prevent overpressurization events. Operators should consider overpressure protection that cannot be defeated by a single operator error or equipment failure.

(d) Operators should consider eliminating direct connections between systems operating at different pressures.

(e) Valves connecting a higher-pressure system to a lower-pressure system should be labeled, locked closed, and clearly identified on drawings to prevent erroneous operation. The operator might consider adding the following.

(1) Double valves or ~~and~~ blind plates or both to prevent leak through.
(2) Pressure gauge connections or sensing points on both sides of these valves.

(3) Relief valve downstream of the valve setting.

*2.4 Transmission lines.* …

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## Section 192.605

**2 MAINTENANCE AND NORMAL OPERATIONS**

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*2.1 Control of corrosion.* …

*2.2 Availability of construction records, maps, and operating history.*

(a) – (f) …

(g) Regulator station drawings should show control line and pressure sensor location as needed. These drawings must be available to personnel working at the station (§192.605(b)(3)) and should be reviewed for accuracy prior to any work. Any changes resulting from work performed at a regulator station should be identified and noted on drawings.

*2.3 Data gathering for incident. ...*

*2.4 Starting up and shutting down a pipeline.*

(a) Starting up any of the following: a newly constructed transmission line, regulated gathering line, distribution main, or another modified pipeline (e.g., an existing transmission line that has a new pressure gradient because of flow reversal, pipeline that has been converted to gas service under §192.14).

(1) For transmission lines, ...

(2) For distribution mains, following the test to prove tightness or strength, the operator should establish procedures for commissioning a new main. The procedures should include provisions for the following.

(i) Ensuring that the procedural manual for operations, maintenance, and emergencies addresses the new main.

(ii) Tying-in the new system segment.

(iii) Determining requirements for purging and notifying public officials and residents of purging activity. See guide material under §192.751.

(iv) Updating maps and other pertinent operating records.

(v) Inspecting the overpressure protection devices required for starting up a new or modified pipeline, including the ~~testing~~ verification of set pressures and the checking of capacities, if necessary.

(b) Starting up or reinstating service lines.

The operator should establish procedures for reinstating the service line following the test to prove tightness or strength. The procedures should include provisions for the following.

(1) Ensuring that the procedural manual for operations, maintenance, and emergencies addresses the new or reinstated services.

(2) Tying-in new or reinstated service segment.

(3) Introducing gas into the meter. Also, see 2.4(c) below.

(4) Updating maps or other pertinent operating records.

(5) Preventing unauthorized turn-on.

(6) For service lines that have individual pressure controls, such as farm taps, inspecting the overpressure protection devices required for starting up a new or modified pipeline, including the ~~testing~~ verification of set pressures and the checking of capacities, if necessary.

(c) Starting up service to a new customer.

…

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*2.5 Maintaining compressor stations. …*

*2.6 Starting, operating, and shutting down gas compressor units. …*

*2.7 Periodically reviewing the work done by operator personnel.*

Field oversight including supervisor visits, field inspections, and quality control are some of the methods available to periodically review the work done by operator personnel. The operator should designate a timetable to review personnel performance to determine if the normal operating and maintenance procedures found in the manual are effective and adequate. The operator should determine if deficiencies exist in the procedures. If applicable, modification of procedures should be accomplished as soon as possible. Documentation should be maintained for all procedure modifications and retraining of personnel.

*2.8 Taking precautions in excavated trenches to protect personnel. …*

*2.9 Responding promptly to a report of a gas odor inside or near a building. …*

*2.10 Control room management procedures. ...*

*2.11 Protecting low-pressure distribution systems from overpressurization events.*

(a) Operators should consider developing written procedures for activities involving new construction or pipe replacement projects for low-pressure distribution systems. These procedures should account for the additional precautions needed to protect those systems from an overpressurization event. For more information on the precautions, see OPS Advisory Bulletin ADB-2020-02 (85 FR 61097, September 29, 2020; reference Guide Material Appendix G-192-1, Section 2).

(b) Operators should provide step-by-step details that guide the personnel at the job site through a pressure system control work task. The sequence of work events is important and adherence to the documented procedure is critical to prevent overpressurization of the system. Personnel should be empowered to stop work if the sequence of work is not followed.

(c) Procedures should include recognizing abnormal operating conditions. For example, the expected range of pressures during the work task and the MAOP should be communicated to personnel in the field. Actions to take in response to abnormal pressures should be prepared and communicated before starting the construction or pipe replacement project.

(d) Complex projects with multiple involved work activities could be simplified by breaking into manageable simplified procedures to reduce the risk of unforeseen abnormal operating conditions.

*2.12 Management of Change (MOC) practices to minimize the potential for overpressurization.*

Operators should consider developing an MOC process for ~~all~~ work tasks that have a potential for overpressurization. The MOC is a formal procedure used to identify and consider the impact of changes to pipeline systems and their integrity. Items to address in the MOC include the following.

(a) The delineation of authority during system work and critical tasks.

(b) How proposed job changes during the construction phase are approved.

(c) The level of authority required to make changes to the design and/or project plan.

(d) That each employee of the operator or the operator's contractor is granted the authority to stop work.

(e) The collection and sharing of near misses.

See guide material under §§192.631(f) and 192.911(k) for more information on MOC.

**3 ABNORMAL OPERATION OF TRANSMISSION LINES**

…

~~**Section 192.613**~~

**Section 192.739**

**1 GENERAL**

*1.1 Gathering lines. …*

*1.2 General considerations.*

(a) Prior to operating equipment, a review of the station's operating mode(s) should be performed using resources such as station schematics or SME input. The operator should follow system operation procedures including applicable recommendations for Control Room Management plans~~. See~~ (see guide material under §192.631). The review should include the operating system pressure and what might occur during an overpressurization event.

(b) ...

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**2 VISUAL INSPECTIONS…**

**3 STOP VALVES…**

**4 PRESSURE REGULATORS…**

**5 RELIEF DEVICES…**

**6 FINAL INSPECTION…**

**7 OVERPRESSURE PROTECTION CONSIDERATIONS FOR LOW-PRESSURE DISTRIBUTION SYSTEMS**

During ~~any~~ an activity that could potentially cause overpressurization, use the type of gauges suitable (~~range and~~ pressure range) for the system being worked on. Continuously observe and monitor the operating pressures in appropriate locations. Leave gauges in place for an appropriate length of time after the work is completed to identify any lagging pressure changes.

~~**Section 192.805**~~

**GUIDE MATERIAL APPENDIX G-192-1**

| **2 GOVERNMENTAL DOCUMENTS** (Continued) | | |
|---|---|---|
| OPS ADB-2020-02 | Advisory Bulletin – Pipeline Safety: Overpressure Protection on Low-Pressure Natural Gas Distribution Systems (85 FR 61097, September 29, 2020) | §192.195<br>§192.605<br>G-192-8 |

**GMA G-192-8**

**GUIDE MATERIAL APPENDIX G-192-8**

(See §§192.1001, 192.1003, 192.1005, 192.1007, 192.1009, 192.1011, 192.1015, and Guide Material Appendix G-192-8A)

**DISTRIBUTION INTEGRITY MANAGEMENT PROGRAM (DIMP)**

**CONTENTS**



**1 INTRODUCTION**

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**5 EVALUATE AND RANK RISK**

The following are some examples of ways to evaluate risk[3] to a distribution system from the applicable threats that are identified in Section 4. There may be other ways to analyze and rank risks to a distribution system. This guide material is not intended to rule out any valid approach selected by the operator.

*5.1 General. …*

*5.2 Information evaluation. …*

*5.3 Methods.*

Two general approaches to risk evaluation are as follows.

(a) The use of knowledgeable persons (the SME method).

(b) The use of mathematical (algorithm) methods.

If an operator uses a combination of methods for different parts of a system, the results of these methods should be combined for common risk ranking.

(a) Subject Matter Expert (SME) Method.

...

(b) Mathematical Method.

(1) An operator may use existing commercially available (off-the-shelf) or internally developed software that performs risk evaluation. The operator should consider what information is required to use the selected software, what information is readily available, and the general applicability of the mathematical model to the operator's system. There are also "predictive" models that can be used for risk evaluation.

(2) Operators should consider using a Failure Mode and Effects Analysis (FMEA) model or an equivalent structured and systematic method to identify and mitigate risks. FMEA is an accepted and recognized engineering practice used to identify and assess potential failures, including common mode failures. This risk mitigation method may not be suitable for all gas systems. For additional information, see OPS Advisory Bulletin ADB-2020-02 (85 FR 61097, September 29, 2020; reference Guide Material Appendix G-192-1, Section 2).

*5.4 Example of risk evaluation. ...*

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