

TR Number	2021-23
Primary	192.615
Secondary	(From TRs 21-21 & 21-22: GMAs G-192-11 & 11A, 192.617, 192.723)
Purpose	Review and revise GM to address NTSB recommendations to GPTC in National Transportation Safety Board’s January 12, 2021, report <i>Atmos Energy Corporation Natural Gas-Fueled Explosion, Dallas, Texas, February 23, 2018</i> , PAR-21/01.
Origin/Rationale	Recommendation P-21-13 Develop additional guidance that identifies steps gas distribution operators can take to safely respond to leaks, fires, explosions, and emergency calls, considering the limitations due to wet weather conditions, that includes: (1) criteria for when to shut down or isolate gas distribution systems, pressure test main and service lines, and begin evacuations, (2) leak investigation methods that are reliable in wet weather, (3) require an alternate safe response, such as an evacuation when reliable leak investigations are not possible due to wet weather, and (4) leak investigations that assess all viable gas migration paths, including granular backfill and crawlspaces.
Notes	July 2021: Executive combined TRs 21-21, 21-22 into TR 21-23. Revised Origin/rationale for TR 21-23 includes information from 21-21 and 21-22. Create new section 5 in GMAs G-11 and G-11A to deal with leakage patrols in inclement weather, and assign to DPER.
Assigned to	DPER

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

Section 192.605

{TG Note: No additional guide material under §192.605 is recommended as 4.4(g) of the guide material sends the reader to GMAs G-192-11 and G-192-11A and GM 5 sends the reader to §192.615.}

Section 192.615 {Addendum 1 update}

Notes:

- (1) Although not required, operators should consider developing an emergency plan for Type B gathering lines.
- (2) To differentiate between operators’ emergency response personnel and processes and those of public agencies and administrations, the term *operator* (or a variant) is used to denote pipeline operators’ personnel and processes. Similarly, the term *local* is used for public agencies, such as fire, police, and other public officials.
- (3) Some activities performed as requirements for emergency plans may also be used to satisfy similar program requirements under §§192.614, 192.616, 192.620(d)(2), and 192.935.

1 WRITTEN EMERGENCY PROCEDURES (§192.615(a))

(a) ...

...

(e) To ensure the safety of the general public, an operator's written procedures should provide for the following as applicable.

1.1 *Receiving, identifying, and classifying emergencies. ...*

1.2 *Establishing and maintaining adequate means of communication. ...*

1.3 *Prompt and effective response to each type of emergency.*

Various types of emergencies will require different responses in order to evaluate and mitigate the hazard. Consideration should be given to the following.

- (a) Emergencies involving gas detected in or near buildings should be prioritized in order to have sufficient operator personnel for response. For leak classification and action criteria, refer to Guide Material Appendices G-192-11 for natural gas systems and G-192-11A for petroleum gas systems. See §192.605(b)(11), which requires procedures for prompt response to reports of a gas odor in or near buildings.
- ...
- (d) Emergencies involving an explosion on or near pipeline facilities may result in damage from fire and shock waves.
- (e) Emergencies involving an explosion or fire where non-typical soil conditions exist (e.g., water-saturated ground, frozen ground) that might affect gas migration and the ability of an operator to quickly find the source of the suspected leak. See Guide Material Appendices G-192-11, Section 5.5 and G-192-11A, Section 5.5.
- ~~(e)~~(f) Emergencies involving blowing or ignited gas may hinder local emergency responders' search and rescue efforts.
- ~~(f)~~(g) Natural disasters, such as earthquakes and ...

1.4 *Assuring the availability of personnel, equipment, tools, and materials. ...*

...

Section 192.723

1 FREQUENCY

...

1.4 *Special one-time surveys.*

- (a) Special one-time surveys should be considered following exposure of the pipeline to unusual stresses (e.g., earthquakes, blasting) or trenchless installation of foreign buried facilities that cross gas pipelines.
- (b) Special one-time surveys should be considered where gas migration and the ability to quickly identify the location of the suspected leak is affected by weather-related conditions (e.g., water-saturated ground, frozen ground). See Guide Material Appendices G-192-11, Section 5.5 and G-192-11A, Section 5.5.

Section 192.803

See Cautionary Note at the beginning of Subpart N.

1 ABNORMAL OPERATING CONDITION

Operators should identify conditions that would be reasonably recognizable by an individual performing a covered task.

1.1 *Incorporation of conditions in task competency requirements.*

...

1.2 *Examples of abnormal operating conditions.*

Examples of abnormal operating conditions may include the following.

- (a) Escaping gas.
- (b) Fire or explosion.
- (c) Excessive or inadequate pressure.
- (d) Inadequate odorization.
- (e) Damage to facilities.
- (f) Component failure.
- (g) Stray current.
- (h) Unintended movement or unusual loading on the pipeline.
- (i) Adverse or unusual weather conditions.

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GMA G-192-11

GUIDE MATERIAL APPENDIX G-192-11

(See guide material under §§192.3, 192.503, 192.557, 192.615, 192.703, 192.706, 192.723, and 192.941)

**GAS LEAKAGE CONTROL GUIDELINES FOR NATURAL GAS SYSTEMS
(METHANE)**

(See Guide Material Appendix G-192-11A for petroleum gas systems)

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{Editorial Note: Adjusting 5.2 - 5.4 & 7.2 headings in contents to match GMA.}

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5.5 Procedural Guidance – Leak investigation and emergency response where non-typical soil conditions exist.

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GUIDE MATERIAL APPENDIX G-192-11

(See guide material under §§192.3, 192.503, 192.557, 192.615, 192.703, 192.706, 192.723, and 192.941)

**GAS LEAKAGE CONTROL GUIDELINES FOR NATURAL GAS SYSTEMS
(METHANE)**

(See Guide Material Appendix G-192-11A for petroleum gas systems)

1 SCOPE

These guidelines provide criteria for the detection, grading, and control of gas leakage and related records.

2 GENERAL DISCUSSION

...

5 LEAK INVESTIGATION AND CLASSIFICATION

5.1 Scope.

- (a) ...
- (b) Leak indications may originate from the following.
 - (1) Scheduled leak surveys.
 - (2) Line patrols.
 - (3) Customer reports.
 - (4) Reports from the general public.
 - (5) Notifications from local emergency responders.

- (c) ...
- ...

5.2 Procedural Guidance – General

- (a) The following guide material is not intended to be step by step procedure in responding to leak calls but is intended to assist operators in developing their own written procedures. Certain actions may be initiated ahead of other action items based on conditions at the leak location.
- (b) ...
- ...
- (g) If the leak investigation is initiated by an outside odor complaint, see 5.3 below.
- (h) If the leak investigation is initiated by an inside odor complaint, see 5.4 below.
- (i) If a leak investigation is conducted where non-typical soil conditions exist, see 5.5 below.

5.3 Procedural Guidance – Outside underground leak.

...

5.4 Procedural Guidance – Inside leak or odor complaint.

- (a) It may be necessary to investigate a reported leak or gas odor inside a structure. These investigations may result from the following.
 - (1) Gas migration.
 - (2) Indications of gas readings while performing routine leak surveys.
 - (3) Odor complaints.
 - (4) Notification from local emergency responders.

Note: *If a hazardous condition is detected or discovered during a leak investigation, see 5.2(b) above.*

- (b) ...
- ...

5.5 Procedural Guidance – Leak investigation and emergency response where non-typical soil conditions exist.

Note: See 5.2, 5.3, and 5.4 above for standard leak investigation procedures.

- (a) It is sometimes necessary to conduct leak investigations where non-typical soil conditions exist (e.g., water-saturated ground, frozen ground). If in the preliminary investigation it is determined that natural gas is involved, use equipment and resources available to identify the extent of gas migration and buildings that are at risk as quickly and efficiently as possible.
- (b) The operator should consider the tools and technology available to improve leak investigations during inclement weather, such as the following.
 - (1) Remote laser technology.
 - (2) Mobile leakage detection.
 - (3) Barhole equipment capable of sampling to the depth of the main.
 - (4) Powered barhole equipment for moisture saturated soils, frost, or pavement.
- (c) The operator should attempt to identify issues with gas migration under the following conditions such as:
 - (1) Water-saturated soil.
 - (2) Frost or frozen ground.
 - (3) Flooding.
 - (4) Snow or ice.
 - (5) Environmental or weather-related conditions that will limit venting and affect gas migration.
- (d) Survey techniques.

- (1) Use survey or leak investigation techniques that address the potential for undetected gas migration. Under normal soil conditions, natural gas tends to migrate in all directions away from the leak. Subsurface construction will also influence the extent of gas migration, especially underground utilities that use granular backfill such as sewers, water mains, or other subsurface disturbances that create a “ditch line” effect on gas migration. Similarly, driveways and walkways constructed with crushed stone often provide a low-resistance path for migrating gas to follow.

In addition, certain soils and fill materials will influence the migration and venting of gas such as heavy clay soils versus coarse gravel. Gas will also accumulate in areas of granular backfill around foundation walls, footings, and concrete slab construction. Once gas has migrated to a foundation, footing, or slab, natural pressure differential between the atmosphere in the building and the surrounding soil will often enhance the entry of gas into the building.
- (2) When using a remote laser type detector to survey buildings for the presence of gas, consider checking areas such as the following.
 - (i) Inside crawlspaces and around foundation vents.
 - (ii) Around the perimeter of buildings that have no basement or crawlspace.
 - (iii) Any area of a building where potential gas is likely to vent (e.g., foundation sill plate, appliance and roof vents, windows and window frames, door frames, soffit).
- (3) Regardless of the prevailing weather conditions, the operator should consider using mobile leakage detection units to increase detection capability in the immediate area of the reported event.

Note: Review manufacturer’s operating instructions regarding weather-related limitations.
- (4) Where standing water and saturated soil conditions are present:
 - (i) Attempt to barhole away from the standing water in areas where gas is likely to migrate or vent, such as the following.
 - (A) Along the edges of areas of standing water.
 - (B) Along the edges of concrete slabs, concrete footings, or foundation walls.
 - (C) Adjacent to utility poles where there may be less soil moisture.
 - (D) Expansion seams in paved areas.
 - (E) Along other underground utilities and at underground utility entry points to buildings.
 - (ii) Barhole deeper than normal to create a sample space at the top of the barhole above the water level.
 - (iii) Observe for bubbling or bubbles in standing water, especially around any building or structures.
 - (iv) Use water traps and filters to prevent damage to leakage detection equipment.
- (5) The operator should attempt to gain access to buildings in the area of suspected gas migration. Note that some operators place the responsibility of entering gas-filled buildings on local emergency responders. Using advanced leakage detection technology, portable infrared laser detectors, or other ppm-capable detection equipment, check for the presence of gas within:
 - (i) Buildings.
 - (ii) Basements.
 - (iii) Crawlspaces (no basement).
 - (iv) Utility entrance points, where the building is constructed on a concrete slab (no basement).
- (6) If a building has a basement, check for gas venting from floor drains, seams and cracks in foundation walls, and utility entrances (e.g., gas, water, sewer, electric, telephone, cable).

- (7) For buildings with a crawlspace, test for the presence of gas at crawlspace vents.
- (8) For buildings built on a concrete slab, test for the presence of gas inside the building at cracks and seams in the slab and at utility entrances (e.g., gas, water, sewer, electric, telephone, cable). Check meter or valve boxes, as appropriate, where gas might be present. Some buildings constructed on a slab have a central vent system that can be checked for the presence of gas.
- (e) Ventilate, evacuate, monitor, and isolate.
If buildings are in the suspected area of migration, consider:
 - (1) Following operator written procedures regarding emergency response, including use of ventilation or evacuation. If detected gas readings are in the flammable range or above, ventilation may not be an option. The operator should not attempt to ventilate until gas readings fall below the LEL.
 - (2) Installing ventilation trenches between the suspected source and adjacent buildings.
 - (3) Aspirating gas from the ground.
 - (4) Eliminating potential sources of ignition in area (e.g., electric, telephone, cable).
 - (5) Continuously monitoring buildings in the suspected area of migration.
 - (6) Isolating gas supply to the area until conditions improve and resources are available to do a more thorough investigation (e.g., pinpointing, isolation, pressure testing).

5.56 *Leak grades. ...*

5.67 *Leak classification and action criteria. ...*

5.78 *Temporary mitigative measures for Grade 1 leaks. ...*

5.89 *Follow-up inspection. ...*

5.910 *Reevaluation of a leak. ...*

6 RECORDS AND SELF-AUDIT GUIDELINES

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GMA G-192-11A

GUIDE MATERIAL APPENDIX G-192-11A

(See guide material under §§192.3, 192.11, 192.503 192.557, 192.615, 192.703, and 192.723)

GAS LEAKAGE CONTROL GUIDELINES FOR PETROLEUM GAS SYSTEMS

(See Guide Material Appendix G-192-11 for natural gas systems)

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GUIDE MATERIAL APPENDIX G-192-11A

(See guide material under §§192.3, 192.11, 192.503 192.557, 192.615, 192.703, and 192.723)

GAS LEAKAGE CONTROL GUIDELINES FOR PETROLEUM GAS SYSTEMS

(See Guide Material Appendix G-192-11 for natural gas systems)

1 SCOPE

These guidelines provide criteria for the detection, grading, and control of gas leakage and for related records for systems handling petroleum gases or petroleum gas/air mixtures that are heavier than air.

2 GENERAL DISCUSSION

...

5 LEAK INVESTIGATION AND CLASSIFICATION

5.1 *Scope.*

(a) ...

(b) Leak indications may originate from the following.

(1) Scheduled leak surveys.

(2) Line patrols.

(3) Customer reports.

(4) Reports from the general public.

(5) Notifications from local emergency responders.

(c) ...

...

5.2 *Procedural Guidance-General.*

(a) ...

...

(g) ...

(h) If a leak investigation is conducted where non-typical soil conditions exist, see 5.5 below.

5.3 *Procedural Guidance – Outside underground leak.*

...

5.4 *Procedural Guidance-Inside leak or odor complaint.*

- (a) It may be necessary to investigate a reported leak or gas odor inside a structure. These investigations may result from the following.
- (1) Gas migration.
 - (2) Indications of gas readings while performing routine leak surveys.
 - (3) Odor complaints.
 - (4) Notification from local emergency responders.

...

5.5 *Procedural Guidance – Leak investigation and emergency response where non-typical soil conditions exist.*

Note: See 5.2, 5.3, and 5.4 above for standard leak investigation procedures.

- (a) It is sometimes necessary to conduct leak investigations during inclement weather. If in the preliminary investigation it is determined that petroleum gas is involved, use equipment and resources available to identify the extent of gas migration and buildings that are at risk as quickly and efficiently as possible.
- (b) The operator should consider the tools and technology available to improve leak investigations during inclement weather, such as the following.
- (1) Detectors capable of detecting petroleum gases in the parts per million (ppm) detection range.
 - (2) Barhole equipment capable of sampling to the depth of the main.
 - (3) Powered barhole equipment for moisture saturated soils, frost, or pavement.
- (c) The operator should attempt to identify issues with gas migration under the following conditions such as:
- (1) Water-saturated soil.
 - (2) Frost or frozen ground.
 - (3) Flooding.
 - (4) Snow or ice.
 - (5) Environmental or weather-related conditions that will limit venting and affect gas migration.
- (d) Survey techniques.
- (1) Use survey or leak investigation techniques that address the potential for undetected gas migration. Under normal soil conditions, petroleum gas tends to migrate in all directions away from the leak. Subsurface construction will also influence the extent of gas migration, especially underground utilities that use granular backfill such as sewers, water mains, or other subsurface disturbances that create a “ditch line” effect on gas migration. Similarly, driveways and walkways constructed with crushed stone often provide a low-resistance path for migrating gas to follow.

In addition, certain soils and fill materials will influence the migration and venting of gas such as heavy clay soils versus coarse gravel. Petroleum gas will also accumulate in areas of granular backfill around foundation walls, footings, and concrete slab construction. Petroleum gas is heavier than air and will settle on top of a water table. Changes in the water table (increase) will bring residual petroleum gas to the surface and facilitate migration. Once gas has migrated to a foundation, footing, or slab, natural pressure differential between the atmosphere in the building and the surrounding soil will often enhance the entry of gas into the building.
 - (2) When using a ppm-capable detector to survey buildings for the presence of gas, consider checking areas such as the following.
 - (i) Inside crawlspaces and around foundation vents.
 - (ii) Around the perimeter of buildings that have no basement or crawlspace.

- (iii) Any area of a building where potential gas is likely to vent (e.g., foundation sill plate, appliance and roof vents, windows and window frames, door frames).
 - (3) Regardless of the prevailing weather conditions, the operator should expand the search area as quickly as possible-practicable to include all buildings in the suspected area of migration
 - (4) Where standing water and saturated soil conditions are present:
 - (i) Attempt to barhole away from the standing water in areas where gas is likely to migrate or vent, such as the following.
 - (A) Along the edges of areas of standing water.
 - (B) Along the edges of concrete slabs, concrete footings, or foundation walls.
 - (C) Adjacent to utility poles where there may be less soil moisture.
 - (D) Expansion seams in paved areas.
 - (E) Along other underground utilities and at underground utility entry points to buildings.
 - (ii) Barhole deeper than normal to create a sample space at the top of the barhole above the water level.
 - (iii) Observe for bubbling or bubbles in standing water, especially around any building or structures.
 - (iv) Use water traps and filters to prevent damage to leakage detection equipment.
 - (5) The operator should attempt to gain access to buildings in the area of suspected gas migration. Note that some operators place the responsibility of entering gas-filled buildings on local emergency responders. Using ppm-capable detection equipment, check for the presence of gas within:
 - (i) Buildings.
 - (ii) Basements.
 - (iii) Crawlspaces (no basement).
 - (iv) Utility entrance points, where the building is constructed on a concrete slab (no basement).
 - (6) If a building has a basement, check for gas venting from floor drains, seams and cracks in foundation walls, and utility entrances (e.g., gas, water, sewer, electric, telephone, cable).
 - (7) For buildings with a crawlspace, test for the presence of gas at crawlspace vents.
 - (8) For buildings built on a concrete slab, test for the presence of gas inside the building at cracks and seams in the slab and at utility entrances (e.g., gas, water, sewer, electric, telephone, cable). Check meter or valve boxes, as appropriate, where gas might be present. Some buildings constructed on a slab have a central vent system that can be checked for the presence of gas.
 - (e) Ventilate, evacuate, monitor, and isolate.

If buildings are in the suspected area of migration, consider:

 - (1) Following operator written procedures regarding emergency response, including use of ventilation or evacuation. If detected gas readings are in the flammable range or above, ventilation may not be an option. The operator should not attempt to ventilate until gas readings fall below the LEL.
 - (2) Installing ventilation trenches between the suspected source and adjacent buildings.
 - (3) Aspirating gas from the ground.
 - (4) Eliminating potential sources of ignition in area (e.g., electric, telephone, cable).
 - (5) Continuously monitoring buildings in the suspected area of migration.
 - (6) Isolating gas supply to the area until conditions improve and resources are available to do a more thorough investigation (e.g., pinpointing, isolation, pressure testing).

[5.56](#) *Leak grades. ...*

[5.67](#) *Leak classification and action criteria. ...*

[5.78](#) *Temporary mitigative measures for Grade 1 leaks. ...*

[5.89](#) *Follow-up inspection. ...*

[5.910](#) *Reevaluation of a leak. ...*

6 RECORDS AND SELF-AUDIT GUIDELINES

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