COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

RESPONSE OF COLUMBIA GAS OF MASSACHUSETTS TO THE
FIRST SET OF INFORMATION REQUESTS FROM THE D.P.U.
PIPELINE ENGINEERING AND SAFETY DIVISION

D.P.U. 19-PL-07 – Merrimack Valley Incident (9/13/18)

Date: September 10, 2019

Responsible: Lee Reynolds, Manager Gas Standards

IR-PL-1-5: Please provide copies of the most current tie-in and abandonment procedures in place and the last six revisions of these procedures. Identify the procedure in place at the time of the incident.

Response:

The tie-in procedures are stated in GS 1680.010 "Tie-ins and Tapping Pressurized Pipelines." The abandonment procedures are stated in GS 1740.010(MA) "Abandonment of Facilities," GS 1740.012(MA) "Abandonment of Facilities – Service Tee Removal," and GS 1782.010(MA) "Protecting Cast Iron Pipelines," including the Bay State legacy standard to GS 1782.010(MA) [4.20B "Cast Iron Replacement and Abandonment Program"].

The applicable standards are included as Attachments IR-PL-1-5 (a) through IR-PL-1-5 (e) to this response. Table IR-PL-1-5 provides a chronological listing starting from most recent with the date marked that was in effect at the time of the incident.

Table IR-PL-1-5

IR-PL-1-5 (a)	**IR-PL-1-5 (b)**	**IR-PL-1-5 (c)**	**IR-PL-1-5 (d)**	**IR-PL-1-5 (e)**
1680.010	**1740.010(MA)**	**1740.012(MA)**	**1782.010(MA)**	**BSG 4.20b**
02-28-2019 (notes added 04-19-2019) current version	01-01-2018 (version in place at the time of incident) current version	07-01-2011 (version in place at the time of incident) current version	01-01-2013 (version in place at the time of incident) current version	
02-28-2019	07-01-2014	06-10-2011	04-01-2009	
06-01-2018 (version in place at the time of incident)	11-01-2013			04/04/1994
01-01-2016	01-01-2013			07/30/1992
01-01-2014	01-01-2012			
04-22-2013	07-08-2011			
01-01-2013	04-01-2010			

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Gas Standard

Distribution Operations

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 1 of 42

Companies Affected:	☒ NIPSCO	☒ CVA	☒ CMD
		☒ CKY	☒ COH
		☒ CMA	☒ CPA

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations range from routine to complex and are sometimes referred to as “management of change operations.” The term “Tie-in Plan” refers to a written document that includes requirements and steps for tie-ins and tapping of pressurized pipeline facilities and can incorporate other related elements such as bypassing, abandonments, purging, special odorization requirements and testing. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the Tie-in Plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 “Pressure Testing.”

Fittings used for tapping and plugging, including but not limited to, fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not

subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. Refer to the applicable GS 1500.010 “Pressure Testing” for leak test procedures for steel tapping and stopping fittings.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1690.010 “Purging.”
c. GS 1740.010 “Abandonment of Facilities.”
d. GS 1770.010 “Prevention of Accidental Ignition.”

2. DEFINITIONS

For the purpose of this gas standard, the following definitions are applicable.

“Person in Charge” is the person responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.

“Reinforced,**”** as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

For other definitions, refer to GS 1012.010 “Definitions.”

3. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

3.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: Only hand tighten a cap on a plastic tapping tee. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standard Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit C for related mapping symbols.

3.2 Steel or Wrought Iron

3.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on distribution pipelines with an MAOP equal to or greater than 200 psig or transmission class pipelines, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

3.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

3.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure

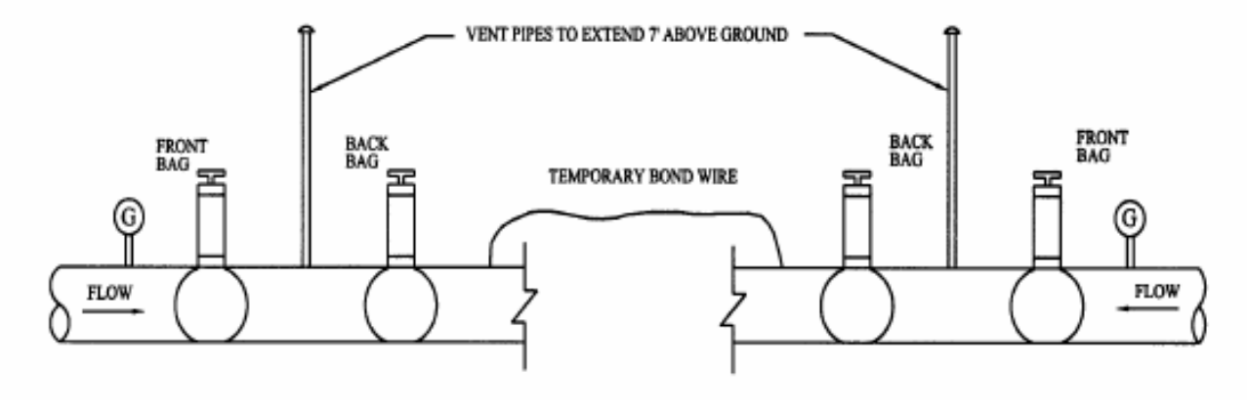
for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



3.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

3.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

3.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

3.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be

installed on 4 inch cast iron or ductile iron without reinforcement.

4. WRITTEN TIE-IN PLAN

A Tie-in Plan shall be prepared for tie-in operations on the following types of work.

1. Designed capital mainline installations, replacement and/or abandonment work.
2. Designed capital installations, replacements and/or abandonments of measurement, regulation, or measurement and regulation (M&R) stations.
3. Emergency work, either capital or operations and maintenance (O&M), involving the replacement of mains, temporary bypass of a mainline or a mainline to be temporarily taken out of service. The Tie-in Plan for emergency work may be expedited and consolidate multiple elements such as the Advance and Execution Briefings (see Section 5.1 below). However, safety cannot be compromised.
4. Maintenance operations that require a temporary bypass of a mainline or require a mainline to be temporarily taken out of service.

NOTE: A Tie-in Plan is not required for operating a regulator station utilizing its permanent setting bypass.

4.1 Plan Requirements

The Tie-in Plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The Tie-in Plan includes two parts, the “Tie-in Plan: Design” and the “Tie-in Plan: Execution Steps,” as identified in the tie-in template. The Design is to be completed as part of the job order approval. The Execution Steps portion has to be prepared prior to the Advance Briefing (see Section 5.1.1 below).

The Tie-in Plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s) as described in Section 5.

A Tie-in Plan template example is shown in Exhibits A and B. Standard templates and drawings are provided through the Engineering SharePoint site and WMSDocs.

The Tie-in Plan shall address the following items, as applicable. Additional items may be addressed as deemed appropriate.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions to prevent abnormal operating conditions, such as the following.
    a. Identification and protection of control lines and tap locations.
    b. Knowledge of maximum allowable operating pressure (MAOP) and expected range of system pressures during tie-in operations.

3. Scope or extent of system to be tied in and/or bypassed.
4. Identification of station(s) (district regulator, point-of-delivery (POD), town border - permanent or temporary), as follows.
    a. Delivering gas directly to the system in the area of the tie-in.
    b. Downstream of the work being performed that would be impacted and require monitoring during the tie-in process.
    c. Where a significant change in flow (increase or decrease) could result from the work.

    All stations identified shall be analyzed to determine the need for monitoring during excavation or the tie-in process.

    For low pressure regulator stations identified, refer to ON 19-02 “Low Pressure Regulator System Work Requirements” for the requirements to monitor low pressure regulator stations (based on completed LP Enhanced Safety Actions) during tie-in operations.

    All stations downstream of the work being performed shall be equipped with proper equipment (e.g., strainers) to protect the pressure regulation from pipeline debris such as construction shavings.

    All stations identified shall also have an accurate isometric sketch which is available in GIS, at the station and included in the project drawings.
5. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
6. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
7. Verification of pressure and content.
8. Method and location of pressure control and monitoring for tie-in location(s).
9. Determining the sequence of closing and opening valves or any other flow controlling device.
10. Identifying applicable valve(s), which should be located and checked for accessibility and operability before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
11. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
12. Planning for additional pressure monitoring at regulator stations where excavation is planned to occur within the footprint of a POD or district plant

regulator station or within 25 feet of a station building or fence unless all regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines are verified to be located completely above ground (refer to applicable GS 1100.040 “Damage Prevention when Using Conventional Excavation Technologies”).

13. For tie-ins on a metallic pipeline operating above 10 psig, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

    EXCEPTIONS: The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the Tie-in Plan due to one or more of the following exceptions, the exception(s) shall be documented in the Tie-in Plan.

    a. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.

    b. Direct tie-ins with full-sized steel bypass (see example in Exhibit D).

    c. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

    Refer to Section 5.2.d. for methods of evaluation for unknown mechanical couplings.

14. Check for leak-through of line stopping devices.

15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance).

16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).

17. Communication between critical points during the operation (e.g., monitoring pressures).

18. Notification of customers who will have service temporarily interrupted (if applicable).

19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.

20. Notification of Gas Control. Engineering shall review each planned tie-in to determine if it could impact Gas Control operations (e.g., SCADA monitored points, ERX) resulting in a high or low alarm as well as to determine if Gas Control could assist in management of the tie-in process. If it is determined that Gas Control can assist in management of a tie-in process, Gas Control is to be notified, and the Engineer shall indicate on the Tie-in Plan that notification of Gas Control is required and list the points monitored by Gas Control that could be impacted.
21. Odorant level testing if determined necessary by Engineering.

4.2 Plan Accountability

Engineering shall prepare or provide final review of the Tie-in Plan. Request input from Construction or Operations personnel for Tie-in Plans, as needed.

When Tie-in Plans involve the installation of concrete anchor(s) on a metallic pipeline (resulting from the evaluation for unknown mechanical couplings), the Tie-in Plan, prepared by Engineering, shall also be approved by all of the following, except as noted.

a. Engineering Leader.
b. Construction (or Project Management) Leader.
c. Corrosion Leader.

NOTE: If consensus cannot be reached between Engineering, Construction (or Project Management), and Corrosion leadership for Tie-in Plans involving the installation of concrete anchor(s) on a metallic pipeline, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the Tie-in Plan.

5. PRE-CONSTRUCTION

5.1 Tie-in Plan Briefings

5.1.1 Advance Briefing

The Tie-in Plan advance briefing is to provide project leadership with a clear understanding of the planned tie-in(s). The Tie-in Plan advance briefing will typically be completed during the Pre-Construction Review or Constructability Review (refer to GS 2810.050 “Stakeholder Review of Capital Projects”) and shall include all of the following personnel, as applicable.

a. The Engineer responsible for the Tie-in Plan. The Engineer’s responsibility includes coordination of the advance briefing. This can be accomplished through a group meeting, one on one

sessions or otherwise communicated as appropriate as long as understanding of the Tie-in Plan is accomplished and confirmation is documented.

b. M&R Leader (or designee).

c. Local OCM or designee as operator of the overall system.

d. Construction or Field Operations Leader (or designee) responsible for the project.

e. Engineering Leader.

f. Person in Charge of tie-in execution (e.g., crew leader, Construction Coordinator/Inspector).

g. Manager Transmission Integrity (or designee), if the Tie-in Plan involves a Company-owned transmission line.

5.1.2 Execution Briefing

The Tie-in Plan execution briefing shall be conducted for each individual tie-in within a job order on the same day of the tie-in and shall include the following personnel. If the tie-in takes multiple days to complete, the Execution Briefing is to be repeated each day. It is also to be repeated when there is a change in personnel involved with the tie-in.

1. Person in Charge. The Person in Charge of the tie-in execution (e.g., crew leader, Construction Coordinator / Inspector). Their responsibility includes conducting the Tie-in Plan execution briefing to assure understanding of the plan and to make assignments for the required tasks of the tie-in execution (e.g., monitoring pressure at various locations during tie-in operations, regulator station monitoring or adjustments, tapping, stopping, bypassing).

2. Personnel performing tasks. Personnel performing the tasks involved with the tie-in execution.

3. Engineer. Engineer responsible for the Tie-in Plan as needed and requested.

The Execution Briefing shall cover the following.

a. Review of the Tie-in Plan.

b. Designation of personnel responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations).

c. Review of the expected system status and configuration based on Company records and the Tie-in Plan to make sure Company facility

records and the Tie-in Plan are consistent with what is visually observed in the tie-in excavation. Any discrepancies in Company facility records and the Tie-in Plan shall be addressed by reconciling Company facility records to the actual conditions found (i.e., submit map revision in accordance with GS 2610.040 “Map Revisions”) and by the Engineer evaluating and adjusting the Tie-in Plan (also see “i” below).

d. Review system MAOPs and acceptable pressures expected to be encountered at system monitoring locations.

e. Verification that on-site communications equipment is functioning properly.

f. Verification that tapping equipment is rated equal to or greater than the operating pressure.

g. Requirements of work zone and personal protective equipment (PPE) safety.

h. Reminder of Stop Work Authority. Every employee has the responsibility and authority to Stop Work immediately if a situation arises due to an unsafe action, condition, behavior or non-action that may potentially lead to an incident. Work suspended due to a Stop Work action shall not resume until all safety concerns are addressed.

i. If modifications to the Tie-in Plan are required after review at the job site, the changes shall be approved by all of the following.

    1. Engineer.
    2. M&R Leader (or designee).
    3. Construction or Field Operations Leader (or designee) responsible for the project.

Any changes or adjustments to the Tie-in Plan shall be documented, including revision approvals, and another execution briefing shall be held if the changes were made after the original execution briefing.

5.2 Other Pre-Construction Activities

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. If indicated by the Tie-in Plan, notify Gas Control of the work to be performed. This notification shall include the following.

    1. A point of contact for the crew performing the tie-in activity.
    2. A list of the points monitored by Gas Control that could be

impacted by the work.

3. Proposed start and end times of the tie-in activity.

c. For impacted LP stations (as identified on the Tie-in Plan), the location of the control lines and control line taps shall be verified and added to or updated on the LP station isometric drawing as necessary.

d. If the tie-in excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence, available isometric drawings and/or as-built station drawings shall be reviewed for locations of buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines. Known buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines shall be located prior to excavation.

e. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin. If modifications to the Tie-in Plan are required, the changes shall be approved, documented, and communicated in accordance with Section 5.1.2.i. above.

NOTE**:** If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership and Gas Control.

f. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1410.010 "Metallic Pipeline Exposures" for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

g. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent

coupling pullout.

1. Check the Tie-in Plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rock shield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, side booms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline operating above 10 psig, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

   NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

   Methods of evaluation for unknown mechanical couplings include the following options.

   i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. If the pipeline operating pressure is higher than the maximum working pressure of the camera system, consider reducing the pipeline operating pressure to allow for the use of a camera to inspect for mechanical couplings. If reducing the pipeline operating pressure is not practicable, refer to options identified in bullets “ii” and “iii” below.

      The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

   ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

      Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut

down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

iv. If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

   If no indication of couplings are found, the project may resume without further investigation.

   If mechanical coupling(s) are found or if the evaluation is inconclusive, take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

   i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

      NOTE: Evaluation of the pipeline from the edge of the new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

   ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

   iii. Anchor.

   iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

   v. Take the pipeline out of service.

   vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or

to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 8.2 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

6. DURING CONSTRUCTION

Qualified Company personnel shall be on site and in charge of the tie-in execution.

Assignments, as outlined in Section 5.1.2, shall be executed as planned and discussed in the Tie-in Plan execution briefing.

6.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), properly calibrated pressure gauges shall be installed in appropriate locations and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

Regulating stations identified in the Tie-in Plan shall be monitored throughout the tie-in process by qualified personnel that can take corrective action at the station in the event an Abnormal Operating Condition (AOC) occurs, until the tie-in gauges are removed to ensure proper operation. Engineering will provide expected pressure ranges. Actual pressure information will be recorded as identified in the Tie-in Plan: Execution Steps.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration shall be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. If a tie-in involves shutting down a section of pipeline immediately downstream of a

regulator station supply, leak-through of the bypass valve or regulator orifice may occur which could result in a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure may occur on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken, and a new Tie-in Plan is prepared.

Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

6.2 Bypassing and Stopping Techniques

Engineering shall provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions shall be strictly followed to avoid exposure to combustible gas-air mixtures. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is necessary to maintain gas service to downstream customers, unless an alternate gas supply is arranged (e.g. portable gas supply, alternate fuel).

6.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.

b. A combustible atmosphere in the work area cannot be avoided.

c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.

d. The tie-in is on cast iron pipe.

e. An installation is temporary (e.g., regulators for bypassing or uprating).

f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

6.4 Additional Tie-In Considerations

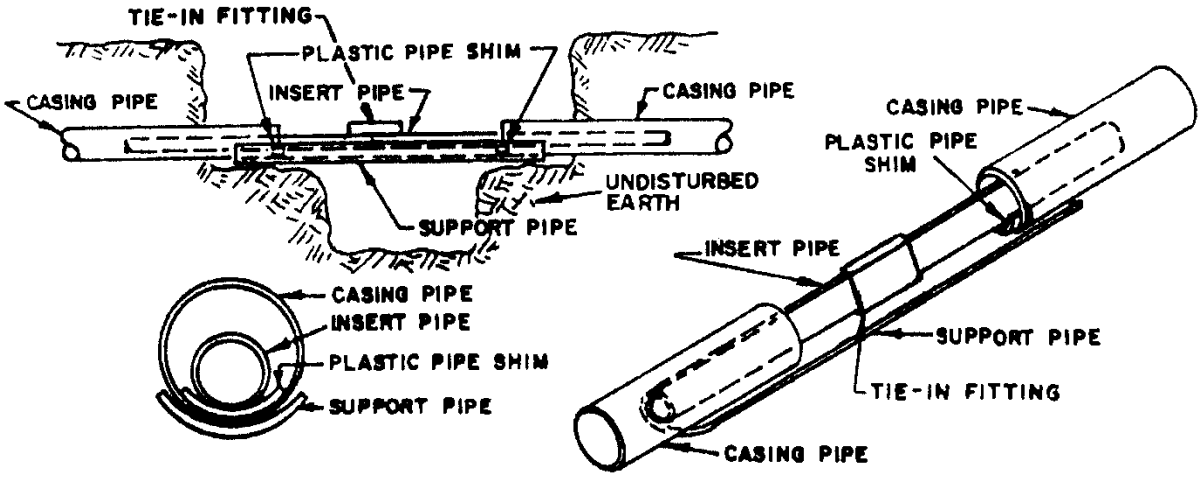
The following general tie-in considerations shall be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in shall be installed according to GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture,

screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

7. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair clamps, or installing and/or removing any other appropriate materials, tools, or equipment.

e. Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

f. Engineering shall determine whether post construction odorant level testing is necessary, which should be part of the Tie-in Plan. If odorant level testing is required, refer to the applicable GS 1670.020 "Odor Level Monitoring" and GS 1670.040 "Pipeline Conditioning New Pipelines."

8. RECORDS

8.1 Written Tie-In Plans

Approved and executed Tie-in Plans, including completed documentation of each checklist and step, shall be filed with the work order completion report and retained for at least the life of the pipeline plus 10 years.

8.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 “Map Revision” to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

EXHIBIT A
(1 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

CONTENTS

EXHIBIT A
(2 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

<<Project Name>>

Tie-In Plan: DESIGN

(To be completed prior to project approval)

System Number(s) involved		Tie-in Site Identifiers	
MAOP(s)		Expected Pressure Range(s)	
Feed into tie-in site	Choose an item	Bypass(es) Needed	Choose an item
M&R Needed during Tie-in?	Choose an item		

Tie-In Plan: Cover Sheet

No tie-in is to be made without a Written Tie-in Plan

1. The purpose of this plan is to address the requirements of tapping (GS 1680.010), pressure testing (GS 1500.010), purging (GS 1690.010), and abandonment (GS 1740.010) when performing tie-in planning and execution.
2. All persons performing any tie-in/bypass/abandonment operation ("tie-in") shall review the entire Tie-in Plan.
3. When any clarification or alteration is required, contact Engineering as far in advance of the tie-in as possible.
4. Engineering must re-review the Tie-in Plan prior to the start of the process when the temperature is at or below XX°F during any portion of the tie-in.
5. All persons performing tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire tie-in process and documented in the Company's system of record for the Project.
6. The person overseeing and controlling execution of the tie-in process is referred to as the "Person in Charge". The Person in Charge is responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.
7. Throughout all Tie-in planning, preparation and execution, all persons shall follow proper procedures, Gas Standards, and safety precautions. These include but are not limited to the following Contingnecy Plan, Tie-in Plan, and checklists attached below:
   - Tie-in Planning – Engineering
   - Tie-in Preparation – Construction / Field Operations
   - Tie-in Execution Briefing – Construction / Field Operations

Contingency (Emergency Shut-down) Plan for this tie-in:

The project Contingency plan shall be used in the event of an emergency or hazardous situation during execution of the Tie-in plan. This is a supplement to the Emergency Manual and Gas Standard series GS 1150.

Contact the Field Operations Leader {Name of Field Operations Leader} at phone number {Field Operations Leader's Phone number} immediately in the event of an emergency.

A decision to shut down mains shall be based on protection of life and property, followed by maintaining gas service to customers.

EXHIBIT A
(3 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Emergency Isolation Valve(s) and Alternate Points of isolation have been identified, documented on the Project's Emergency Isolation Valve Form, and included with this document.

Checklist: Tie-in Planning – Engineering

☑	N/A	Tie-in Planning – Engineering (Check the appropriate box for each item)
☐	☐	a. Identify regulator station(s) requiring locating buried "control lines" ("control lines" also refer to regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines) prior to tie-in (GS 1100.040).
☐	☐	b. Identify regulator station(s) potentially requiring monitoring during tie-in. i. Regulator stations within 25 feet of tie-in excavation work, unless all control lines are confirmed to be completely above ground (ON 15-05). ii. Trace all lines planned for abandonment to confirm appropriate action taken for any existing control lines or service lines. iii. Upstream and/or downstream stations impacted by tie-in (GS 1680.010). iv. Perform station flow analysis based on planned system modification to assure proper capacity with focus on post-project under or oversizing. v. Regulator stations or commercial/industrial customers upstream that may be impacted by purging operations (GS 1690.010). vi. Station isometric drawings current and included in the project drawings. vii. List of stations identified:

Station ID	Station Impacted (Y/N)	Control Lines Impacted (Y/N)	Monitoring Required (Y/N)	Comments

Sign-offs: _____ Engineer _____ System Operations

☐	☐	c. Determine if tie-in(s) affect systems monitored by Gas Control, and add notification of Gas Control to the applicable tie-in scenario(s) (GS 1680.010, GS 1740.010).
☐		d. Identify MAOP of pipeline and expected range of pressures during tie-in operations for communication to field personnel and Gas Control.
☐	☐	e. Determine necessity of, size, length and temperature limitations for a bypass (GS 1680.010).
☐	☐	f. Determine the need for reinforcement for branch connections (GS 2420.010).
☐	☐	g. Determine if pressure changes are expected from moving customers from one system to another.
☐	☐	h. Determine if scope of job requires odorant checks and pipeline conditioning (GS 1670.040).
☐	☐	i. Identify downstream M&R and customer stations supplied by the project's pipeline section. Ensure proper equipment is installed to prevent pipeline debris from entering regulator equipment (e.g.: strainers). Plan for equipment installations and monitoring at downstream stations as needed.
☐		j. Create Emergency Shutdown plan. Identify valve(s) to be operated in case of emergency (GS 1680.010).
☐		k. Project drawings updated to show tie-in locations and designs, including required materials (permanent and temporary bypass) on the bill of materials.

EXHIBIT A
(4 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Project's Emergency Isolation Valves & Alternate Points

Ops Center: _____

<<SYSTEM NUMBER>> (<< HP / MP / IP / LP >>) SEGMENT ISOLATION VALVES

Total Quantity of Isolation Valves: _____ Additional Valves: _____

Verify & record that each valve is Operational within 30 days of tie-in, and verify Accessibility immediately before tie-in.

Ref #	Cross St / House # Or Alternate Point Description	Size	Type (ST/PL)	Year Installed	Facility ID / AKA	Critical? (Y/N)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Closing these valves will isolate the following area(s): <<List Streets and Critical Customers>>

DISCLAIMER: THE ISOLATION OF THIS AREA DOES NOT GUARANTEE CONTINUOUS FLOW DOWNSTREAM OF THE ISOLATED AREA

<<Copy and complete this page for each system that has work done on it by this project. This paragraph should be deleted>>

EXHIBIT A
(5 of 18)

Example Tie-in Plan Template

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Pipe Internal Surface Area Calculation for Odorant Monitoring

Engineer to put a screenshot or other legible output copy of the project's "Pipe Surface Area Calculator" on this page for odorant check requirements (this text should be deleted)

EXHIBIT A
(6 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Tie-In Plan: Execution Steps

(To be completed prior to the Tie-in Advance Briefing with modifications or additions as needed during construction)

Advance Briefing: This briefing shall be conducted by Engineering.

Tie-in and Contingency Plan Reviewed by:

Title (or designee)	Name	Signature (or describe alternate confirmation)	Date
Engineer			
M&R Leader			
Construction or Field Leader			
Engineering Leader			

Checklist: Tie-in Preparation – Construction / Field Operations

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		a. Review job order package for completeness, accuracy and any system restrictions that must be considered prior to construction that could alter Tie-In Plans and Procedures.
☐		b. Set up Work Area Protection (GS 4100.020, GS 1770.010). • Traffic plan • Confined space entry • Excavation safety (shoring and ladders) • Noise and particulate protection for hard surface removal • Fire extinguishers • Conformance with HSE 4100.010 Hazardous Atmosphere Consideration • Adequate number of road plates available
☐	☐	c. Locate control lines at regulator stations identified by Engineering. Verify that the Isometric Sketch at each engineering-identified station contains control line measurements; notify engineering if sketch is incomplete, incorrect, or older than one calendar year. Work with Engineering to update station documentation (and Infrastructure Records) accordingly.
☐		d. Locate valve(s) identified for Emergency Shutdown, and verify that valve(s) are accessible and operable prior to Tie-in.
☐	☐	e. Notify customers who will have service temporarily interrupted to review job expectations (if applicable).
☐		f. Visually expose and verify systems and configurations match the Tie-in plan. Investigate and address inconsistencies. Ensure adequate plans are established to plate or protect road openings for off-hours.
☐		g. Verify required equipment and materials are available.
☐		h. Verify pressure and contents of pipeline(s) (GS 1680.010).
☐		i. Inspect pipe condition to determine suitability for tapping (GS 1680.010).
☐	☐	j. Obtain safe embedment distance from Engineering and evaluate metallic pipelines for the existence of mechanical couplings and take steps to prevent coupling pullout (GS 1680.010).
☐		k. Pressure test all pipelines and bypasses that will contain gas prior to introduction of gas (GS 1500.010).

EXHIBIT A
(7 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		l. Identify potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures.
☐		m. Conduct Tie-in Execution briefing whenever a new tie-in sequence is started (GS 1680.010). Discuss communication expectation at critical points during the Tie-in (e.g., monitoring pressures prior, during and after Tie-in).

Checklist: Pre-Construction Review – Construction / Field Operations

☑	Pre-Construction Review – Construction/Field Operations (Check the box once each item is completed)
☐	a. Review Tie-in Plan and Contingency Plan.
☐	b. Review the Operator Qualification(s). All persons performing Tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire Tie-in process and documented in the Company's system of record for the Project (e.g., WMSdocs, Maximo).
☐	c. Notify Gas Control that work is to start in conformance with Tie-In Procedures (if indicated as necessary). GS 1170.010 Gas Control Room Management Standard.
☐	d. Designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operation.
☐	e. Discuss potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures. Reminder to communicate and resolve any AOCs prior to continuing further Tie-in operations.
☐	f. Reminder of Stop Work Authority.
☐	g. Verify that tapping equipment is rated equal to or greater than the operating pressure.
☐	h. Review expected system status and configuration, based on Company records and the Tie-in Plan • Verify tie-in designs are compatible with what is found in the tie-in excavation. • Confirm depths, sizes, materials, and pressures. Address inconsistencies before continuing. • Update Tie-In plans with field verified information. Thoroughly review tie-in plan details with all personnel involved to ensure understanding of the procedure steps and individual roles and responsibilities.
☐	i. Review system MAOPs and acceptable pressure ranges expected to be encountered at system monitoring locations.
☐	j. Verify that on-site communications equipment is functioning properly.
☐	k. Review requirements of work zone and personal protective equipment (PPE) safety.
☐	l. Perform tie-in in accordance with Tie-In Plan and applicable procedures. • Reminder that modifications to the Tie-in plan shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee. • Changes shall be documented, and list those parties involved in determining them. • Any changes or adjustments to the tie-in plan shall be communicated with the Engineer and the personnel performing the tasks and documented that the discussion of changes took place.

Crew Foreman

(Signature) (Printed Name) (Date)

Written Tie-in Template 02-26-19.docm Page 7 of 18

EXHIBIT A
(8 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Inspector or Supervisor

(Signature) (Printed Name) (Date)

EXHIBIT A
(9 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Main Installation Standard Operating Procedure

IN PROGRESS status for Use by Columbia Gas Construction/Operations Team

The following checklist is to be used by the Construction Team when working a main installation that is in the In Progress Status. The following tasks must be completed before moving the JO into the Completed Status.

This list is not intended to replace or circumvent all applicable Gas Standards or the instructions in the JO.

While this list is applicable to most main installations, the SOP is intended to address the unique operating characteristics, system configuration and potential improper operations that could occur on this specific project. Moreover, this SOP will ensure consistent performance of the tasks necessary to safely install main in compliance with federal, state regulations and company standards.

Tasks to be completed by the Construction Team for main installations before moving JO to Complete Status

Purpose: Provide direction on main installations to:

1. Identify prerequisite tasks required prior to performing field construction.
2. Identify and address system configuration and system impacts in order to mitigate potential improper system operations.
3. Identify and perform critical steps required to install new gas facilities.
4. Document completed project.

Procedure Roles and Responsibilities:

RESPONSIBILITY	PERSONNEL
Oversee Implementation of Procedure	Crew Leader/Construction Coordinator
Confirm Personnel Qualifications	Construction FLL/Construction Coordinator
Notifications (police, municipalities, Gas Control, etc)	Construction FLL
Coordination (police, municipalities, Gas Control, etc)	Construction FLL
Monitor System Pressures	Designated Crew Member
Operate Critical Valve(s)	Designated Crew Member
Monitor Excavation Safety	Crew Leader/Construction Coordinator
Document Project Completion	Crew Leader/Construction Coordinator
As-builts	Crew Leader/Construction Coordinator
Backfill and Restoration	Crew Leader/Construction Coordinator
Site Safety	Crew Leader
Locate and Mark	Dig Safe Technician

EXHIBIT A
(10 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Project-Specific Tie-in / Purge / Abandonment Steps

#1 – Plastic Branch Saddle Side Tap
#2 – Plastic Double Squeeze Scenario 1
#3 – Plastic Double Squeeze Scenario 2
#4 – Plastic Full Flow Tee By Double Squeeze W/Two Bypasses
#5 – Plastic High Volume Tapping Tee (HVTT)
#6 – Plastic Single Squeeze Abandonment
#7 – Plastic Single Squeeze One-Way Feed ("Squeeze-and-Go")
#8 – Plastic Triple Squeeze
#9 – Steel Abandonment Using a Pressure Control Fitting
#10 – Steel Double Bag Stopping - Low Pressure Only
#11 – Steel Single Pressure Control Fitting
#12 – Steel Two Pressure Control Fittings

1. Person in charge and contractor / crew leader reviewed the Tie-in Plan and determined the number of crew members needed to perform the tie-in is: _____

Title	Name (printed)	Signature (verification the step is complete)	Date

2. Execution Briefing conducted by the Person in Charge on the day of the tie-in.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date
Crew Member Attendees		Crew Member Attendees	

3. Notify Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) of the work to be performed. This notification shall include:
   a. point of contact for the crew preforming the tie-in activity

Written Tie-in Template 02-26-19.docm Page 10 of 18

EXHIBIT A
(11 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

b. list of the points monitored by Gas Control that could be impacted by the work
c. proposed start and end times of the tie-in activity, and
d. the MAOP of pipeline and expected range of pressures during Tie-in operations.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

4. Installed gauge, verified and monitored main line pressure at all points as indicated on site specific sketch.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					

5. Mainline piping and pressure control fittings installed per site specific sketch. Provided support for weight of fitting and tapping equipment as necessary.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

6. Pressure Test per **GS 1500.010**, and per Job Order design completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

7. Qualified M&R Personnel monitored Regulator Station(s). Gauges were actively watched and personnel were ready to take immediate action (i.e., having a wrench on the applicable outlet valve(s) prior to the start of the tie-in). Monitoring to continue until the tie-in gauges were removed after the tie-ins are complete.

EXHIBIT A
(12 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

8. First pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

9. Purged at point _____, as indicated on site specific sketch and filled with gas. Air is purged out of new main and 95% gas is achieved with CGI unit.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					

EXHIBIT A
(13 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

10. Second pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

11. If applicable, change over or add regulator control / sensing lines and services to new main. Do not continue until all regulator control / sensing lines and services are changed over.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Abandonment:

12. Notified appropriate Company personnel that pipeline will be taken out of service.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Written Tie-in Template 02-26-19.docm Page 13 of 18

NiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 34 of 42

EXHIBIT A
(14 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

13. Set stopping devices in pressure control fittings at points _____ and _____ to stop flow into pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

14. Properly depressurized gas from main to be abandoned via vent at point _____. Depressurize to zero (0) PSIG, continuing to monitor gauges.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

15. Verified adequate shutdown (point _____) and system stabilization. (waited a minimum of 15 minutes).

EXHIBIT A
(15 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

16. Utilized an air mover at point _____ to create suction on pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

17. Properly purged gas from piping to be abandoned at point _____ until a sustained reading of less than 2% gas is achieved with CGI unit by opening or separating main at opposite ends of piping to be abandoned at points _____ and _____.

EXHIBIT A
(16 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

18. Properly cut and separated mains at points _____ and _____. If used, mechanical end caps are strapped or blocked as required (GS 1320.010).

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

19. All pipe ends are properly sealed for abandonment.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

EXHIBIT A
(17 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

20. Removed stopping devices at points _____ and _____ and removed vents.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

21. Performed completion process for pressure control fittings at points _____ and _____.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

22. Gauges left in place and monitored following the completion of the tie-in for a minimum of 30 minutes.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

Written Tie-in Template 02-26-19.docm Page 17 of 18

EXHIBIT A
(18 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date

23. Remove all gauges at monitoring points.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

24. Soap tested all required fitting, test point, monitoring, and purge locations.
25. Test for PCBs, inspect for internal corrosion, and secure materials when required.
26. If applicable, monitor, address, and document Odorant levels.
27. Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) is notified the work is completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

28. Tie-in process complete.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

#13 – M&R Monitor Replacement & Bypass Removal
#14 – Perform Uprate (0001: XX-XXXXXXX-XX)

EXHIBIT B

Example Tie-in Sketch Template

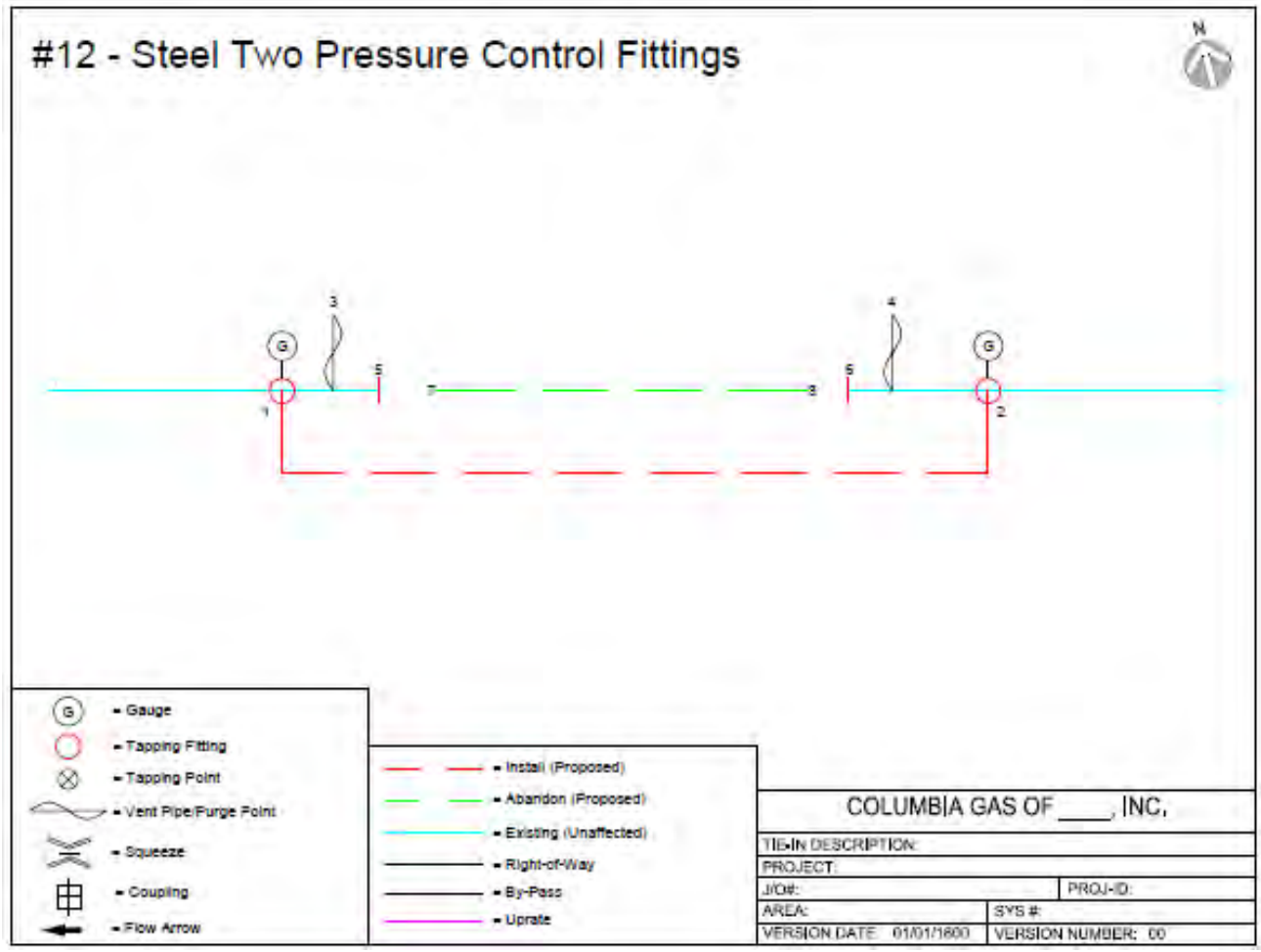
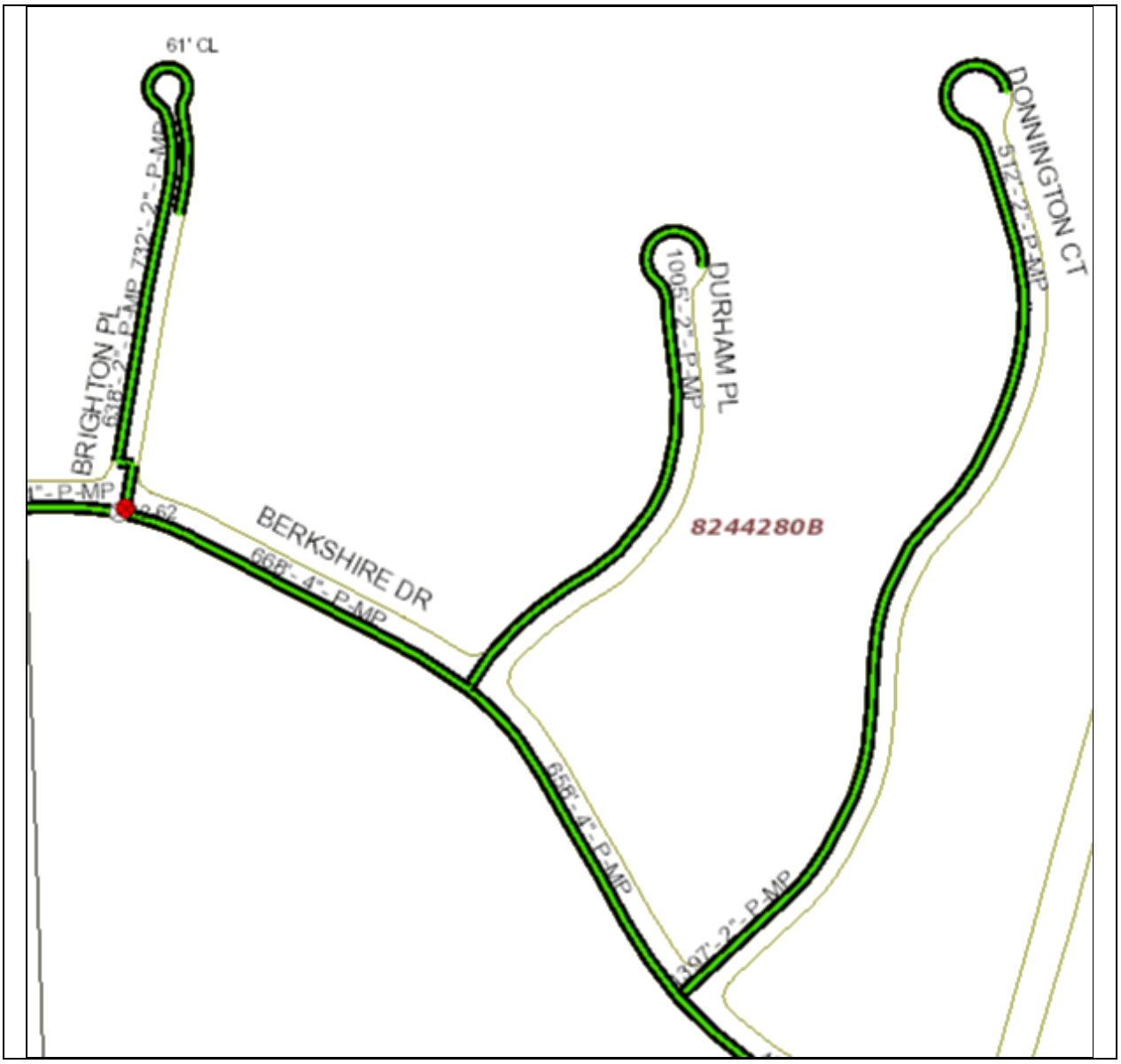


EXHIBIT C
(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

MiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 41 of 42

EXHIBIT C
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

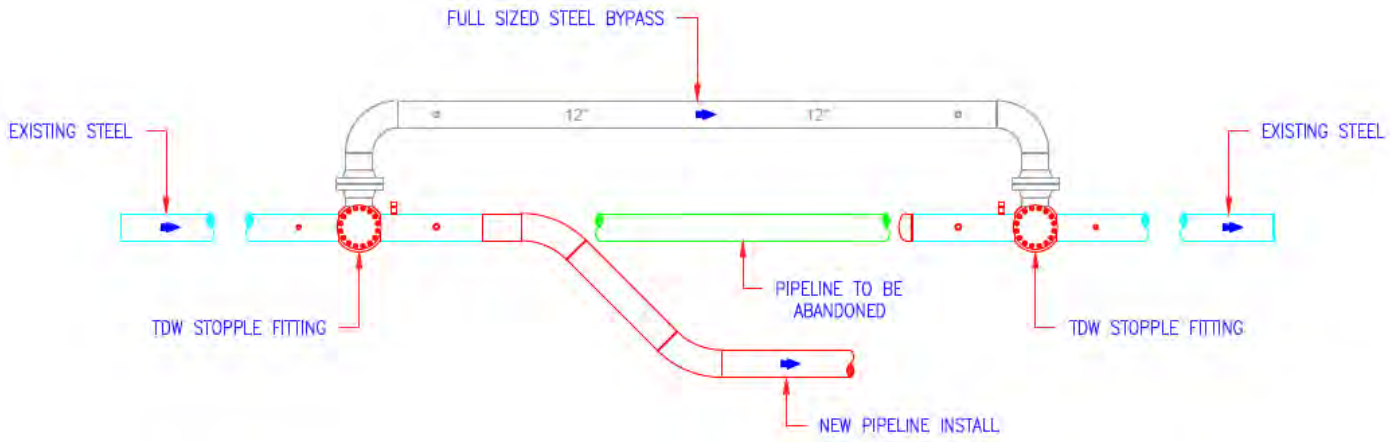
MiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 42 of 42

EXHIBIT D

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 1 of 42

Companies Affected:

☒ NIPSCO	☒ CVA	☒ CMD
	☒ CKY	☒ COH
	☒ CMA	☒ CPA

04/19/2019

See Sections 4, 5, and 6 for notes that clarify the intent of GS 1680.010 until a formal revision can be published.

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations range from routine to complex and are sometimes referred to as “management of change operations.” The term “Tie-in Plan” refers to a written document that includes requirements and steps for tie-ins and tapping of pressurized pipeline facilities and can incorporate other related elements such as bypassing, abandonments, purging, special odorization requirements and testing. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the Tie-in Plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 “Pressure Testing.”

Fittings used for tapping and plugging, including but not limited to, fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not

subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. Refer to the applicable GS 1500.010 “Pressure Testing” for leak test procedures for steel tapping and stopping fittings.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1690.010 “Purging.”
c. GS 1740.010 “Abandonment of Facilities.”
d. GS 1770.010 “Prevention of Accidental Ignition.”

2. DEFINITIONS

For the purpose of this gas standard, the following definitions are applicable.

“Person in Charge” is the person responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.

“Reinforced,**”** as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

For other definitions, refer to GS 1012.010 “Definitions.”

3. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

3.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: Only hand tighten a cap on a plastic tapping tee. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standard Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit C for related mapping symbols.

3.2 Steel or Wrought Iron

3.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on distribution pipelines with an MAOP equal to or greater than 200 psig or transmission class pipelines, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

3.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

3.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure

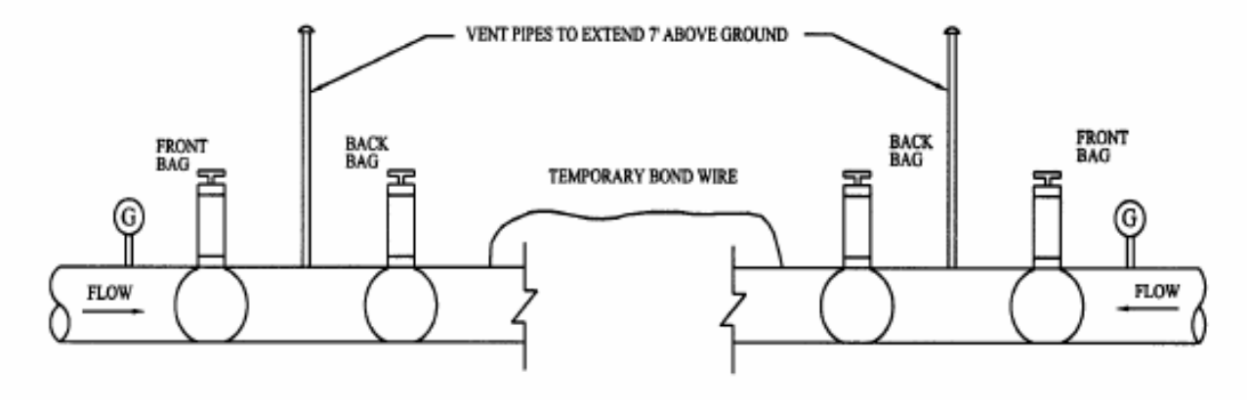
for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



3.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

3.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

3.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

3.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be

installed on 4 inch cast iron or ductile iron without reinforcement.

4. WRITTEN TIE-IN PLAN

A Tie-in Plan shall be prepared for tie-in operations on the following types of work.

1. Designed capital mainline installations, replacement and/or abandonment work.
2. Designed capital installations, replacements and/or abandonments of measurement, regulation, or measurement and regulation (M&R) stations.
3. Emergency work, either capital or operations and maintenance (O&M), involving the replacement of mains, temporary bypass of a mainline or a mainline to be temporarily taken out of service. The Tie-in Plan for emergency work may be expedited and consolidate multiple elements such as the Advance and Execution Briefings (see Section 5.1 below). However, safety cannot be compromised.
4. Maintenance operations that require a temporary bypass of a mainline or require a mainline to be temporarily taken out of service.

Clarification for Section 4, bullet 3, an expedited Tie-in Plan may consist of issuing a shut-down plan first, then following up with a start-up plan.

NOTE: A Tie-in Plan is not required for operating a regulator station utilizing its permanent setting bypass.

4.1 Plan Requirements

The Tie-in Plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The Tie-in Plan includes two parts, the “Tie-in Plan: Design” and the “Tie-in Plan: Execution Steps,” as identified in the tie-in template. The Design is to be completed as part of the job order approval. The Execution Steps portion has to be prepared prior to the Advance Briefing (see Section 5.1.1 below).

The Tie-in Plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s) as described in Section 5.

A Tie-in Plan template example is shown in Exhibits A and B. Standard templates and drawings are provided through the Engineering SharePoint site and WMSDocs.

The Tie-in Plan shall address the following items, as applicable. Additional items may be addressed as deemed appropriate.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions to prevent abnormal operating conditions, such as the following.
    a. Identification and protection of control lines and tap locations.

b. Knowledge of maximum allowable operating pressure (MAOP) and expected range of system pressures during tie-in operations.

3. Scope or extent of system to be tied in and/or bypassed.
4. Identification of station(s) (district regulator, point-of-delivery (POD), town border - permanent or temporary), as follows.
   a. Delivering gas directly to the system in the area of the tie-in.
   b. Downstream of the work being performed that would be impacted and require monitoring during the tie-in process.
   c. Where a significant change in flow (increase or decrease) could result from the work.

   All stations identified shall be analyzed to determine the need for monitoring during excavation or the tie-in process.

   For low pressure regulator stations identified, refer to ON 19-02 “Low Pressure Regulator System Work Requirements” for the requirements to monitor low pressure regulator stations (based on completed LP Enhanced Safety Actions) during tie-in operations.

   All stations downstream of the work being performed shall be equipped with proper equipment (e.g., strainers) to protect the pressure regulation from pipeline debris such as construction shavings.

   All stations identified shall also have an accurate isometric sketch which is available in GIS, at the station and included in the project drawings.
5. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
6. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
7. Verification of pressure and content.
8. Method and location of pressure control and monitoring for tie-in location(s).

Clarification for Section 4.1, bullet 4.

The intent of the first sentence in bullet 4 and the following sub-bullets a., b., and c. is to determine which stations are impacted by the Tie-in Plan.

“Impacted” stations is to be determined by the Engineer preparing the Tie-in Plan using sound engineering judgement through the use of engineering tools (e.g., Synergi), when necessary.

The remaining paragraphs in bullet 4 are the actions to take for those impacted stations.

Clarification for Section 4.1, bullet 10.

As an alternative to identifying valve(s), isolation points, such as bag or squeeze-off locations, may be identified; however, these locations must be excavated and squeeze-off or bagging equipment, as applicable must be accessible nearby.

9. Determining the sequence of closing and opening valves or any other flow controlling device.
10. Identifying applicable valve(s), which should be located and checked for accessibility and operability before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
11. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
12. Planning for additional pressure monitoring at regulator stations where excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence unless all regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines are verified to be located completely above ground (refer to applicable GS 1100.040 “Damage Prevention when Using Conventional Excavation Technologies”).
13. For tie-ins on a metallic pipeline operating above 10 psig, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

    EXCEPTIONS: The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the Tie-in Plan due to one or more of the following exceptions, the exception(s) shall be documented in the Tie-in Plan.

    a. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.
    b. Direct tie-ins with full-sized steel bypass (see example in Exhibit D).
    c. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

    Refer to Section 5.2.d. for methods of evaluation for unknown mechanical couplings.
14. Check for leak-through of line stopping devices.
15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to

applicable GS 1500.010 "Pressure Testing" for additional guidance).

16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).
17. Communication between critical points during the operation (e.g., monitoring pressures).
18. Notification of customers who will have service temporarily interrupted (if applicable).
19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.
20. Notification of Gas Control. Engineering shall review each planned tie-in to determine if it could impact Gas Control operations (e.g., SCADA monitored points, ERX) resulting in a high or low alarm as well as to determine if Gas Control could assist in management of the tie-in process. If it is determined that Gas Control can assist in management of a tie-in process, Gas Control is to be notified, and the Engineer shall indicate on the Tie-in Plan that notification of Gas Control is required and list the points monitored by Gas Control that could be impacted.
21. Odorant level testing if determined necessary by Engineering.

4.2 Plan Accountability

Engineering shall prepare or provide final review of the Tie-in Plan. Request input from Construction or Operations personnel for Tie-in Plans, as needed.

When Tie-in Plans involve the installation of concrete anchor(s) on a metallic pipeline (resulting from the evaluation for unknown mechanical couplings), the Tie-in Plan, prepared by Engineering, shall also be approved by all of the following, except as noted.

a. Engineering Leader.
b. Construction (or Project Management) Leader.
c. Corrosion Leader.

NOTE: If consensus cannot be reached between Engineering, Construction (or Project Management), and Corrosion leadership for Tie-in Plans involving the installation of concrete anchor(s) on a metallic pipeline, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the Tie-in Plan.

5. PRE-CONSTRUCTION

5.1 Tie-in Plan Briefings

5.1.1 Advance Briefing

The Tie-in Plan advance briefing is to provide project leadership with a clear understanding of the planned tie-in(s). The Tie-in Plan advance briefing will typically be completed during the Pre-Construction Review or Constructability Review (refer to GS 2810.050 “Stakeholder Review of Capital Projects”) and shall include all of the following personnel, as applicable.

a. The Engineer responsible for the Tie-in Plan. The Engineer’s responsibility includes coordination of the advance briefing. This can be accomplished through a group meeting, one on one sessions or otherwise communicated as appropriate as long as understanding of the Tie-in Plan is accomplished and confirmation is documented.

b. M&R Leader (or designee).

c. Local OCM or designee as operator of the overall system.

d. Construction or Field Operations Leader (or designee) responsible for the project.

e. Engineering Leader.

f. Person in Charge of tie-in execution (e.g., crew leader, Construction Coordinator/Inspector).

g. Manager Transmission Integrity (or designee), if the Tie-in Plan involves a Company-owned transmission line.

Clarification for 5.1.1 e.

An Engineering Leader may assign a designee.

5.1.2 Execution Briefing

The Tie-in Plan execution briefing shall be conducted for each individual tie-in within a job order on the same day of the tie-in and shall include the following personnel. If the tie-in takes multiple days to complete, the Execution Briefing is to be repeated each day. It is also to be repeated when there is a change in personnel involved with the tie-in.

1. Person in Charge. The Person in Charge of the tie-in execution (e.g., crew leader, Construction Coordinator / Inspector). Their responsibility includes conducting the Tie-in Plan execution briefing to assure understanding of the plan and to make assignments for the required tasks of the tie-in execution (e.g., monitoring pressure at various locations during tie-in operations, regulator station monitoring or adjustments, tapping, stopping, bypassing).

2. Personnel performing tasks. Personnel performing the tasks involved with the tie-in execution.

3. Engineer. Engineer responsible for the Tie-in Plan as needed and requested.

The Execution Briefing shall cover the following.

a. Review of the Tie-in Plan.

b. Designation of personnel responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations).

c. Review of the expected system status and configuration based on Company records and the Tie-in Plan to make sure Company facility records and the Tie-in Plan are consistent with what is visually observed in the tie-in excavation. Any discrepancies in Company facility records and the Tie-in Plan shall be addressed by reconciling Company facility records to the actual conditions found (i.e., submit map revision in accordance with GS 2610.040 “Map Revisions”) and by the Engineer evaluating and adjusting the Tie-in Plan (also see “i” below).

d. Review system MAOPs and acceptable pressures expected to be encountered at system monitoring locations.

e. Verification that on-site communications equipment is functioning properly.

f. Verification that tapping equipment is rated equal to or greater than the operating pressure.

g. Requirements of work zone and personal protective equipment (PPE) safety.

h. Reminder of Stop Work Authority. Every employee has the responsibility and authority to Stop Work immediately if a situation arises due to an unsafe action, condition, behavior or non-action that may potentially lead to an incident. Work suspended due to a Stop Work action shall not resume until all safety concerns are addressed.

i. If modifications to the Tie-in Plan are required after review at the job site, the changes shall be approved by all of the following.

   1. Engineer.
   2. M&R Leader (or designee).
   3. Construction or Field Operations Leader (or designee) responsible for the project.

Any changes or adjustments to the Tie-in Plan shall be documented, including revision approvals, and another execution briefing shall be held if the changes were made after the original execution briefing.

5.2 Other Pre-Construction Activities

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. If indicated by the Tie-in Plan, notify Gas Control of the work to be performed. This notification shall include the following.

   1. A point of contact for the crew performing the tie-in activity.
   2. A list of the points monitored by Gas Control that could be impacted by the work.
   3. Proposed start and end times of the tie-in activity.

c. For impacted LP stations (as identified on the Tie-in Plan), the location of the control lines and control line taps shall be verified and added to or updated on the LP station isometric drawing as necessary.

d. If the tie-in excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence, available isometric drawings and/or as-built station drawings shall be reviewed for locations of buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines. Known buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines shall be located prior to excavation.

e. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin. If modifications to the Tie-in Plan are required, the changes shall be approved, documented, and communicated in accordance with Section 5.1.2.i. above.

   NOTE**:** If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership and Gas Control.

f. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

g. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

1. Check the Tie-in Plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rock shield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, side booms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline operating above 10 psig, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

Methods of evaluation for unknown mechanical couplings include the following options.

i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. If the pipeline operating pressure is higher than the maximum working pressure of the camera system, consider reducing the pipeline operating pressure to allow for the use of a camera to inspect for mechanical couplings. If reducing the pipeline operating pressure is not practicable, refer to options

identified in bullets “ii” and “iii” below.

The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

iv. If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

If no indication of couplings are found, the project may resume without further investigation.

If mechanical coupling(s) are found or if the evaluation is inconclusive, take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

NOTE: Evaluation of the pipeline from the edge of the

new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

iii. Anchor.

iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

v. Take the pipeline out of service.

vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 8.2 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

6. DURING CONSTRUCTION

Qualified Company personnel shall be on site and in charge of the tie-in execution.

Assignments, as outlined in Section 5.1.2, shall be executed as planned and discussed in the Tie-in Plan execution briefing.

6.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), properly calibrated pressure gauges shall be installed in appropriate locations and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

Regulating stations identified in the Tie-in Plan shall be monitored throughout the tie-in process by qualified personnel that can take corrective action at the station in the event an Abnormal Operating Condition (AOC) occurs, until the tie-in gauges are removed to ensure proper operation. Engineering will provide expected pressure ranges. Actual pressure information will be recorded as identified in the Tie-in Plan: Execution Steps.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of

the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration shall be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. If a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, leak-through of the bypass valve or regulator orifice may occur which could result in a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure may occur on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken, and a new Tie-in Plan is prepared.

Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

6.2 Bypassing and Stopping Techniques

Engineering shall provide assistance for appropriate bypass sizing.

Clarification for 6.2.

It is still acceptable to plan to temporarily interrupt service to customers to perform a tie-in (e.g., take a pipeline temporarily out of service to pressure test).

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions shall be strictly followed to avoid exposure to combustible gas-air mixtures. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is necessary to maintain gas service to downstream customers, unless an alternate gas supply is arranged (e.g. portable gas supply, alternate fuel).

6.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer's recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.

b. A combustible atmosphere in the work area cannot be avoided.

c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.

d. The tie-in is on cast iron pipe.

e. An installation is temporary (e.g., regulators for bypassing or uprating).

f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

6.4 Additional Tie-In Considerations

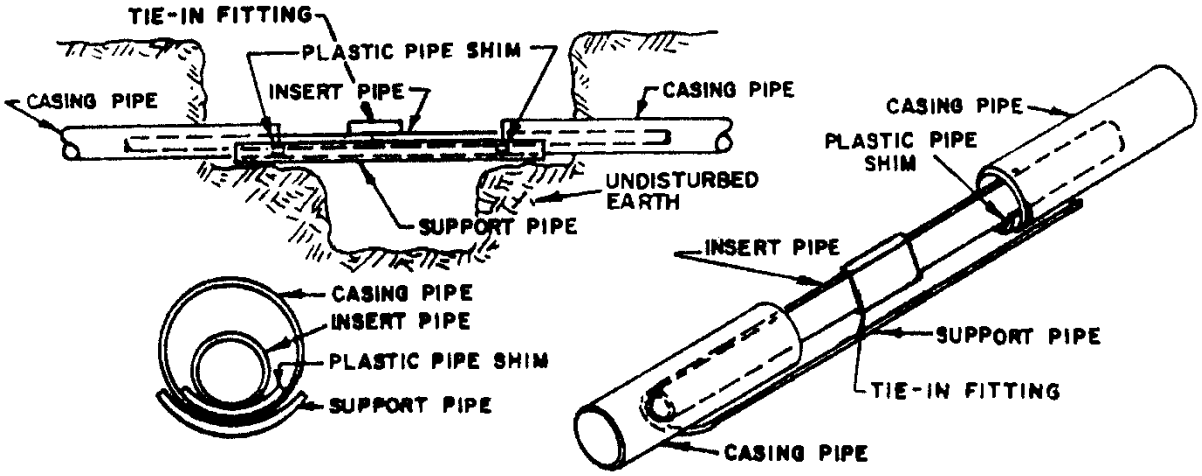
The following general tie-in considerations shall be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 "Reinforcement Requirements for Branch Connections" for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in shall be installed according to GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture, screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

7. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair

clamps, or installing and/or removing any other appropriate materials, tools, or equipment.

e. Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

f. Engineering shall determine whether post construction odorant level testing is necessary, which should be part of the Tie-in Plan. If odorant level testing is required, refer to the applicable GS 1670.020 “Odor Level Monitoring” and GS 1670.040 “Pipeline Conditioning New Pipelines.”

8. RECORDS

8.1 Written Tie-In Plans

Approved and executed Tie-in Plans, including completed documentation of each checklist and step, shall be filed with the work order completion report and retained for at least the life of the pipeline plus 10 years.

8.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 “Map Revision” to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

EXHIBIT A
(1 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

CONTENTS

EXHIBIT A
(2 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

<<Project Name>>

Tie-In Plan: DESIGN

(To be completed prior to project approval)

System Number(s) involved		Tie-in Site Identifiers	
MAOP(s)		Expected Pressure Range(s)	
Feed into tie-in site	Choose an item	Bypass(es) Needed	Choose an item
M&R Needed during Tie-in?	Choose an item		

Tie-In Plan: Cover Sheet

No tie-in is to be made without a Written Tie-in Plan

1. The purpose of this plan is to address the requirements of tapping (GS 1680.010), pressure testing (GS 1500.010), purging (GS 1690.010), and abandonment (GS 1740.010) when performing tie-in planning and execution.
2. All persons performing any tie-in/bypass/abandonment operation ("tie-in") shall review the entire Tie-in Plan.
3. When any clarification or alteration is required, contact Engineering as far in advance of the tie-in as possible.
4. Engineering must re-review the Tie-in Plan prior to the start of the process when the temperature is at or below XX°F during any portion of the tie-in.
5. All persons performing tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire tie-in process and documented in the Company's system of record for the Project.
6. The person overseeing and controlling execution of the tie-in process is referred to as the "Person in Charge". The Person in Charge is responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.
7. Throughout all Tie-in planning, preparation and execution, all persons shall follow proper procedures, Gas Standards, and safety precautions. These include but are not limited to the following Contingnecy Plan, Tie-in Plan, and checklists attached below:
   - Tie-in Planning – Engineering
   - Tie-in Preparation – Construction / Field Operations
   - Tie-in Execution Briefing – Construction / Field Operations

Contingency (Emergency Shut-down) Plan for this tie-in:

The project Contingency plan shall be used in the event of an emergency or hazardous situation during execution of the Tie-in plan. This is a supplement to the Emergency Manual and Gas Standard series GS 1150.

Contact the Field Operations Leader {Name of Field Operations Leader} at phone number {Field Operations Leader's Phone number} immediately in the event of an emergency.

A decision to shut down mains shall be based on protection of life and property, followed by maintaining gas service to customers.

EXHIBIT A
(3 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Emergency Isolation Valve(s) and Alternate Points of isolation have been identified, documented on the Project's Emergency Isolation Valve Form, and included with this document.

Checklist: Tie-in Planning – Engineering

☑	N/A	Tie-in Planning – Engineering (Check the appropriate box for each item)
☐	☐	a. Identify regulator station(s) requiring locating buried "control lines" ("control lines" also refer to regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines) prior to tie-in (GS 1100.040).
☐	☐	b. Identify regulator station(s) potentially requiring monitoring during tie-in. i. Regulator stations within 25 feet of tie-in excavation work, unless all control lines are confirmed to be completely above ground (ON 15-05). ii. Trace all lines planned for abandonment to confirm appropriate action taken for any existing control lines or service lines. iii. Upstream and/or downstream stations impacted by tie-in (GS 1680.010). iv. Perform station flow analysis based on planned system modification to assure proper capacity with focus on post-project under or oversizing. v. Regulator stations or commercial/industrial customers upstream that may be impacted by purging operations (GS 1690.010). vi. Station isometric drawings current and included in the project drawings. vii. List of stations identified:

Station ID	Station Impacted (Y/N)	Control Lines Impacted (Y/N)	Monitoring Required (Y/N)	Comments

Sign-offs: _____ Engineer _____ System Operations

☐	☐	c. Determine if tie-in(s) affect systems monitored by Gas Control, and add notification of Gas Control to the applicable tie-in scenario(s) (GS 1680.010, GS 1740.010).
☐		d. Identify MAOP of pipeline and expected range of pressures during tie-in operations for communication to field personnel and Gas Control.
☐	☐	e. Determine necessity of, size, length and temperature limitations for a bypass (GS 1680.010).
☐	☐	f. Determine the need for reinforcement for branch connections (GS 2420.010).
☐	☐	g. Determine if pressure changes are expected from moving customers from one system to another.
☐	☐	h. Determine if scope of job requires odorant checks and pipeline conditioning (GS 1670.040).
☐	☐	i. Identify downstream M&R and customer stations supplied by the project's pipeline section. Ensure proper equipment is installed to prevent pipeline debris from entering regulator equipment (e.g.: strainers). Plan for equipment installations and monitoring at downstream stations as needed.
☐		j. Create Emergency Shutdown plan. Identify valve(s) to be operated in case of emergency (GS 1680.010).
☐		k. Project drawings updated to show tie-in locations and designs, including required materials (permanent and temporary bypass) on the bill of materials.

EXHIBIT A
(4 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Project's Emergency Isolation Valves & Alternate Points

Ops Center: _____

<<SYSTEM NUMBER>> (<< HP / MP / IP / LP >>) SEGMENT ISOLATION VALVES

Total Quantity of Isolation Valves: _____ Additional Valves: _____

Verify & record that each valve is Operational within 30 days of tie-in, and verify Accessibility immediately before tie-in.

Ref #	Cross St / House # Or Alternate Point Description	Size	Type (ST/PL)	Year Installed	Facility ID / AKA	Critical? (Y/N)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Closing these valves will isolate the following area(s): <<List Streets and Critical Customers>>

DISCLAIMER: THE ISOLATION OF THIS AREA DOES NOT GUARANTEE CONTINUOUS FLOW DOWNSTREAM OF THE ISOLATED AREA

<<Copy and complete this page for each system that has work done on it by this project. This paragraph should be deleted>>

Written Tie-in Template 02-26-19.docm Page 4 of 18

EXHIBIT A
(5 of 18)

Example Tie-in Plan Template

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Pipe Internal Surface Area Calculation for Odorant Monitoring

Engineer to put a screenshot or other legible output copy of the project's "Pipe Surface Area Calculator" on this page for odorant check requirements (this text should be deleted)

EXHIBIT A
(6 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Tie-In Plan: Execution Steps

(To be completed prior to the Tie-in Advance Briefing with modifications or additions as needed during construction)

Advance Briefing: This briefing shall be conducted by Engineering.

Tie-in and Contingency Plan Reviewed by:

Title (or designee)	Name	Signature (or describe alternate confirmation)	Date
Engineer			
M&R Leader			
Construction or Field Leader			
Engineering Leader			

Checklist: Tie-in Preparation – Construction / Field Operations

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		a. Review job order package for completeness, accuracy and any system restrictions that must be considered prior to construction that could alter Tie-In Plans and Procedures.
☐		b. Set up Work Area Protection (GS 4100.020, GS 1770.010). • Traffic plan • Confined space entry • Excavation safety (shoring and ladders) • Noise and particulate protection for hard surface removal • Fire extinguishers • Conformance with HSE 4100.010 Hazardous Atmosphere Consideration • Adequate number of road plates available
☐	☐	c. Locate control lines at regulator stations identified by Engineering. Verify that the Isometric Sketch at each engineering-identified station contains control line measurements; notify engineering if sketch is incomplete, incorrect, or older than one calendar year. Work with Engineering to update station documentation (and Infrastructure Records) accordingly.
☐		d. Locate valve(s) identified for Emergency Shutdown, and verify that valve(s) are accessible and operable prior to Tie-in.
☐	☐	e. Notify customers who will have service temporarily interrupted to review job expectations (if applicable).
☐		f. Visually expose and verify systems and configurations match the Tie-in plan. Investigate and address inconsistencies. Ensure adequate plans are established to plate or protect road openings for off-hours.
☐		g. Verify required equipment and materials are available.
☐		h. Verify pressure and contents of pipeline(s) (GS 1680.010).
☐		i. Inspect pipe condition to determine suitability for tapping (GS 1680.010).
☐	☐	j. Obtain safe embedment distance from Engineering and evaluate metallic pipelines for the existence of mechanical couplings and take steps to prevent coupling pullout (GS 1680.010).
☐		k. Pressure test all pipelines and bypasses that will contain gas prior to introduction of gas (GS 1500.010).

EXHIBIT A
(7 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		l. Identify potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures.
☐		m. Conduct Tie-in Execution briefing whenever a new tie-in sequence is started (GS 1680.010). Discuss communication expectation at critical points during the Tie-in (e.g., monitoring pressures prior, during and after Tie-in).

Checklist: Pre-Construction Review – Construction / Field Operations

☑	Pre-Construction Review – Construction/Field Operations (Check the box once each item is completed)
☐	a. Review Tie-in Plan and Contingency Plan.
☐	b. Review the Operator Qualification(s). All persons performing Tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire Tie-in process and documented in the Company's system of record for the Project (e.g., WMSdocs, Maximo).
☐	c. Notify Gas Control that work is to start in conformance with Tie-In Procedures (if indicated as necessary). GS 1170.010 Gas Control Room Management Standard.
☐	d. Designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operation.
☐	e. Discuss potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures. Reminder to communicate and resolve any AOCs prior to continuing further Tie-in operations.
☐	f. Reminder of Stop Work Authority.
☐	g. Verify that tapping equipment is rated equal to or greater than the operating pressure.
☐	h. Review expected system status and configuration, based on Company records and the Tie-in Plan • Verify tie-in designs are compatible with what is found in the tie-in excavation. • Confirm depths, sizes, materials, and pressures. Address inconsistencies before continuing. • Update Tie-In plans with field verified information. Thoroughly review tie-in plan details with all personnel involved to ensure understanding of the procedure steps and individual roles and responsibilities.
☐	i. Review system MAOPs and acceptable pressure ranges expected to be encountered at system monitoring locations.
☐	j. Verify that on-site communications equipment is functioning properly.
☐	k. Review requirements of work zone and personal protective equipment (PPE) safety.
☐	l. Perform tie-in in accordance with Tie-In Plan and applicable procedures. • Reminder that modifications to the Tie-in plan shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee. • Changes shall be documented, and list those parties involved in determining them. • Any changes or adjustments to the tie-in plan shall be communicated with the Engineer and the personnel performing the tasks and documented that the discussion of changes took place.

Crew Foreman

(Signature) (Printed Name) (Date)

Written Tie-in Template 02-26-19.docm Page 7 of 18

EXHIBIT A
(8 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Inspector or Supervisor

(Signature) (Printed Name) (Date)

EXHIBIT A
(9 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Main Installation Standard Operating Procedure

IN PROGRESS status for Use by Columbia Gas Construction/Operations Team

The following checklist is to be used by the Construction Team when working a main installation that is in the In Progress Status. The following tasks must be completed before moving the JO into the Completed Status.

This list is not intended to replace or circumvent all applicable Gas Standards or the instructions in the JO.

While this list is applicable to most main installations, the SOP is intended to address the unique operating characteristics, system configuration and potential improper operations that could occur on this specific project. Moreover, this SOP will ensure consistent performance of the tasks necessary to safely install main in compliance with federal, state regulations and company standards.

Tasks to be completed by the Construction Team for main installations before moving JO to Complete Status

Purpose: Provide direction on main installations to:

1. Identify prerequisite tasks required prior to performing field construction.
2. Identify and address system configuration and system impacts in order to mitigate potential improper system operations.
3. Identify and perform critical steps required to install new gas facilities.
4. Document completed project.

Procedure Roles and Responsibilities:

RESPONSIBILITY	PERSONNEL
Oversee Implementation of Procedure	Crew Leader/Construction Coordinator
Confirm Personnel Qualifications	Construction FLL/Construction Coordinator
Notifications (police, municipalities, Gas Control, etc)	Construction FLL
Coordination (police, municipalities, Gas Control, etc)	Construction FLL
Monitor System Pressures	Designated Crew Member
Operate Critical Valve(s)	Designated Crew Member
Monitor Excavation Safety	Crew Leader/Construction Coordinator
Document Project Completion	Crew Leader/Construction Coordinator
As-builts	Crew Leader/Construction Coordinator
Backfill and Restoration	Crew Leader/Construction Coordinator
Site Safety	Crew Leader
Locate and Mark	Dig Safe Technician

EXHIBIT A
(10 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Project-Specific Tie-in / Purge / Abandonment Steps

#1 – Plastic Branch Saddle Side Tap
#2 – Plastic Double Squeeze Scenario 1
#3 – Plastic Double Squeeze Scenario 2
#4 – Plastic Full Flow Tee By Double Squeeze W/Two Bypasses
#5 – Plastic High Volume Tapping Tee (HVTT)
#6 – Plastic Single Squeeze Abandonment
#7 – Plastic Single Squeeze One-Way Feed ("Squeeze-and-Go")
#8 – Plastic Triple Squeeze
#9 – Steel Abandonment Using a Pressure Control Fitting
#10 – Steel Double Bag Stopping - Low Pressure Only
#11 – Steel Single Pressure Control Fitting
#12 – Steel Two Pressure Control Fittings

1. Person in charge and contractor / crew leader reviewed the Tie-in Plan and determined the number of crew members needed to perform the tie-in is: _____

Title	Name (printed)	Signature (verification the step is complete)	Date

2. Execution Briefing conducted by the Person in Charge on the day of the tie-in.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date
Crew Member Attendees		Crew Member Attendees	

3. Notify Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) of the work to be performed. This notification shall include:
   a. point of contact for the crew preforming the tie-in activity

Written Tie-in Template 02-26-19.docm Page 10 of 18

EXHIBIT A
(11 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

b. list of the points monitored by Gas Control that could be impacted by the work
c. proposed start and end times of the tie-in activity, and
d. the MAOP of pipeline and expected range of pressures during Tie-in operations.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

4. Installed gauge, verified and monitored main line pressure at all points as indicated on site specific sketch.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					

5. Mainline piping and pressure control fittings installed per site specific sketch. Provided support for weight of fitting and tapping equipment as necessary.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

6. Pressure Test per **GS 1500.010**, and per Job Order design completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

7. Qualified M&R Personnel monitored Regulator Station(s). Gauges were actively watched and personnel were ready to take immediate action (i.e., having a wrench on the applicable outlet valve(s) prior to the start of the tie-in). Monitoring to continue until the tie-in gauges were removed after the tie-ins are complete.

EXHIBIT A
(12 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

8. First pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

9. Purged at point _____, as indicated on site specific sketch and filled with gas. Air is purged out of new main and 95% gas is achieved with CGI unit.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					

Written Tie-in Template 02-26-19.docm Page 12 of 18

EXHIBIT A
(13 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

10. Second pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

11. If applicable, change over or add regulator control / sensing lines and services to new main. Do not continue until all regulator control / sensing lines and services are changed over.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Abandonment:

12. Notified appropriate Company personnel that pipeline will be taken out of service.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

EXHIBIT A
(14 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

13. Set stopping devices in pressure control fittings at points _____ and _____ to stop flow into pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

14. Properly depressurized gas from main to be abandoned via vent at point _____. Depressurize to zero (0) PSIG, continuing to monitor gauges.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

15. Verified adequate shutdown (point _____) and system stabilization. (waited a minimum of 15 minutes).

EXHIBIT A
(15 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

16. Utilized an air mover at point _____ to create suction on pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

17. Properly purged gas from piping to be abandoned at point _____ until a sustained reading of less than 2% gas is achieved with CGI unit by opening or separating main at opposite ends of piping to be abandoned at points _____ and _____.

EXHIBIT A
(16 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

18. Properly cut and separated mains at points _____ and _____. If used, mechanical end caps are strapped or blocked as required (GS 1320.010).

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

19. All pipe ends are properly sealed for abandonment.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

EXHIBIT A
(17 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

20. Removed stopping devices at points _____ and _____ and removed vents.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

21. Performed completion process for pressure control fittings at points _____ and _____.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

22. Gauges left in place and monitored following the completion of the tie-in for a minimum of 30 minutes.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

Written Tie-in Template 02-26-19.docm Page 17 of 18

EXHIBIT A
(18 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date

23. Remove all gauges at monitoring points.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

24. Soap tested all required fitting, test point, monitoring, and purge locations.
25. Test for PCBs, inspect for internal corrosion, and secure materials when required.
26. If applicable, monitor, address, and document Odorant levels.
27. Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) is notified the work is completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

28. Tie-in process complete.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

#13 – M&R Monitor Replacement & Bypass Removal
#14 – Perform Uprate (0001: XX-XXXXXXX-XX)

EXHIBIT B

Example Tie-in Sketch Template

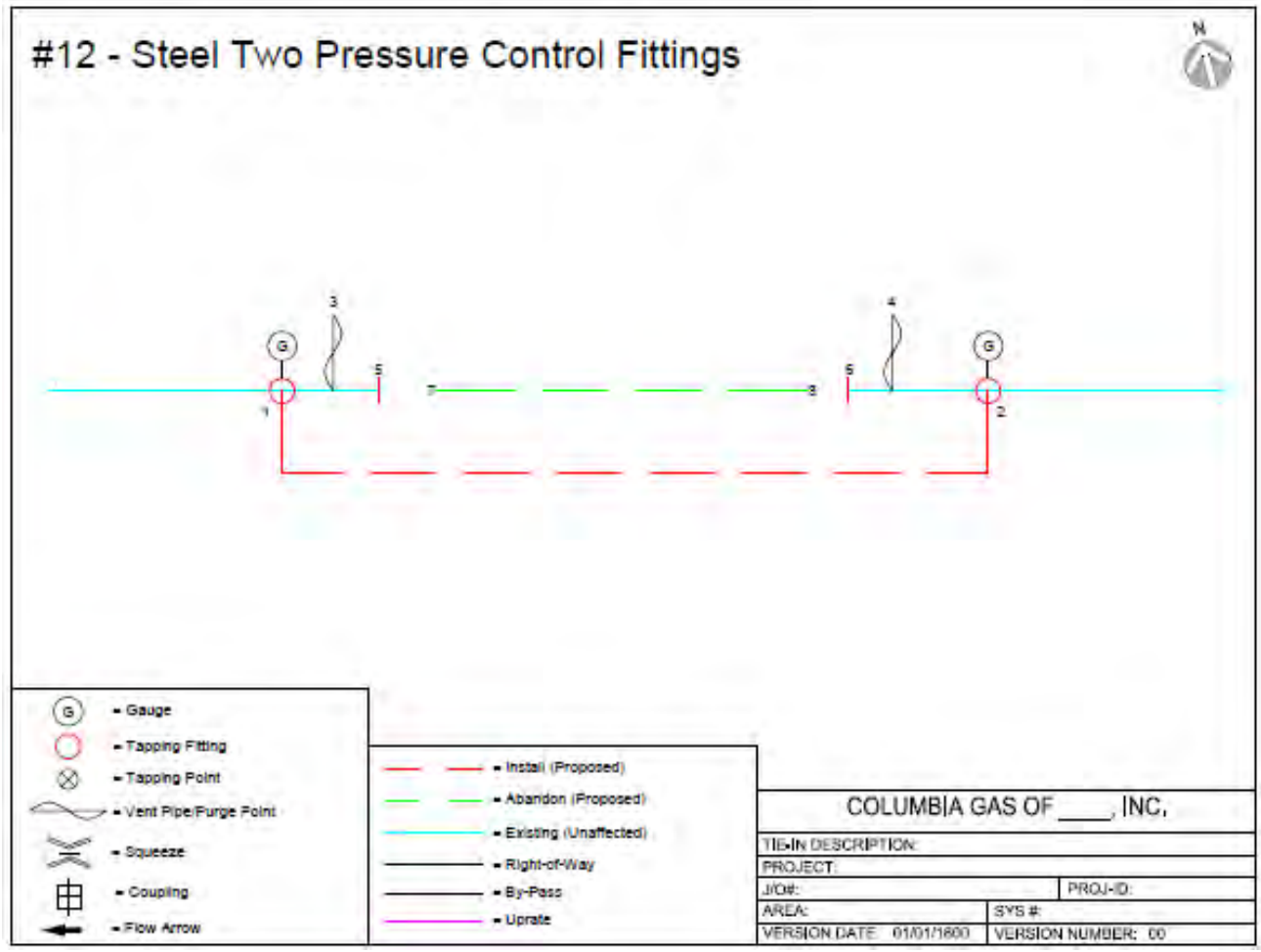
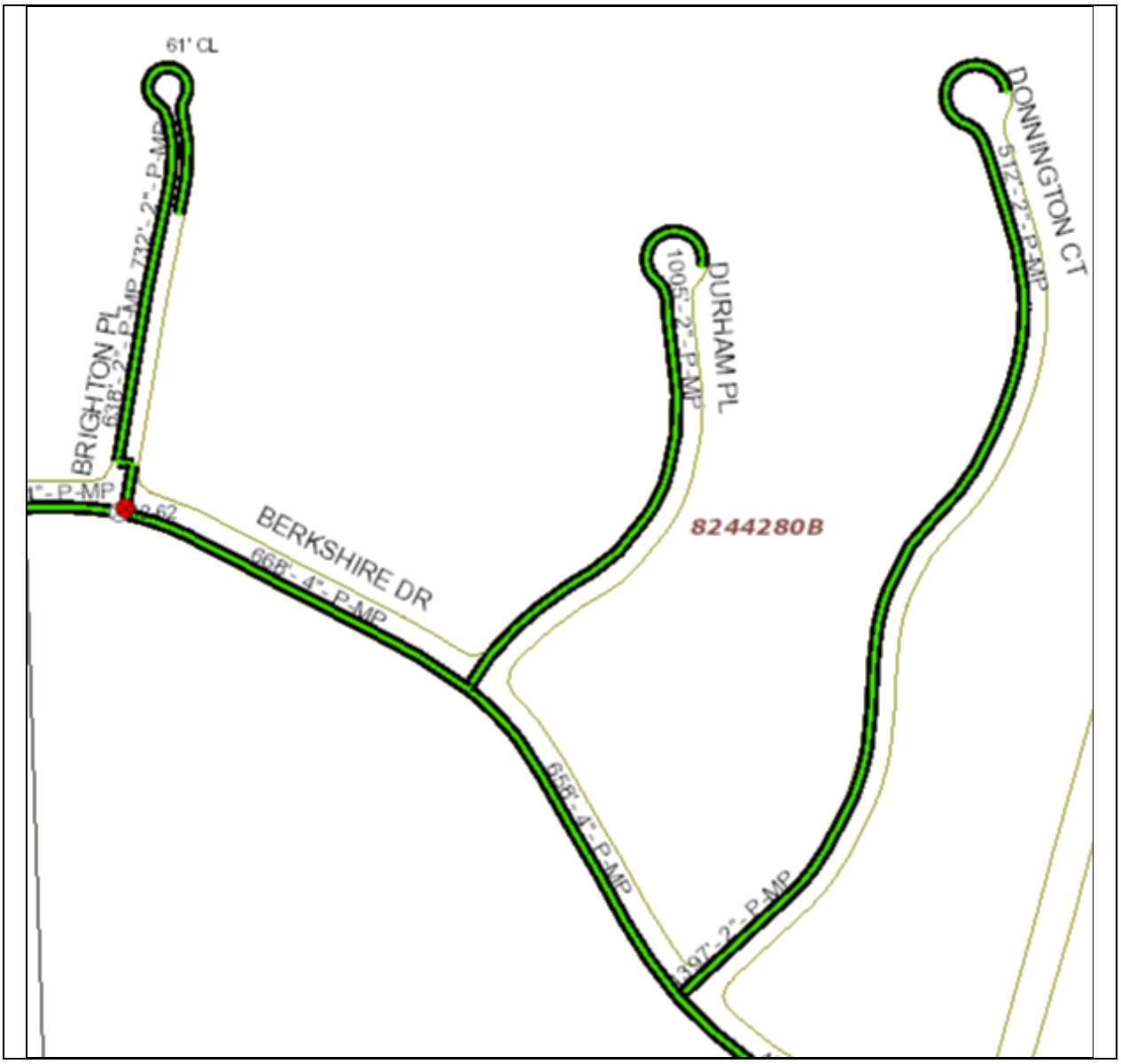


EXHIBIT C
(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

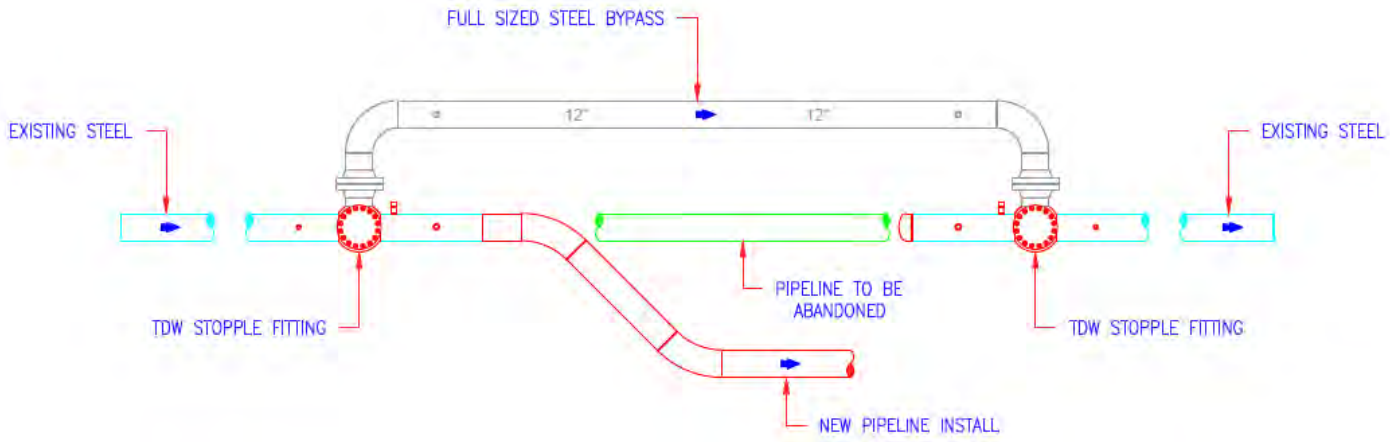
EXHIBIT C
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

EXHIBIT D

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

Effective Date: 06/01/2018	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 01/01/2016		Page 1 of 18

Companies Affected:	☒ NIPSCO	☒ CVA	☒ CMD
		☒ CKY	☒ COH
		☒ CMA	☒ CPA

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the tie-in plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, if practicable, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers' documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 "Pressure Testing."

Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant

differential between the system pressure and the intended test pressure for the fitting. A full encirclement type fitting is more apt to cause a problem than a tee type fitting.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1770.010 “Prevention of Accidental Ignition.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

   NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as Gas Standard Series 1300 “Pipe & Fitting Joining.”

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit A for related mapping symbols.

2.2 Steel or Wrought Iron

2.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using

inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on transmission class pipelines or distribution pipelines with a MAOP equal to or greater than 200 psig, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

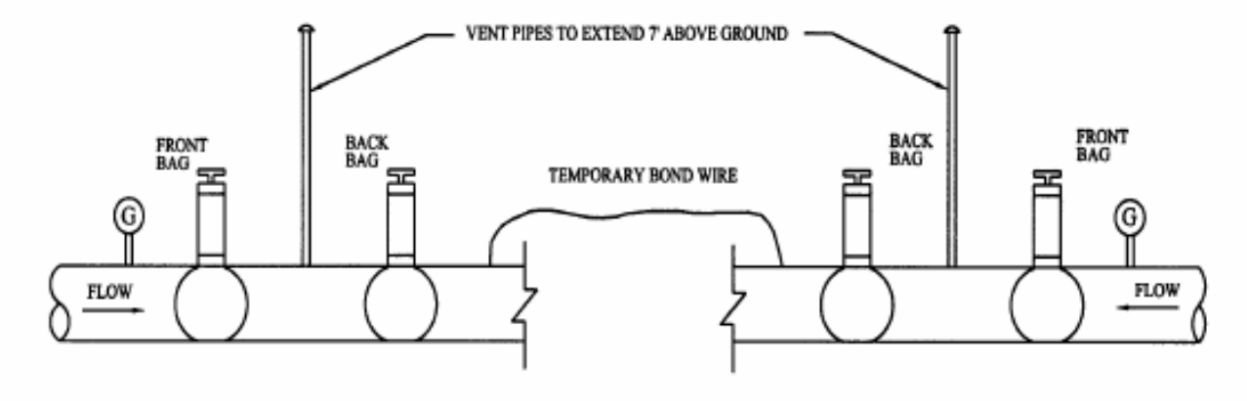
The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term “cast iron” is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe’s dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line

Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered for development of written tie-in plans are included in, but not limited to, the list below.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions (e.g., traffic control).
3. Scope or extent of system to be tied in and/or bypassed.
4. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
5. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
6. Verification of pressure and content.
7. Pressure control and monitoring.
8. Determining the sequence of closing and opening valves or any other flow controlling device.
9. Identifying applicable valve(s), which should be located and checked for accessibility and operation before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
10. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
11. Planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station.
12. Providing support at tie-in locations.
13. For tie-ins on a metallic pipeline, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

EXCEPTIONS:

The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the tie-in plan due to one or more of the following exceptions, the exception(s) shall be documented in the tie-in plan.

i. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.

ii. Direct tie-ins with full-sized steel bypass (see example in Exhibit B).

iii. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

Refer to Section 4, bullet d, for methods of evaluation for unknown mechanical couplings.

14. Check for leak-through of line stopping devices.
15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance).
16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).
17. Communication between critical points during the operation (e.g., monitoring pressures).
18. Notification of customers who will have service temporarily interrupted (if applicable).
19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.
20. Notification of Gas Control when Engineering determines an impact to Gas Control operations (e.g., SCADA monitored points) during the tie-in (e.g., operation of valves, shut-down of a section of pipeline).
21. Odorant level testing if determined necessary by Engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from Construction

personnel for non-typical tie-in plans.

Tie-in plans involving the installation of concrete anchor(s) on a metallic pipeline shall be approved by Engineering, Construction (or Project Management), and Corrosion Leadership. If consensus cannot be reached, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the tie-in plan.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the crew leader or Construction Coordinator/Inspector prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, Construction Coordinator/Inspector) reviews tie-in plan with personnel performing the tasks on the same day prior to starting tie-in activities. The crew person in charge of project shall designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations). If modifications to the plan are required after review at the job site, the changes shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee by documenting the changes and those parties involved in determining them. Any changes or adjustments to the tie-in plan shall be communicated with the personnel performing the tasks and documented that the discussion took place.

c. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, if practicable, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin.

NOTE**:** If pressure verification indicates a pressure that is above the

MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

Evaluations for unknown mechanical couplings include the following.

i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. Consider reducing operating pressure to allow for the use of a camera to inspect for mechanical couplings.

The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera

inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

If no indication of couplings are found, the project may resume without further investigation.

If mechanical coupling(s) are found or if the evaluation is inconclusive, plan to take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

NOTE: Evaluation of the pipeline from the edge of the new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

iii. Anchor.

iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

v. Take the pipeline out of service.

vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 7 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

e. Inspect pipe condition to determine suitability for tapping.

   1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), pressure gauges shall be installed, appropriately placed and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs

on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.
b. A combustible atmosphere in the work area cannot be avoided.
c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.
d. The tie-in is on cast iron pipe.
e. An installation is temporary (e.g., regulators for bypassing or uprating).
f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

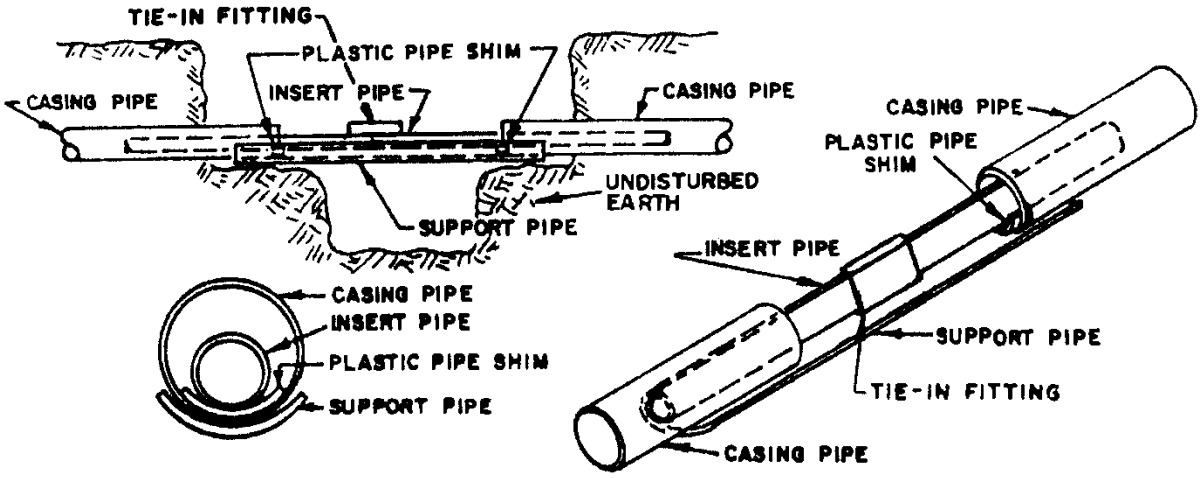
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp

or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering is responsible for determining whether post construction odorant level testing is necessary, which should be part of the tie-in plan. If odorant level testing is required, refer to the applicable GS 1670.020 "Odor Level Monitoring" and GS 1670.040 "Pipeline Conditioning New Pipelines."

7. RECORDS

7.1 Written Tie-In Plans

Approved written tie-in plans shall be filed with the work order completion report.

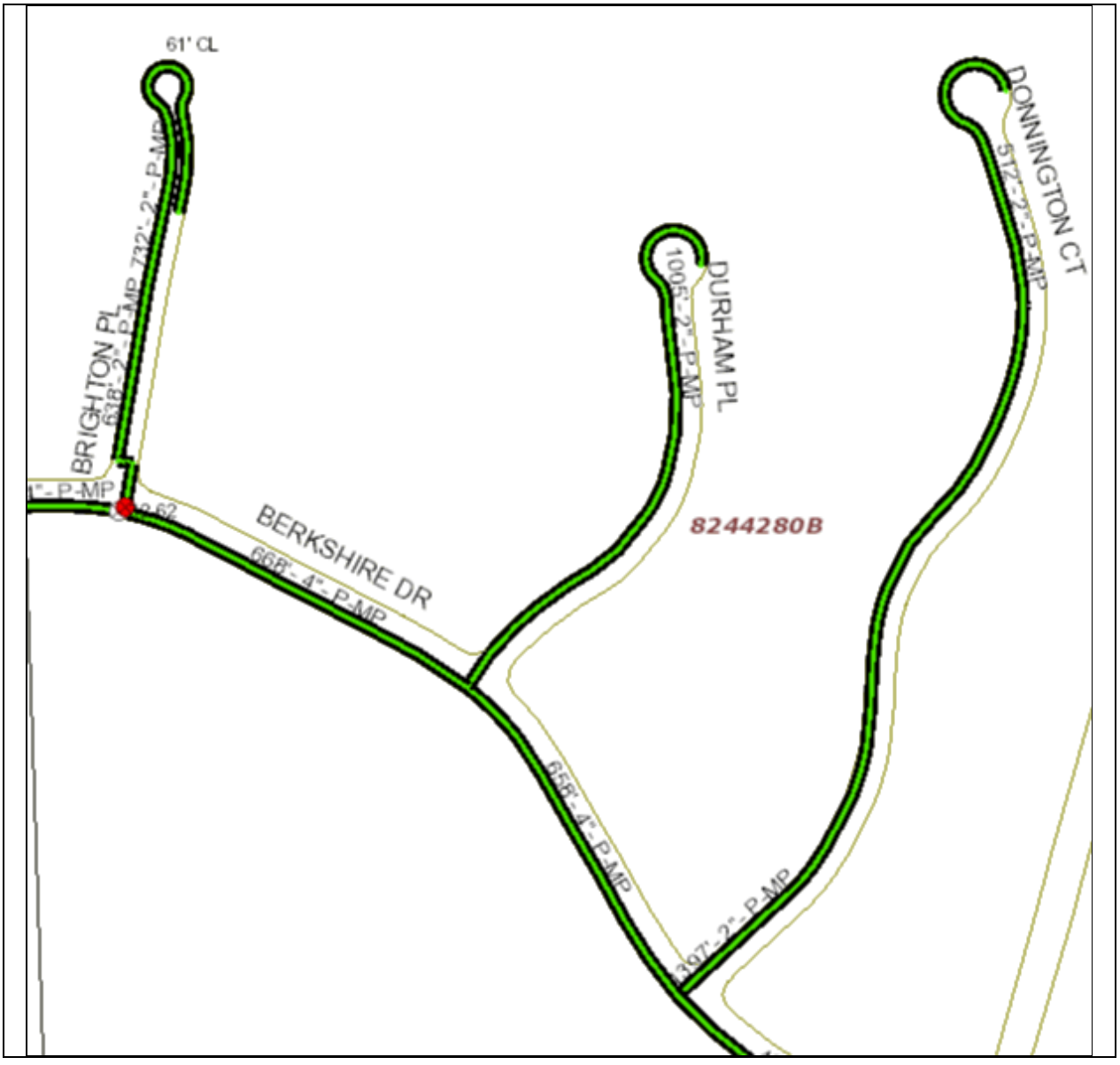
7.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 "Map Revision" to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

EXHIBIT A

(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

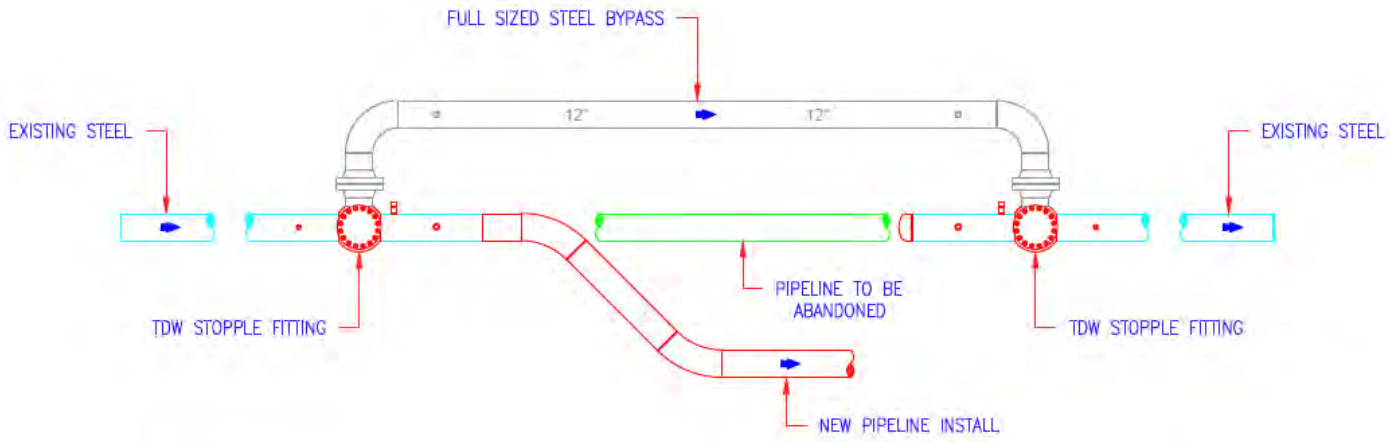
EXHIBIT A
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

EXHIBIT B

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2016	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 01/01/2014		Page 1 of 12

Companies Affected:			
☑ NIPSCO	☑ CGV	☑ CMD
	☑ CKY	☑ COH
	☑ CMA	☑ CPA

REFERENCE 49 CFR Part 192.627

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers' documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joint shall be done in accordance with applicable GS 1500.010 "Pressure Testing."

Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline it is installed on. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. A full encirclement type fitting is more apt to cause a problem than a tee type fitting.

1.3 Safety and Related Standards

All applicable HSE safety standards shall be followed including the following.

a. HSE 4100.010 "Hazardous Atmosphere Considerations."

b. GS 1770.010 “Prevention of Accidental Ignition.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as Gas Standards Series 1300 “Pipe & Fitting Joining.”

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

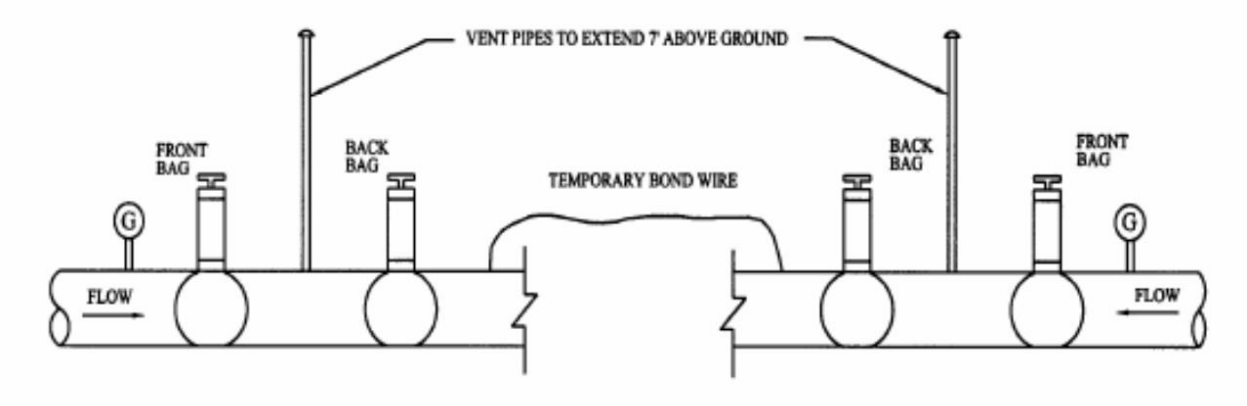
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or

ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010

"Purging"),

14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them. Any changes or adjustments to the tie-in plan shall be communicated with the personnel performing the tasks and documented that the discussion took place.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

NOTE: If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
   3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
   4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

   1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

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Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

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c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

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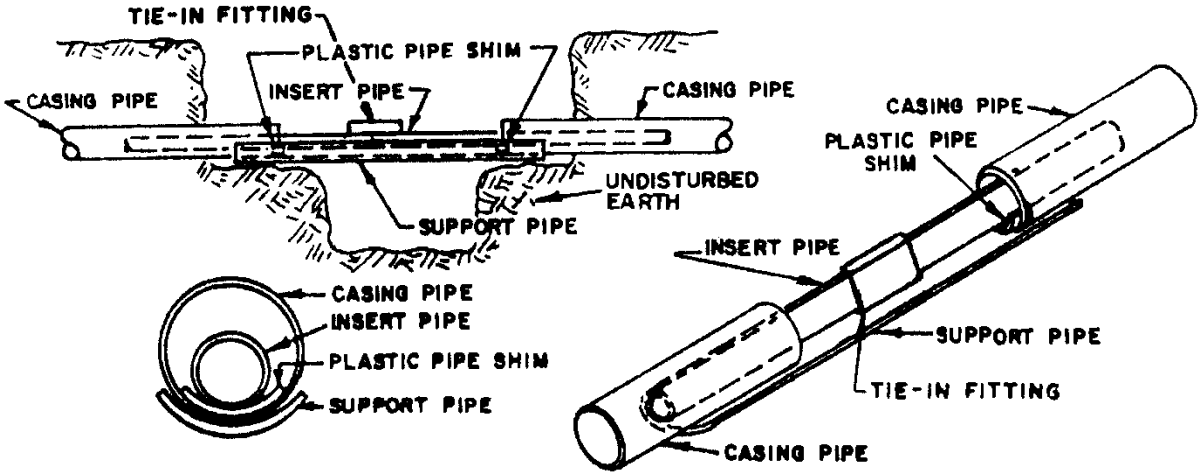
b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

NiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2014	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 04/22/2013		Page 1 of 12

Companies Affected:		
☑ NIPSCO	☑ CGV ☑ CKY ☑ CMA	☑ CMD ☑ COH ☑ CPA

REFERENCE 49 CFR Part 192.627

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required. Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations. The test pressure shall be at least equal to the main test pressure. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures. All applicable safety standards shall be followed.

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining” or GS 1306.010 “Saddle Fusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standards Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

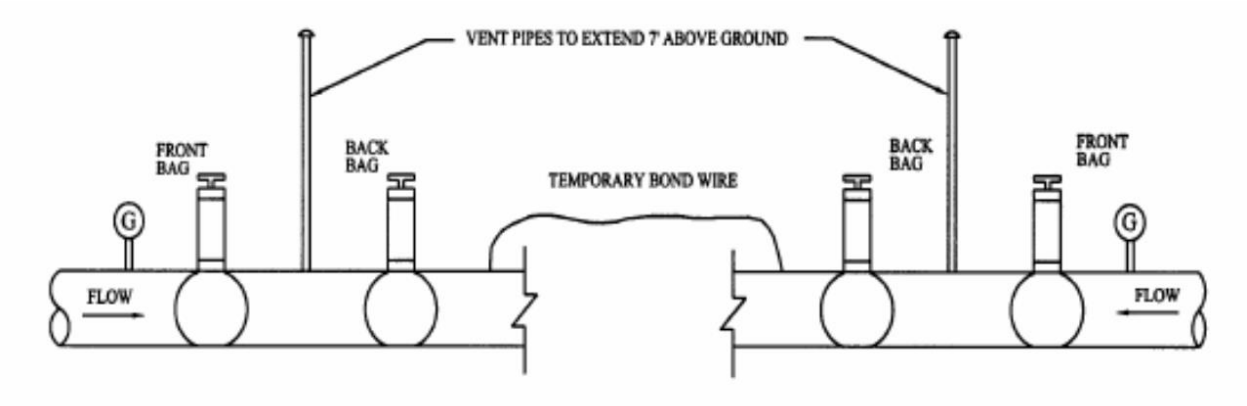
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the

following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1 1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-

New Construction and Abandonment"),

14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

NOTE: If pressure verification indicates a pressure that is above the

MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
   3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
   4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

   1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of

the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1690.010 “Purging New Construction and Abandonment” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

a. Following manufacturer's recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve,

b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

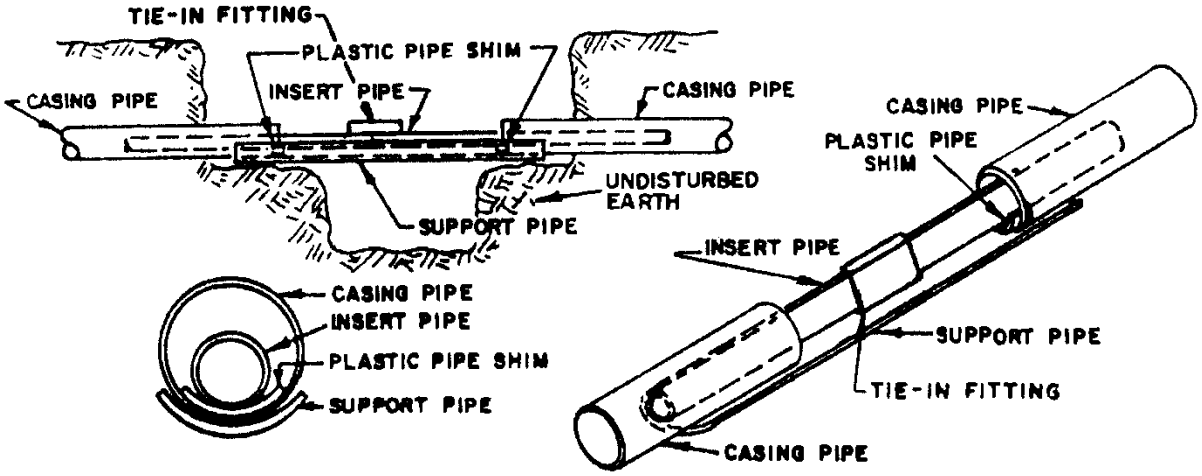
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 "Reinforcement Requirements for Branch Connections" for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



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g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

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6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

MiSource
Distribution Operations

Gas Standard

Effective Date: 04/22/2013	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 01/01/2013		Page 1 of 11

Companies Affected:			
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1. GENERAL

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All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

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NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as the Plastic Fusion and Mechanical Joining Manual.

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

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b. The equipment being used.

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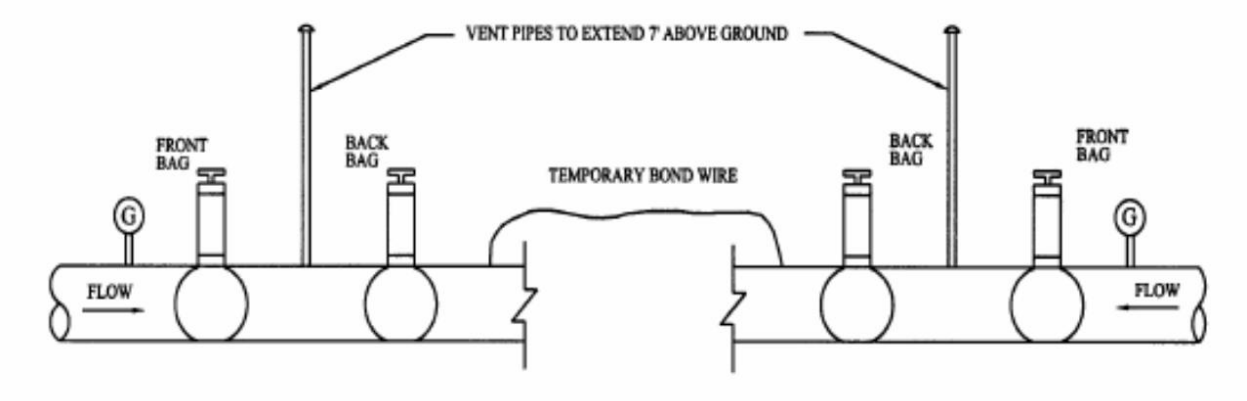
The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



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2.3.3 Tapping

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“Reinforced,” as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

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3”	Reinforced	Reinforced	Reinforced	X

4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1 1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and

requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-New Construction and Abandonment”),
14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

   NOTE: If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.

   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from

damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.

3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.

4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1430.010 “Metallic Pipeline Exposures” for additional guidance.

2. Verify wall thickness (if appropriate).

3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.

4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1690.010 “Purging New Construction and Abandonment” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve,

b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

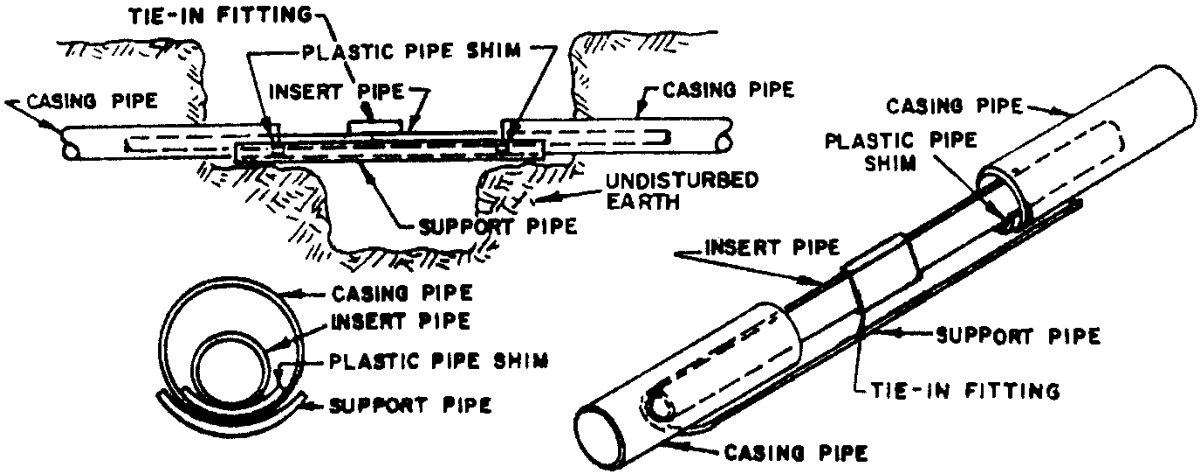
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not

suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

MiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2013	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 07/08/2011		Page 1 of 11

Companies Affected:		
☑ NIPSCO	☑ CGV ☑ CKY ☑ CMA	☑ CMD ☑ COH ☑ CPA

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required. Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations. The test pressure shall be at least equal to the main test pressure. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures. All applicable safety standards shall be followed.

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment.

All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining” or GS 1306.010 “Saddle Fusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as the Plastic Fusion and Mechanical Joining Manual.

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

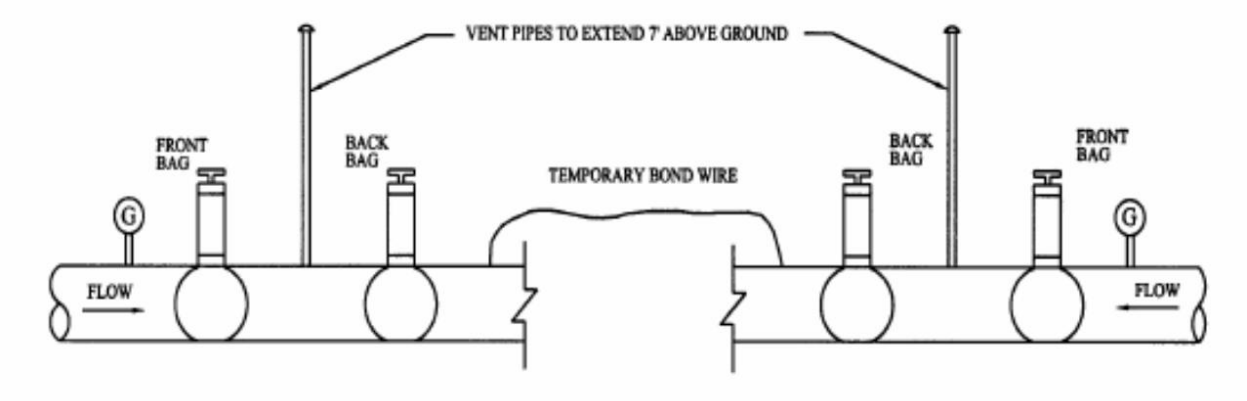
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term “cast iron” is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe’s dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers’ pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the

least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

“Reinforced,” as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X

4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
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24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1 1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and

requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-New Construction and Abandonment”),
14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

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The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

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d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

    1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.

    2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.

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e. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1430.010 “Metallic Pipeline Exposures” for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

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Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

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The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

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b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

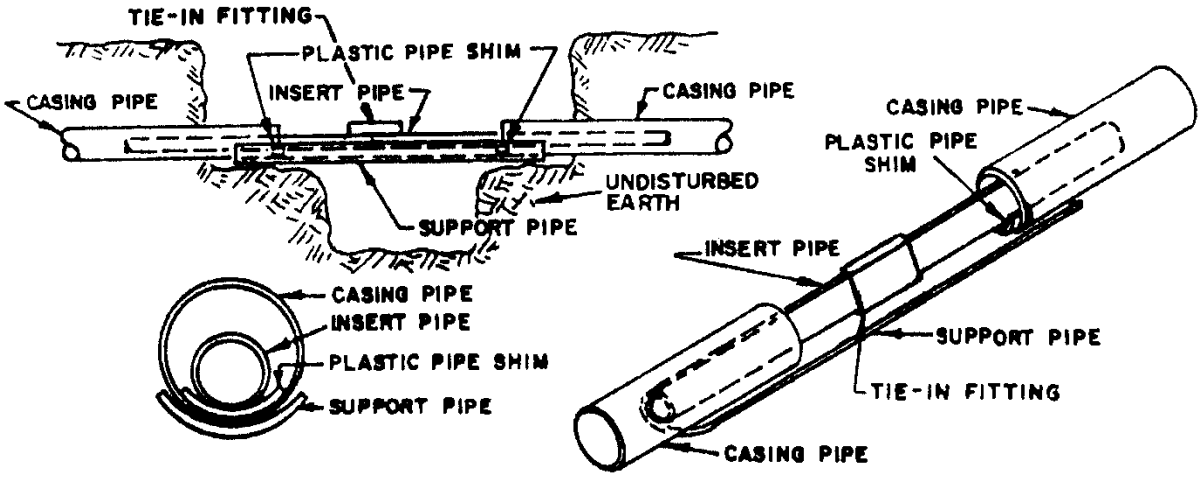
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp

or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

MiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2018	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 07/01/2014		Page 1 of 8

Companies Affected:	☐ NIPSCO	☐ CVA	☐ CMD
		☐ CKY	☐ COH
		☒ CMA	☐ CPA

REFERENCE 49 CFR Part 192.727, MA 220 CMR 107.05, 107.06

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

For additional abandonment requirements, refer to GS 1740.012(MA) “Abandoning Facilities–Service Tee Removal” and GS 1782.010(MA) “Protecting Cast Iron Pipelines.”

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer. The plan must include identifying all known main valves to be abandoned and their associated valve boxes that must be removed or filled in as part of the main abandonment as required in Section 2.5.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezers, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.

c. Stopping gas from all sources.

d. Venting to allow pressure to decrease in pipe being abandoned.

e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Prior to abandonment of the facility, identify all likely sources of supply to the pipeline to be abandoned. A review of operating records (e.g., maps, work completion) shall be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010 “Purging” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam.
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
   c. Allow room for approximately 1-1/2 inches of foam for each 1 inch of main diameter. For example, on a 4 inch main use 4 - 6 inches of foam; on a 6 inch main use 6 – 9 inches of foam, etc.
   d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
   e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method

of application.

2. Expansion plug.
    a. Clean out any loose particles or debris from the end of the main to be abandoned.
    b. Squarely fit plug into end of main and hand press in firmly.
    c. Check by pulling outward on plug.
3. Plastic cap.
4. Concrete.

2.5 Main Valve Box Abandonment

When a distribution main is to be abandoned, valve boxes associated with the abandoned main (if they exist) shall be removed and the hole filled with a suitable compacting material. If the valve boxes cannot be removed due to their location in concrete or pavement, the valve box lids shall be removed and the valve boxes filled with concrete or other suitable material.

2.6 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed. Old pipeline markers over deactivated facilities should also be removed. Examples of above ground and grade level pipeline facilities include pipe, valves, valve boxes, M&R stations, pipeline markers (i.e., posts, signs), corrosion control test station boxes.

Valve boxes and grade level corrosion test stations boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the boxes cannot be removed due to their location in concrete or pavement, the box lids shall be removed and the boxes filled with concrete or similar material.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through the purging process before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines which shall be abandoned promptly, with due consideration to public safety, are those listed as follows.

a. Located in, or close to, excavations.
b. Located in, or close to, buildings that are known to have been severely damaged (e.g., fire, natural disasters).
c. Located in, or close to, buildings being demolished.
d. Discovered to be leaking gas.
e. Unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

3.1.3 Abandonment of Remaining Inactive Service Lines Installed On or Before July 31, 1971

In addition to the abandonment requirements of Section 3.1.2 of this gas standard, each service line that was installed on or before July 31, 1971 which becomes inactive, shall be abandoned not later than five years after the most recent inactivation date, provided, however, that if the Company can demonstrate that such service line is plastic or cathodically protected in accordance with the Company's corrosion control procedures, then such service line shall be abandoned not later than ten years after the most recent inactivation date.

3.1.4 Abandonment of Remaining Inactive Service Lines Installed After July 31, 1971

In addition to the abandonment requirements of Section 3.1.2 of this gas standard, each service line that was installed after July 31, 1971, and which becomes inactive, shall be abandoned not later than ten years after the most

recent inactivation date.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

3.2.1 Service Tapping Tees

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped. See GS 1740.012(MA) "Abandoning Facilities-Service Tee Removal" for additional requirements.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

3.2.2 Outside Meter Set Assembly and Riser

The meter set assembly and applicable riser shall be removed. The below ground portion of the service line to be abandoned in place shall be sealed. The customer house piping shall be sealed.

For the purpose of this standard, the meter set assembly includes the meter, piping and related fittings from the outlet of the meter valve to the outlet of the meter.

3.2.3 Inside Meters

3.2.3.1 Not Associated With Mainline Abandonment

Reasonable efforts shall be made to gain access to the meter. The meter set assembly and related piping shall be removed unless attached to a structure or where access cannot be gained.

Where access can be gained inside, an expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Where access cannot be gained, the service line should be excavated as close as practical to the outside foundation wall, cut and sealed at both ends.

3.2.3.2 Associated With Mainline Abandonment

No Existing Curb Valve

Stop the flow of gas entering the service by disconnecting the service line at or near the property line and seal ends.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Existing Curb Valve

Stop the flow of gas entering the building by shutting off the curb valve.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end and conduct a leak test to ensure a gas tight seal. Paint the sealed end yellow. The customer house piping shall be sealed.

NOTE: Caps used for sealing shall be painted outside of the residence and allowed to dry before installation.

3.2.4 Curb Boxes

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. STATE REPORTING REQUIREMENTS

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement. The sealing method of the abandoned pipe ends shall be documented in WMS as job order execute comments.

7.1 Inactive Service Lines

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as “unknown.”

7.2 Record Location and Retention

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 07/01/2014	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 11/01/2013		Page 1 of 8

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

REFERENCE 49 CFR Part 192.727, MA 220 CMR 107.05, 107.06

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

For additional abandonment requirements, refer to GS 1740.012(MA) “Abandoning Facilities–Service Tee Removal” and GS 1782.010(MA) “Protecting Cast Iron Pipelines.”

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer. The plan must include identifying all known main valves to be abandoned and their associated valve boxes that must be removed or filled in as part of the main abandonment as required in Section 2.5.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezers, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.

c. Stopping gas from all sources.

d. Venting to allow pressure to decrease in pipe being abandoned.

e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Prior to abandonment of the facility, identify all likely sources of supply to the pipeline to be abandoned. A review of operating records (e.g., maps, work completion) shall be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010 “Purging” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam.
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
   c. Allow room for approximately 1-1/2 inches of foam for each 1 inch of main diameter. For example, on a 4 inch main use 4 - 6 inches of foam; on a 6 inch main use 6 – 9 inches of foam, etc.
   d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
   e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method

of application.

2. Expansion plug.
    a. Clean out any loose particles or debris from the end of the main to be abandoned.
    b. Squarely fit plug into end of main and hand press in firmly.
    c. Check by pulling outward on plug.
3. Plastic cap.
4. Concrete.

2.5 Main Valve Box Abandonment

When a distribution main is to be abandoned, valve boxes associated with the abandoned main (if they exist) shall be removed and the hole filled with a suitable compacting material. If the valve boxes cannot be removed due to their location in concrete or pavement, the valve box lids shall be removed and the valve boxes filled with concrete or other suitable material.

2.6 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed. Old pipeline markers over deactivated facilities should also be removed. Examples of above ground and grade level pipeline facilities include pipe, valves, valve boxes, M&R stations, pipeline markers (i.e., posts, signs), corrosion control test station boxes.

Valve boxes and grade level corrosion test stations boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the boxes cannot be removed due to their location in concrete or pavement, the box lids shall be removed and the boxes filled with concrete or similar material.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through the purging process before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines which shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or

b. located in, or close to, buildings that are known to have been severely damaged (e.g., fire, natural disasters), or

c. located in, or close to, buildings being demolished, or

d. discovered to be leaking gas, or

e. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

3.1.3 Abandonment of Remaining Inactive Service Lines

Except as noted below, service lines shall be abandoned not later than the end of the 24th month* from either the date that the gas service was discontinued, or when the service line was placed in service for a service line that has not had a meter installed. (The Company will have until 12/31/2017 to comply with this requirement.)

*Note: In the event that a service line abandonment is required to take place under a newly paved street and permitting is not approved, the abandonment may be held in abeyance until the end of the moratorium period. All permitting requests and responses associated shall be maintained as part of the service line abandonment record.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply

and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

3.2.1 Service Tapping Tees

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped. See GS 1740.012(MA) "Abandoning Facilities-Service Tee Removal" for additional requirements.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

3.2.2 Outside Meter Set Assembly and Riser

The meter set assembly and applicable riser shall be removed. The below ground portion of the service line to be abandoned in place shall be sealed. The customer house piping shall be sealed.

For the purpose of this standard, the meter set assembly includes the meter, piping and related fittings from the outlet of the meter valve to the outlet of the meter.

3.2.3 Inside Meters

3.2.3.1 Not Associated With Mainline Abandonment

Reasonable efforts shall be made to gain access to the meter. The meter set assembly and related piping shall be removed unless attached to a structure or where access cannot be gained.

Where access can be gained inside, an expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Where access cannot be gained, the service line should be excavated as close as practical to the outside foundation wall, cut and sealed at both ends.

3.2.3.2 Associated With Mainline Abandonment

No Existing Curb Valve

Stop the flow of gas entering the service by disconnecting the service line at or near the property line and seal ends.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Existing Curb Valve

Stop the flow of gas entering the building by shutting off the curb valve.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end and conduct a leak test to ensure a gas tight seal. Paint the sealed end yellow. The customer house piping shall be sealed.

Note: Caps used for sealing shall be painted outside of the residence and allowed to dry before installation.

3.2.4 Curb Boxes

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box

lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. STATE REPORTING REQUIREMENTS

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement. The sealing method of the abandoned pipe ends shall be documented in WMS as job order execute comments.

7.1 Inactive Service Lines

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as “unknown.”

7.2 Record Location and Retention

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 11/01/2013	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 01/01/2012		Page 1 of 8

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
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REFERENCE 49 CFR Part 192.727, MA 220 CMR 107.05, 107.06

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

For additional abandonment requirements, refer to GS 1740.012(MA) “Abandoning Facilities–Service Tee Removal” and GS 1782.010(MA) “Protecting Cast Iron Pipelines.”

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer. The plan must include identifying all known main valves to be abandoned and their associated valve boxes that must be removed or filled in as part of the main abandonment as required in Section 2.5.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezing, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.

c. Stopping gas from all sources.

d. Venting to allow pressure to decrease in pipe being abandoned.

e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Prior to abandonment of the facility, identify all likely sources of supply to the pipeline to be abandoned. A review of operating records (e.g., maps, work completion) shall be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010 “Purging – New Construction & Abandonment” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam.
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
   c. Allow room for approximately 1 1/2" of foam for each 1" of main diameter. For example, on a 4" main use 4” - 6" of foam; on a 6" main, use 6” - 9" of foam, etc.
   d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
   e. The foam should be sprayed directly into the main or sprayed through a

hole cut in the cardboard. Field conditions should dictate the best method of application.

2. Expansion plug.
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Squarely fit plug into end of main and hand press in firmly.
   c. Check by pulling outward on plug.
3. Plastic cap.
4. Concrete.

2.5 Main Valve Box Abandonment

When a distribution main is to be abandoned, valve boxes associated with the abandoned main (if they exist) shall be removed and the hole filled with a suitable compacting material. If the valve boxes cannot be removed due to their location in concrete or pavement, the valve box lids shall be removed and the valve boxes filled with concrete or other suitable material.

2.6 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through purging before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines which shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or

b. located in, or close to, buildings that are known to have been severely damaged (e.g., fire, natural disasters), or

c. located in, or close to, buildings being demolished, or

d. discovered to be leaking gas, or

e. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

3.1.3 Abandonment of Remaining Inactive Service Lines

Except as noted below, service lines shall be abandoned not later than the end of the 24th month* from either the date that the gas service was discontinued, or when the service line was placed in service for a service line that has not had a meter installed. (The Company will have until 12/31/2017 to comply with this requirement.)

*Note: In the event that a service line abandonment is required to take place under a newly paved street and permitting is not approved, the abandonment may be held in abeyance until the end of the moratorium period. All permitting requests and responses associated shall be maintained as part of the service line abandonment record.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

3.2.1 Service Tapping Tees

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped. See GS 1740.012(MA) “Abandoning Facilities-Service Tee Removal” for additional requirements.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

If service lines are abandoned in conjunction with the abandonment of the supply pipeline, the service lines do not need to be disconnected from the pipeline and no venting of the service line is required if the volume of gas in the line is not considered potentially hazardous.

3.2.2 Outside Meter Set Assembly and Riser

The meter set assembly and applicable riser shall be removed. The below ground portion of the service line to be abandoned in place shall be sealed. The customer house piping shall be sealed.

For the purpose of this standard, the meter set assembly includes the meter, piping and related fittings from the outlet of the meter valve to the outlet of the meter.

3.2.3 Inside Meters

3.2.3.1 Not Associated With Mainline Abandonment

Reasonable efforts shall be made to gain access to the meter. The meter set assembly and related piping shall be removed unless attached to a structure or where access cannot be gained.

Where access can be gained inside, an expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Where access cannot be gained, the service line should be excavated

as close as practical to the outside foundation wall, cut and sealed at both ends.

3.2.3.2 Associated With Mainline Abandonment

No Existing Curb Valve

Stop the flow of gas entering the service by disconnecting the service line at or near the property line and seal ends.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end. Paint the sealed end yellow. The customer house piping shall be sealed.

Existing Curb Valve

Stop the flow of gas entering the building by shutting off the curb valve.

Inside the building, the meter set assembly and related piping shall be removed unless attached to a structure. An expansion plug shall be inserted into the service line. Reasonable effort should be made so that the plug resides on the outside of the foundation wall. Seal the pipe end and conduct a leak test to ensure a gas tight seal. Paint the sealed end yellow. The customer house piping shall be sealed.

3.2.4 Curb Boxes

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. STATE REPORTING REQUIREMENTS

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement. The sealing method of the abandoned pipe ends shall be documented in WMS as job order execute comments.

7.1 Inactive Service Lines

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as “unknown.”

7.2 Record Location and Retention

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2013	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 01/01/2012		Page 1 of 7

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

REFERENCE 49 CFR Part 192.727; MA 220 CMR 107, 107.05, 107.06

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

An inactive pipeline not being maintained by the Company shall be abandoned.

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer. The plan must include identifying all known main valves to be abandoned and their associated valve boxes that must be removed or filled in as part of the main abandonment as required in Section 2.5.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezing, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.
c. Stopping gas from all sources.
d. Venting to allow pressure to decrease in pipe being abandoned.

e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic, and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Identify all likely sources of supply to the pipeline to be abandoned. A check of operating records (e.g., maps, work completion) should first be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010, “Purging – New Construction & Abandonment” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam (e.g., NIE FOA-0010)
    a. Clean out any loose particles or debris from the end of the main to be abandoned.
    b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
    c. Allow room for approximately 1 1/2" of foam for each 1" of main diameter. For example, on a 4" main use 4” - 6" of foam; on a 6" main, use 6” - 9" of foam, etc.
    d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
    e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method of application.
2. Expansion plug (e.g., NIE PLU-0010)

a. Clean out any loose particles or debris from the end of the main to be abandoned.

b. Squarely fit plug into end of main and hand press in firmly.

c. Check by pulling outward on plug.

3. Plastic cap (e.g., NIE CAP-0020)

4. Concrete

2.5 Main Valve Box Abandonment

When a distribution main is to be abandoned, valve boxes associated with the abandoned main (if they exist) shall be removed and the hole filled with a suitable compacting material. If the valve boxes cannot be removed due to their location in concrete or pavement, the valve box lids shall be removed and the valve boxes filled with concrete or other suitable material.

2.6 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through purging before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months, at which time an order to remove the meter should be issued. The meter may continue to remain in place if circumstances indicate it is appropriate.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Service Lines

Service lines that have gas discontinued should be evaluated for the prospect of future use by the end of the 24th month from the day the gas service was discontinued. If no prospect for future can be determined, then the service line shall be abandoned.

Service lines that have not had a meter installed (e.g., NSL classification for CDC) should be evaluated for the prospect of future use by the end of the 24th month from the date the service line was placed in service. The service line shall be abandoned if it is determined that the service line has no prospect for future use or before the Company's state regulatory required maximum length of time to abandon it, whichever occurs first.

Service lines shall be abandoned not later than the end of the 60th month from either the date that the gas service was discontinued, or when the service line was placed in service for a service line that has not had a meter installed.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

e. Aboveground piping and fittings, such as a measurement setting, should be removed unless attached to a structure.

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

If service lines are abandoned in conjunction with the abandonment of the supply pipeline, the service lines do not need to be disconnected from the pipeline and no venting of the service line is required if the volume of gas in the line is not considered potentially hazardous.

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE., Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement.

7. MASSACHUSETTS SPECIFIC REQUIREMENTS

7.1 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or

b. located in, or close to, buildings being demolished, or

c. discovered to be leaking gas, or

d. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

7.2 Abandonment of Inactive Service Lines Installed on or Before July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed on or before July 31, 1971 which becomes inactive, shall be abandoned not later than five years after the most recent inactivation date, provided, however, that if the Company can demonstrate that such service line is plastic or cathodically protected in accordance with the Company's corrosion control procedures, then such service line shall be abandoned not later than ten years after the most recent inactivation date.

7.3 Abandonment of Inactive Service Lines Installed After July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed after July 31, 1971, and which becomes inactive, shall be abandoned not later than ten years after the most recent inactivation date.

7.4 Annual Report of Service Lines Abandoned In Massachusetts

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7.5 Inactive Service Line Records

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as 'unknown.'

7.6 Abandoned Service Line Location Records

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2012	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 07/08/2011		Page 1 of 7

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

REFERENCE OMP 1740

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer. The plan must include identifying all known main valves to be abandoned and their associated valve boxes that must be removed or filled in as part of the main abandonment as required in Section 2.5.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezing, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.
c. Stopping gas from all sources.
d. Venting to allow pressure to decrease in pipe being abandoned.

e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Identify all likely sources of supply to the pipeline to be abandoned. A check of operating records (e.g., maps, work completion) should first be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010, "*Purging – New Construction & Abandonment*" for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam (e.g., NIE FOA-0010)
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
   c. Allow room for approximately 1 1/2" of foam for each 1" of main diameter. For example, on a 4" main use 4" - 6" of foam; on a 6" main, use 6" - 9" of foam, etc.
   d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
   e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method of application.
2. Expansion plug (e.g., NIE PLU-0010)

a. Clean out any loose particles or debris from the end of the main to be abandoned.

b. Squarely fit plug into end of main and hand press in firmly.

c. Check by pulling outward on plug.

3. Plastic cap (e.g., NIE CAP-0020)
4. Concrete

2.5 Main Valve Box Abandonment

When a distribution main is to be abandoned, valve boxes associated with the abandoned main (if they exist) shall be removed and the hole filled with a suitable compacting material. If the valve boxes cannot be removed due to their location in concrete or pavement, the valve box lids shall be removed and the valve boxes filled with concrete or other suitable material.

2.6 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through purging before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months, at which time an order to remove the meter should be issued. The meter may continue to remain in place if circumstances indicate it is appropriate.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Service Lines

Service lines that have gas discontinued should be evaluated for the prospect of future use by the end of the 24th month from the day the gas service was discontinued. If no prospect for future can be determined, then the service line shall be abandoned.

Service lines that have not had a meter installed (e.g., NSL classification for CDC) should be evaluated for the prospect of future use by the end of the 24th month from the date the service line was placed in service. The service line shall be abandoned if it is determined that the service line has no prospect for future use or before the Company's state regulatory required maximum length of time to abandon it, whichever occurs first.

Service lines shall be abandoned not later than the end of the 60th month from either the date that the gas service was discontinued, or when the service line was placed in service for a service line that has not had a meter installed.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

e. Aboveground piping and fittings, such as a measurement setting, should be removed unless attached to a structure.

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

If service lines are abandoned in conjunction with the abandonment of the supply pipeline, the service lines do not need to be disconnected from the pipeline and no venting of the service line is required if the volume of gas in the line is not considered potentially hazardous.

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement.

7. MASSACHUSETTS SPECIFIC REQUIREMENTS

Reference 220 CMR 107.05, 107.06

7.1 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or

b. located in, or close to, buildings being demolished, or

c. discovered to be leaking gas, or

d. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

7.2 Abandonment of Inactive Service Lines Installed on or Before July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed on or before July 31, 1971 which becomes inactive, shall be abandoned not later than five years after the most recent inactivation date, provided, however, that if the Company can demonstrate that such service line is plastic or cathodically protected in accordance with the Company's corrosion control procedures, then such service line shall be abandoned not later than ten years after the most recent inactivation date.

7.3 Abandonment of Inactive Service Lines Installed After July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed after July 31, 1971, and which becomes inactive, shall be abandoned not later than ten years after the most recent inactivation date.

7.4 Annual Report of Service Lines Abandoned In Massachusetts

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7.5 Inactive Service Line Records

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as 'unknown.'

7.6 Abandoned Service Line Location Records

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 07/08/2011	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: 04/01/2010		Page 1 of 7

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

REFERENCE OMP 1740

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources. If the plan requires modification prior to being executed, it shall be reviewed and approved by the preparer.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezing, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.
c. Stopping gas from all sources.
d. Venting to allow pressure to decrease in pipe being abandoned.
e. Checking that the flow from the vent continues to decrease – all sources addressed.

f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic, and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Identify all likely sources of supply to the pipeline to be abandoned. A check of operating records (e.g., maps, work completion) should first be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010, “Purging – New Construction & Abandonment” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam (e.g., NIE FOA-0010)
   a. Clean out any loose particles or debris from the end of the main to be abandoned.
   b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
   c. Allow room for approximately 1 1/2" of foam for each 1" of main diameter. For example, on a 4" main use 4” - 6" of foam; on a 6" main, use 6” - 9" of foam, etc.
   d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
   e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method of application.
2. Expansion plug (e.g., NIE PLU-0010)
   a. Clean out any loose particles or debris from the end of the main to be abandoned.

b. Squarely fit plug into end of main and hand press in firmly.

c. Check by pulling outward on plug.

3. Plastic cap (e.g., NIE CAP-0020)
4. Concrete

2.5 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through purging before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

3.1.1 Meters

Service lines that have gas service discontinued, i.e. where the gas has been turned off, may have the meter remain in place for up to 24 months, at which time an order to remove the meter should be issued. The meter may continue to remain in place if circumstances indicate it is appropriate.

NOTE: When the last meter is removed from a service line, any curb valve in the line shall be closed if it can be located and it is operable.

3.1.2 Service Lines

Service lines that have gas discontinued should be evaluated for the prospect of future use by the end of the 24th month from the day the gas service was discontinued. If no prospect for future can be determined, then the service line shall be abandoned.

Service lines that have not had a meter installed (e.g., NSL classification for CDC) should be evaluated for the prospect of future use by the end of the 24th month from the date the service line was placed in service. The service line shall be abandoned if it is determined that the service line has no prospect for future use or before the Company's state regulatory required maximum length of time to abandon it, whichever occurs first.

Service lines shall be abandoned not later than the end of the 60th month from either the date that the gas service was discontinued, or when the service line was placed in service for a service line that has not had a meter installed.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers' house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

e. Aboveground piping and fittings, such as a measurement setting, should be removed unless attached to a structure.

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

If service lines are abandoned in conjunction with the abandonment of the supply pipeline, the service lines do not need to be disconnected from the pipeline and no venting of the service line is required if the volume of gas in the line is not considered potentially hazardous.

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. ABANDONMENT OF PIPELINE FACILITIES INVOLVING COMMERCIALLY NAVIGABLE WATERWAYS

If the pipeline facility abandoned is an onshore pipeline that crosses over, under, or through a commercially navigable waterway, a report must be prepared and submitted by either of the following methods.

5.1 Submit Report to the National Pipeline Mapping System (NPMS)

The preferred method to submit data on pipeline facilities abandoned is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards.

In addition to the NPMS-required attributes, the Company must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the Company's knowledge, all of the reasonably available information requested was provided and, to the best of the Company's knowledge, the abandonment was completed in accordance with applicable laws.

Refer to the NPMS Standards for details in preparing data for submission.

5.2 Submit Report to the PHMSA Information Officer

Alternatively, the Company may submit reports by mail, fax or e-mail to the Information Officer, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, Department of Transportation, Information Resources Manager, PHP-10, 1200 New Jersey Avenue, SE., Washington, DC 20590-0001; fax (202) 366-4566; e-mail InformationResourcesManager@phmsa.dot.gov.

The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.

6. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement.

7. MASSACHUSETTS SPECIFIC REQUIREMENTS

Reference 220 CMR 107.05, 107.06

7.1 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or

b. located in, or close to, buildings being demolished, or

c. discovered to be leaking gas, or

d. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

7.2 Abandonment of Inactive Service Lines Installed on or Before July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed on or before July 31, 1971 which becomes inactive, shall be abandoned not later than five years after the most recent inactivation date, provided, however, that if the Company can demonstrate that such service line is plastic or cathodically protected in accordance with the Company's corrosion control procedures, then such service line shall be abandoned not later than ten years after the most recent inactivation date.

7.3 Abandonment of Inactive Service Lines Installed After July 31, 1971

In addition to the abandonment requirements of Section 7.1 of this procedure, each service line which was installed after July 31, 1971, and which becomes inactive, shall be abandoned not later than ten years after the most recent inactivation date.

7.4 Annual Report of Service Lines Abandoned In Massachusetts

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

7.5 Inactive Service Line Records

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as 'unknown.'

7.6 Abandoned Service Line Location Records

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 04/01/2010	**Abandonment of Facilities**	Standard Number: **GS 1740.010(MA)**
Supersedes: N/A		Page 1 of 6

Companies Affected:			
☐ NIPSCO	☐ CGV	☐ COH	☑ BSG
☐ NIFL	☐ CKY	☐ CPA	
☐ Kokomo Gas	☐ CMD		

REFERENCE OMP 1740

1. GENERAL

This standard shall apply to the abandonment or deactivation of pipeline facilities.

2. DISTRIBUTION MAINS AND TRANSMISSION LINES

When it has been determined that a distribution main or transmission line (pipeline) has no reasonable prospect for future use, it shall be scheduled for retirement.

Each pipeline abandoned in place must be disconnected from all sources of gas supply, purged of all gas, and the ends sealed.

2.1 Written Plan

Field Engineering shall prepare a written plan to accomplish the work, ensuring proper supply is maintained to the parts of the system to remain in service, and gas to the pipeline to be abandoned is properly stopped by disconnecting all sources.

The written plan shall identify the method for stopping the gas flow from the sources. Typical methods include the use of valves, squeezing, stoppers, or bag(s). Alternate methods for each source should be identified in case the planned method cannot accomplish stopping the gas, such as inoperable valves or conflicts with other underground facilities.

The following actions should be considered when developing the written plan.

a. Installing gauge(s) to monitor upstream pressure before stopping the gas.
b. Installing fittings for pressure verification and gas venting.
c. Stopping gas from all sources.
d. Venting to allow pressure to decrease in pipe being abandoned.
e. Checking that the flow from the vent continues to decrease – all sources addressed.
f. Physically separating the section to abandon.

g. Capping live stubs by appropriate methods. Preferred methods are welding for steel, fusion for PE plastic, and mechanical connection for other materials. All mechanically connected caps shall have pull-out protection (integral to the fitting, or by strapping / blocking), and be properly pressure rated.

2.2 Disconnect Gas Sources

Identify all likely sources of supply to the pipeline to be abandoned. A check of operating records (e.g., maps, work completion) should first be done. Any other suspected sources can be identified by field excavation.

Upon stopping of gas flow at each point of disconnection, physically separate the piping or components.

2.3 Purging Pipelines

Refer to GS 1690.010, “Purging – New Construction & Abandonment” for guidance on purging pipelines out of service.

2.4 Seal Pipeline Ends

Seal all ends of the abandoned piping with an approved end cap, a closed valve, or other approved methods to prevent a path of gas migration, such as the following.

1. Expanding foam
    a. Clean out any loose particles or debris from the end of the main to be abandoned.
    b. Insert cardboard, newspaper, or rags into the main to serve as a backstop for the foam.
    c. Allow room for approximately 1 1/2" of foam for each 1" of main diameter. For example, on a 4" main use 4” - 6" of foam; on a 6" main, use 6” - 9" of foam, etc.
    d. Cut out a piece of cardboard slightly larger than the diameter of the main to be abandoned. This piece should be held against the end of the main to contain the foam as it expands in the pipe.
    e. The foam should be sprayed directly into the main or sprayed through a hole cut in the cardboard. Field conditions should dictate the best method of application.
2. Expansion plug
    a. Clean out any loose particles or debris from the end of the main to be abandoned.

b. Squarely fit plug into end of main and hand press in firmly.

c. Check by pulling outward on plug.

3. Plastic cap

4. Concrete

2.5 Above Ground Facilities

All above ground pipeline facilities retired from service will be removed.

EXCEPTION: Piping above ground on private property that is not covered by a removal clause in the right-of-way agreement may be allowed to remain unless requested to be removed by the right-of-way grantor.

The steps in Section 2 must be followed through purging before the removal of any facilities. Removal will create additional points to be capped as per Section 2. This must be allowed for in the written plan.

3. SERVICES

3.1 Conditions Requiring Abandonment

When the last meter on a service line is removed, the service will be set to either “pending inactive” or “inactive.” This will prompt research into the prospect for future use. If it is determined there is no prospect for future use, the service line will be set to “inactive” and given a compliance date for abandonment.

3.2 Abandoning Service Lines

When abandoning service lines, the piping must be disconnected from the gas supply and customers’ house lines, and the abandoned pipe end(s) sealed. This should be accomplished similar to the procedure in Section 2, with the following exceptions.

a. A written plan is not needed.

b. Verification and venting can be accomplished by aboveground piping at a meter setting.

c. Natural venting is normally sufficient to purge a service line that is being abandoned. However, a service line being abandoned shall be purged with a purging medium if natural venting is not effective.

d. The service line should be disconnected as close as practical to the supplying pipeline.

e. Aboveground piping and fittings, such as a measurement setting, should

be removed unless attached to a structure.

Where positive-stop tapping tees exist, it is preferred to stop the gas flow with the positive-stop tapping tees and cap the outlet of the tees. If the "punch" or "cutter" of positive-stop tapping tees is used to affect the disconnection at the main, the "punch" or "cutter" shall be retracted until even with the top of the tees before replacing the tee caps.

Where the tapping tees do not have a positive stop, the outlet piping of plastic tees can be squeezed and some steel tees can have the gas stopped in the tee body, such as by pinning with a metal rod or wooden dowel. The connected piping can then be cut and the outlet of the tee capped.

Other methods to abandon service lines, such as plugging saddles or installing clamps on the main, can be used.

If service lines are abandoned in conjunction with the abandonment of the supply pipeline, the service lines do not need to be disconnected from the pipeline and no venting of the service line is required if the volume of gas in the line is not considered potentially hazardous.

When service lines are abandoned, curb boxes (if they exist) shall be removed and the hole filled with a suitable compacting material. If the curb boxes cannot be removed due to their location in concrete or pavement, the curb box lids shall be removed and the curb boxes filled with concrete or similar material.

4. VAULTS

Each abandoned vault must be filled with a suitable compacting-type material. While filling the vault, ensure that the material flows into all areas so that no voids remain. If necessary, the material can be tamped while filling to achieve some initial compaction.

As an alternate to abandoning a vault, it could be removed and the space previously occupied filled as a typical excavation. All proper safety precautions must be followed considering the depth and all other factors of the work.

5. RECORDS

Abandoned facilities shall be included on the applicable work completion report for the retirement.

6. MASSACHUSETTS SPECIFIC REQUIREMENTS

Reference 220 CMR 107.05, 107.06

6.1 Abandonment of Inactive Service Lines Due to Consideration to Public Safety

Inactive service lines shall be abandoned promptly, with due consideration to public safety, are those:

a. located in, or close to, excavations, or
b. located in, or close to, buildings being demolished, or
c. discovered to be leaking gas, or
d. unrecorded or previously unknown lines discovered in the course of leakage surveys, construction, maintenance or inspection of pipeline facilities.

6.2 Abandonment of Inactive Service Lines Installed on or Before July 31, 1971

In addition to the abandonment requirements of Section 6.1 of this procedure, each service line which was installed on or before July 31, 1971 which becomes inactive, shall be abandoned not later than five years after the most recent inactivation date, provided, however, that if the Company can demonstrate that such service line is plastic or cathodically protected in accordance with the Company's corrosion control procedures, then such service line shall be abandoned not later than ten years after the most recent inactivation date.

6.3 Abandonment of Inactive Service Lines Installed After July 31, 1971

In addition to the abandonment requirements of Section 6.1 of this procedure, each service line which was installed after July 31, 1971, and which becomes inactive, shall be abandoned not later than ten years after the most recent inactivation date.

6.4 Annual Report of Service Lines Abandoned In Massachusetts

Not later than March 15th of each year, the Company shall submit to the Massachusetts Department of Public Utilities (DPU) an annual report indicating the total number of inactive service lines in its distribution system on December 31st of the preceding calendar year, and the number of inactive service lines abandoned during the preceding year.

6.5 Inactive Service Line Records

In Massachusetts, the Company shall maintain readily accessible records of inactive service lines. Such records shall include the service line's location, the date the service line was installed, and the date the service line became inactive. If any information is unavailable to or unobtainable by the Company, it shall be listed on the record as 'unknown.'

6.6 Abandoned Service Line Location Records

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment.

MiSource
Distribution Operations

Gas Standard

Effective Date: 07/01/2011	**Abandoning Facilities Service Tee Removal**	Standard Number: **GS 1740.012(MA)**
Supersedes: 06/10/2011		Page 1 of 2

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

1. GENERAL

This Gas Standard applies to situations in which a service tee is to be removed from a main but has no means of stopping the gas flow. This Gas Standard provides an alternative method to those provided in GS 1714.020 "Leakage: Distribution Pipe Repair," and does not apply in situations where the service tee can remain on the main. All applicable Company safety standards shall be followed.

2. "PINNING" PROCEDURE

1. Insert a tapered steel pin through the tee into the main.
2. Hammer the pin into the main using a brass hammer or other safe means.
3. Purge gas out of the service line and remove the service line from the service tee or as close to the main as possible.
4. While securing the pin by hand, cut the tee off as close to the main as possible using a hack saw.
5. While securing the pin by hand, remove the tee from the main.
6. Weld a bead around the pin and the main line using 6010 or 7010 electrodes.
7. Cut the pin off as close to the main as possible using a hack saw.
8. Complete welding the pin to the main.
9. Fit a 1inch or 2 inch thread-o-let or a Mueller No-Blo save-a-Valve completion plug and cap over the pin.
10. Weld the thread-o-let to the main using 7018 electrodes.
11. Install a steel threaded plug into the thread-o-let.
12. Seal weld the threads with 7018 electrodes.
13. Soap test the plug and thread-o-let to check for leakage.

14. Coat the area with an approved coating and install an anode where required.

Service line removal has been completed.

3. RECORDS

3.1 Records Retention

Abandoned facilities shall be included on the applicable work completion report for the retirement.

3.1.1 Massachusetts Specific Requirement for Records Retention

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment in Massachusetts.

MiSource
Distribution Operations

Gas Standard

Effective Date: 06/10/2011	**Abandoning Facilities Service Tee Removal**	Standard Number: **GS 1740.012(MA)**
Supersedes: N/A		Page 1 of 2

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

1. GENERAL

This Gas Standard applies to situations in which a service tee is to be removed from a main but has no means of stopping the gas flow. This Gas Standard provides an alternative method to those provided in GS 1714.020 and does not apply in situations where the service tee can remain on the main. All applicable Company safety standards shall be followed.

2. "PINNING" PROCEDURE

1. Insert a tapered steel pin through the tee into the main.
2. Hammer the pin into the main using a brass hammer or other safe means.
3. Purge gas out of the service line and remove the service line from the service tee or as close to the main as possible.
4. While securing the pin by hand, cut the tee off as close to the main as possible using a hack saw.
5. While securing the pin by hand, remove the tee from the main.
6. Weld a bead around the pin and the main line using 6010 or 7010 electrodes.
7. Cut the pin off as close to the main as possible using a hack saw.
8. Complete welding the pin to the main.
9. Fit a 1inch or 2 inch thread-o-let or a Mueller No-Blo save-a-Valve completion plug and cap over the pin.
10. Weld the thread-o-let to the main using 7018 electrodes.
11. Install a steel threaded plug into the thread-o-let.
12. Seal weld the threads with 7018 electrodes.
13. Soap test the plug and thread-o-let to check for leakage.

14. Coat the area with an approved coating and install an anode where required.

Service line removal has been completed.

3. RECORDS

3.1 Records Retention

Abandoned facilities shall be included on the applicable work completion report for the retirement.

3.1.1 Massachusetts Specific Requirement for Records Retention

The Company shall maintain readily accessible records of the location of any service line that is abandoned after August 8, 1985 for at least five years after the date of abandonment in Massachusetts.

MiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2013	**Protecting Cast Iron Pipelines**	Standard Number: **GS 1782.010(MA)**
Supersedes: 04/01/2009		Page 1 of 10

Companies Affected:

☐ NIPSCO	☐ CGV	☐ CMD
	☐ CKY	☐ COH
	☑ CMA	☐ CPA

REFERENCE 49 CFR Part 192 192.755, 192.317(a), 192.319, 192.361(b),(c),(d); MA 220 CMR 113

1. GENERAL

The Company has developed and implemented a program to evaluate its cast iron pipe to prioritize and schedule failure-prone segments for replacement, abandonment or where applicable, protection. When the Company has knowledge that the support for a segment of a buried cast-iron pipeline is disturbed or will be disturbed, the requirements of this procedure shall be followed.

The Company has replaced or abandoned all known cast-iron pipe with a nominal diameter of eight inches or less installed before the year 1860. Cast iron pipe required to be replaced in accordance with Section 5 of this procedure shall be surveyed daily for gas leakage and monitored daily until the pipe is replaced.

Refer to GS 1780.010 “Cast Iron - General” and GS 1740.010(MA) “Abandonment of Facilities” for additional guidelines.

2. DEFINITIONS

Angle of Influence is defined as the angle 45^{o} above the horizontal starting from the bottom edge of the trench nearest to the cast iron main.

Immediately means the first regular workday that the operator can gain access to the pipe after obtaining necessary road opening permits. Until that time, if pipe must be replaced in accordance with state regulations, survey and monitor the pipe daily for gas leakage until it is replaced. Daily means each calendar day, including weekends, holidays, etc.

High pressure cast iron pipe is defined as a cast iron distribution pipe in which the gas pressure is higher that the pressure provided to the customer, i.e., a "pounds" system.

Low pressure cast iron pipe is defined as a cast iron distribution pipe in which the gas pressure is substantially the same as the pressure provided to the customer, i.e., an "inches" system.

Soft clay is defined as earth that is easily molded by hand, or that has an unconfined compressive strength of 0.5 to 1.0 kips (1 kip = 1000 pounds of force) per square foot.

3. CAST IRON PROTECTION

The Company shall promptly take appropriate steps to provide permanent protection from damage that might result from external loads for a disturbed cast iron segment. External loads on the cast iron include:

a. vibrations from heavy construction equipment, trains, trucks, buses, major demolition projects, or blasting;

b. impact forces by vehicles;

c. earth movement resulting from washouts, floods, unstable soil, landslides, freeze-thaw cycles, or other hazards that may cause the pipeline to move or to sustain abnormal loads (e.g., water leaks, sewer failures, earthquakes);

d. existing or apparent future excavations/encroachments near the pipeline; or

e. other foreseeable outside forces which may subject that segment of the pipeline to bending stress.

Steps may include dewatering the excavation, providing temporary or permanent shoring or sheeting, supporting the pipeline by use of bridging or bracing, or compacting the soil surrounding the cast iron pipeline with a suitable backfill.

4. CONDITIONS REQUIRING REPLACEMENT

4.1 Replacement of Cast Iron Pipe at Trench Crossings

4.1.1 Cast Iron Pipe 8” or Less

Replace all cast iron pipe 8" or less in diameter **immediately** when exposed and undermined:

a. whenever there is less than 24" of cover; or

b. if there is 24" of cover or more, when the trench widths below are exceeded.

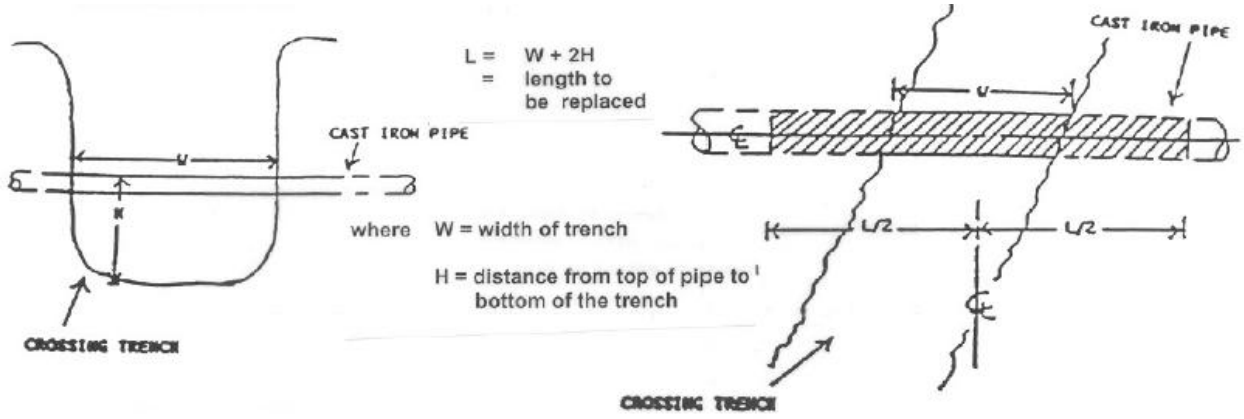
Measure trench widths along the centerline of the exposed pipe.

MAXIMUM ALLOWABLE TRENCH WIDTH

Nominal Pipe Diameter (inches)	Depth of Cover on Cast Iron Pipe (feet)		
	0 to 2 feet	2 to 4 feet	4 feet or more
4 or less	replace	3	4
6	replace	4	6
8	replace	5.5	8

4.1.2 Length of Pipe To Be Replaced When Crossed By 3rd Party

Replace, at a minimum, a length equal to the trench width plus twice the distance from the top of the pipe to the bottom of the crossing trench. Measure the replacement distance equally on both sides of the trench:



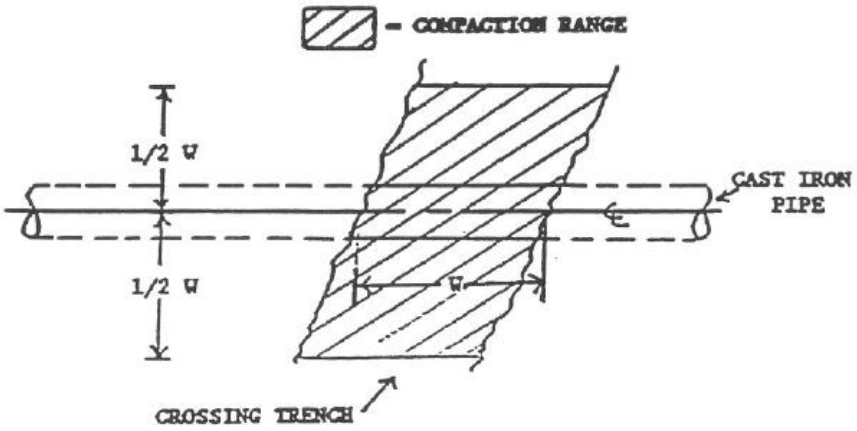
4.1.3 Options When Crossed By a Third Party:

The cast iron pipe does not have to be replaced if, at the discretion of the supervisor all of the following are met:

a. the crossing trench is 5' or less in depth; **AND**

b. the backfill supporting and surrounding the cast iron pipe is compacted in accordance with Company gas standard 4.05 “Trench Padding and Backfilling Procedure For Mains” for the full trench width and for a distance equal to one-half of the trench width on both sides of the centerline of the cast iron pipe (*see sketch below*); **AND**

c. the backfill is clean and free of pavement, frozen soil, rocks, trash and other objectionable material or debris.



4.2 Replacement of Cast Iron Adjacent to Parallel Excavations

Replace all cast iron pipe 8" or less in diameter **immediately**, as defined below, when adjacent to a third party parallel excavation exceeding 8' in length in any of the three following situations. See Section 4.2.4 "Length of Replacement" below to determine how much pipe must be replaced.

REPLACE CAST IRON PIPE IN THE FOLLOWING THREE CASES

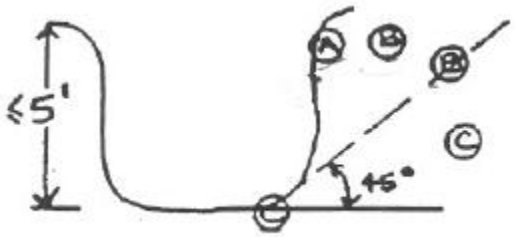
4.2.1 Case 1

a. the cast iron pipe is **low** pressure, as defined above, **AND**

b. the pipe is parallel to a third party trench 5' or less in depth, **AND**

   i. the pipe is exposed **and** undermined, or

   ii. at least one-half the pipe diameter lies within the angle of influence (defined above) and the bottom of the excavation is below the water table or the excavation is in soft clay (defined above).



- REPLACE A
- DO NOT REPLACE C
- REPLACE B IF EXCAVATION IS BELOW WATER TABLE OR IN SOFT CLAY

4.2.2 Case 2

a. The cast iron pipe is **low** pressure, as defined above, **AND**

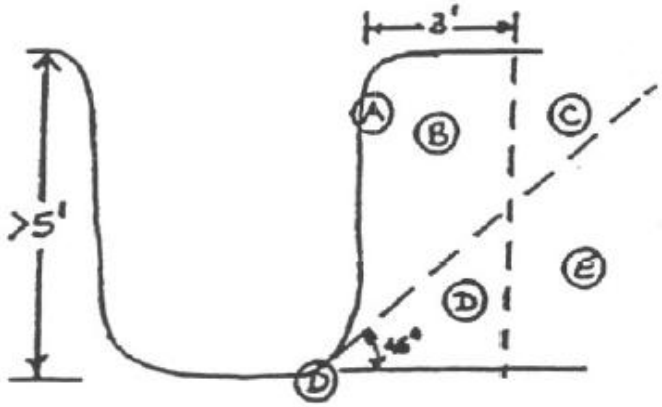
b. the pipe is parallel to a third party trench greater than 5' in depth, lies within the angle of influence, **AND** one or more of the following applies.

i. The pipe is exposed **and** undermined.

ii. The pipe is totally or partially within 3' of the edge of the trench and sheeting is not left in place.

iii. The strain on the pipe caused by, but not limited to, excessive ground movement or inadequate pipe support exceeds 0.05% (500 microstrain). Determine strain according to GS 1782.020(MA) “Determining Pipeline Strain From Soil Displacement”.

iv. The pipe is 3" or less in diameter.



- REPLACE A
- DO NOT REPLACE D OR E
- REPLACE B IF SHORING IS NOT LEFT IN PLACE OR IF PIPE IS 3" OR LESS O.D.
- REPLACE B OR C IF STRAIN >= 500 MICROSTRAIN OR PIPE IS 3" OR LESS O.D.

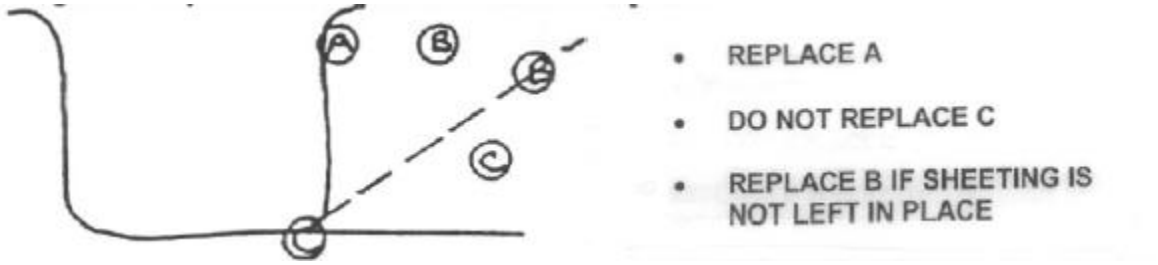
4.2.3 Case 3

a. The cast iron pipe is **high** pressure, as defined above, **AND**

b. the pipe is parallel to **any** third party trench, **AND**

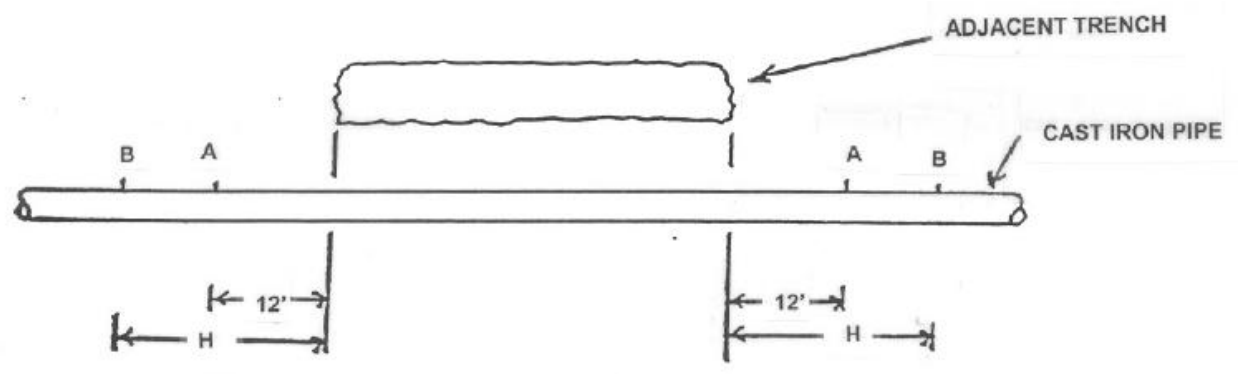
i. the pipe is exposed **and** undermined, or

ii. at least one-half of the pipe diameter lies within the angle of influence, as defined above, and sheeting that may have been used is not left in place.



4.2.4 Length of Replacement - Parallel Trenches

Replace the cast iron a minimum of 12 feet beyond the edge of the trench, measured horizontally, or a distance equal to the depth of the adjacent trench, whichever is greater.



H = Depth of Adjacent Trench

Replace A-A or B-B, whichever is greater

5. CAST IRON REPLACEMENT AND ABANDONMENT PROGRAM

In addition to the conditions requiring replacement of cast iron pipeline indicated above, Engineering is responsible for populating a database with cast iron pipe segments to help prioritize additional candidates for replacement. Typically, this effort is completed on an annual basis in the spring to allow for leak and break history surfacing in the winter months to be evaluated prior to the construction season. Certain segments of cast iron pipe are identified as candidates for replacement based upon certain "selection criteria". These segments are then entered into a data base of cast iron segments which includes characteristics of the pipe: its performance and maintenance history, risk factors, economic factors, etc. Based on these characteristics, point values are assigned. The point values are higher for those characteristics found to be more likely associated with a leak or break, for those characteristics associated with higher risk in the event of a leak or break, and for those characteristics associated with economic benefit to the company. Cast iron segments are ordered by descending total point value. The point value is then used to prioritize and schedule selected segments for replacement or abandonment for each of three years hence.

5.1 Selection Criteria

Each segment of cast iron pipe satisfying one or more of the following criteria is selected for further analysis.

a. Its maximum actual operating pressure is greater than ½ psig.

b. It lies underneath the roadway for which the municipality plans resurfacing or reconstruction and the pipe is 8” or less in diameter.

c. It is subject to replacement due to system improvements within a three year period.

d. Its performance history indicates either of the following:

   i. there are one or more pending leaks on the segment, or

   ii. there have been three or more leak or break repairs made within the last four years (a rolling 12 months).

5.2 Development of Data Base

For each segment identified in Section 4.1, gather the following information:

a. city,

b. street name (from and to),

c. year pipe was installed,

d. diameter of pipe,

e. pressure at which the pipe is operated (maximum actual operating

pressure),

f. length of the segment,

g. number of joint leaks,

h. number of pipe breaks,

i. number of other causes of pipe failure (i.e. drip, valve, etc.),

j. depth of the pipe,

k. number of encapsulation kits or other effective joint sealing techniques applied to the segment (i.e., keyholes, Avon seals, etc.),

l. number of joint clamps or leak clamps installed (mechanical type only),

m. degree of external loads (heavy or light), any abnormal conditions,

n. soil corrosivity,

o. number of pending leaks,

p. any known chemical properties of the pipe,

q. any known mechanical properties of the pipe,

r. location of the pipe relative to paving (paved to building line or not),

s. existence of public building(s), as defined by Company gas standard 14.12, along the segment,

t. whether or not road reconstruction or repavement is planned,

u. whether or not system improvements to the segment are critical or beneficial to the distribution network, and

v. redundancy of mains (if and only if the segment can be retired without disabling the distribution network).

5.3 Prioritization of Pipe Segments

The prioritization is completed automatically in the database by a point system, allowing for replacement or abandonment of the worst pipe segments. Prioritization is done by Engineering on a data base file manager by a point system. Pipe segments for all three operating areas in Massachusetts are combined for prioritization. This allows for replacement or abandonment of the worst pipe segments, regardless of operating area boundaries.

Currently, the Company does not have information on the mechanical properties of the cast iron pipe. However, the Company implemented a coupon sampling program in August 1992 as follows:

Coupon Sampling:

Take a coupon from the cast iron pipe whenever:

a. installing a new service tee,

b. doing a tie-in or retiring a cast iron main, or

c. doing a bag-off for any other reason.

A separate data base will be developed and will include for each coupon the date taken, location, pipe diameter, pipe vintage year, pipe condition (external and internal), soil type and pH (determined from USDA maps), the wall thickness, and any other information thought to be relevant to the mechanical properties of the pipe segment as noted in the field. This data base will be analyzed independently of the overall prioritization model. The analysis will focus on relationships between the wall thickness and pipe condition with pipe diameter, vintage year, soil type, and soil pH. If such a relationship(s) is found, it will then be applied uniformly to the prioritization data base based on the segments pertinent characteristics.

5.4 Evaluation of the Results of Prioritization Model

The prioritized list of cast iron pipe segments shall be reviewed by Engineering. Where sound engineering judgment dictates, modifications to the prioritized list may be made. For each such modification, Engineering shall document the rationale. Additionally, Engineering shall assign point values to any abnormal conditions with a particular pipe segment (e.g., relationship(s) found through analysis of the cast iron coupon sampling program).

5.5 Development of Three Year Schedule

Engineering shall develop a new three year schedule each calendar year. It is recommended that the schedule be updated in conjunction with the budgeting process by repeating each of the above steps. It is also suggested that the three year schedule be updated again in the following spring to allow for leak and break history surfacing in the winter months to be evaluated prior to the construction season. .

5.6 Annual Review of Procedures

Review this gas standard, and modify accordingly at least once each calendar year and more frequently, if needed.

6. TRAINING

Initial training with engineering personnel was effectively conducted on an individual basis when this program was developed. A written plan on initial training was developed in conjunction with the development of the program itself, and is to serve as the written plan for continuing instruction. Every two years, conduct the continuing instruction training session to update appropriate operating, maintenance, supervisory and engineering personnel on the Cast Iron Replacement and Abandonment Program and any modifications that have

occurred as a result of the Company's annual review of any program and procedures.

7. RECORDS

Accurate, readily accessible records must be kept to verify compliance with this procedure.

Leakage survey records for cast iron encroachments shall be kept for a minimum of five consecutive years after the calendar year to which the records apply.

Records supporting the Cast Iron Replacement and Abandonment Program and Database shall be kept for a minimum of five consecutive years after the calendar year to which the records apply.

Cast iron pipeline replacement records shall be kept for the life of the replacement pipeline.

MiSource

Gas Standard

Distribution Operations

Effective Date: 04/01/2009	**Protecting Cast Iron Pipelines**	Standard Number: **GS 1782.010(MA)**
Supercedes: N/A		Page 1 of 8

1. GENERAL

When the Company has knowledge that the support for a segment of a buried cast-iron pipeline is disturbed or will be disturbed, the requirements of this procedure shall be followed.

Cast iron pipe required to be replaced in accordance with Section 5 of this procedure shall be surveyed daily for gas leakage and monitored daily until the pipe is replaced.

Refer to GS 1780.010 “Cast Iron - General” for additional guidelines.

2. DEFINITIONS

Angle of Influence is defined as the angle 45^{o} above the horizontal starting from the bottom edge of the trench nearest to the cast iron main.

Immediately means the first regular workday that the operator can gain access to the pipe after obtaining necessary road opening permits. Until that time, if pipe must be replaced in accordance with state regulations, survey and monitor the pipe daily for gas leakage until it is replaced. Daily means each calendar day, including weekends, holidays, etc.

High pressure cast iron pipe is defined as a cast iron distribution pipe in which the gas pressure is higher that the pressure provided to the customer, i.e., a "pounds" system.

Low pressure cast iron pipe is defined as a cast iron distribution pipe in which the gas pressure is substantially the same as the pressure provided to the customer, i.e., an "inches" system.

Soft clay is defined as earth that is easily molded by hand, or that has an unconfined compressive strength of 0.5 to 1.0 kips (1 kip = 1000 pounds of force) per square foot.

3. CAST IRON PROTECTION

The Company shall promptly take appropriate steps to provide permanent protection from damage that might result from external loads for a disturbed cast iron segment. External loads on the cast iron include:

a. vibrations from heavy construction equipment, trains, trucks, buses, major demolition projects, or blasting;

b. impact forces by vehicles;

c. earth movement resulting from washouts, floods, unstable soil, landslides, freeze-thaw cycles, or other hazards that may cause the pipeline to move or to sustain abnormal loads (e.g., water leaks, sewer failures, earthquakes);

d. existing or apparent future excavations/encroachments near the pipeline; or

e. other foreseeable outside forces which may subject that segment of the pipeline to bending stress.

Steps may include dewatering the excavation, providing temporary or permanent shoring or sheeting, supporting the pipeline by use of bridging or bracing, or compacting the soil surrounding the cast iron pipeline with a suitable backfill.

4. CONDITIONS REQUIRING REPLACEMENT

4.1 Replacement of Cast Iron Pipe at Trench Crossings

4.1.1 Cast Iron Pipe 8” or Less

Replace all cast iron pipe 8" or less in diameter **immediately** when exposed and undermined:

a. whenever there is less than 24" of cover; or

b. if there is 24" of cover or more, when the trench widths below are exceeded.

Measure trench widths along the centerline of the exposed pipe.

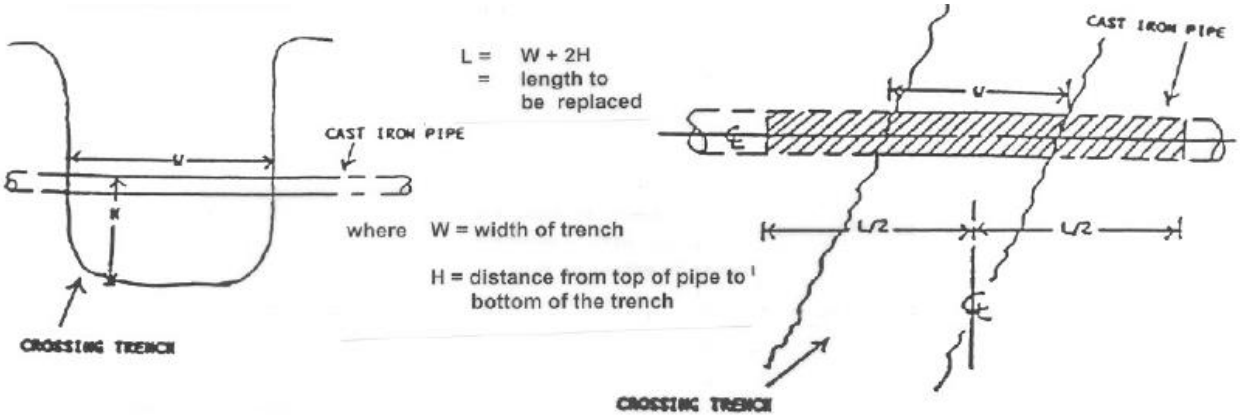
MAXIMUM ALLOWABLE TRENCH WIDTH

Nominal Pipe Diameter (inches)	Depth of Cover on Cast Iron Pipe (feet)		
	0 to 2 feet	2 to 4 feet	4 feet or more
4 or less	replace	3	4
6	replace	4	6
8	replace	5.5	8

Effective Date: 04/01/2009	**Protecting Cast Iron Pipelines**	Standard Number: **GS 1782.010(MA)**
Supercedes: N/A		Page 3 of 8

4.1.2 Length of Pipe To Be Replaced When Crossed By 3rd Party

Replace, at a minimum, a length equal to the trench width plus twice the distance from the top of the pipe to the bottom of the crossing trench. Measure the replacement distance equally on both sides of the trench:



4.1.3 Options When Crossed By a Third Party:

The cast iron pipe does not have to be replaced if, at the discretion of the supervisor all of the following are met:

a. the crossing trench is 5' or less in depth; **AND**

b. the backfill supporting and surrounding the cast iron pipe is compacted in accordance with Company gas standard 4.05 “Trench Padding and Backfilling Procedure For Mains” for the full trench width and for a distance equal to one-half of the trench width on both sides of the centerline of the cast iron pipe (*see sketch below*); **AND**

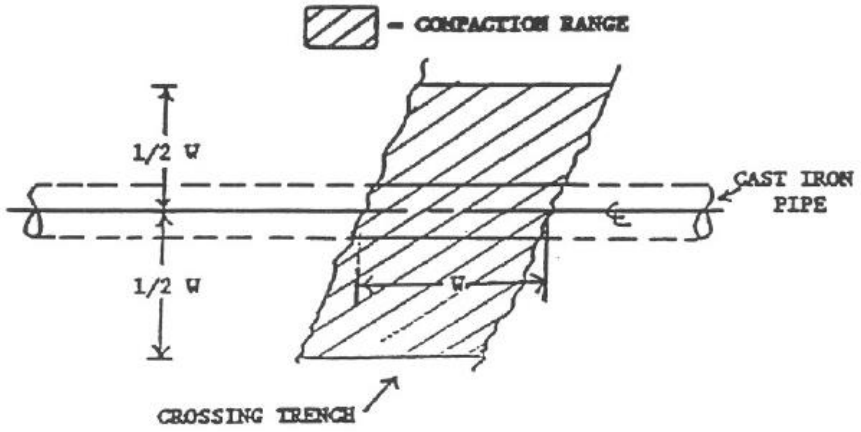
c. the backfill is clean and free of pavement, frozen soil, rocks, trash and other objectionable material or debris.

MiSource

Gas Standard

Distribution Operations

Effective Date: 04/01/2009	**Protecting Cast Iron Pipelines**	Standard Number: **GS 1782.010(MA)**
Supercedes: N/A		Page 4 of 8



4.2 Replacement of Cast Iron Adjacent to Parallel Excavations

Replace all cast iron pipe 8" or less in diameter **immediately**, as defined below, when adjacent to a third party parallel excavation exceeding 8' in length in any of the three following situations. See Section 4.2.4 "Length of Replacement" below to determine how much pipe must be replaced.

REPLACE CAST IRON PIPE IN THE FOLLOWING THREE CASES

4.2.1 Case 1

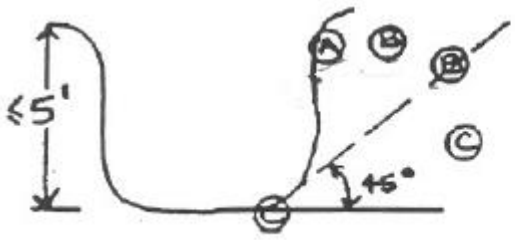
a. the cast iron pipe is **low** pressure, as defined above, **AND**

b. the pipe is parallel to a third party trench 5' or less in depth, **AND**

i. the pipe is exposed **and** undermined, or

ii. at least one-half the pipe diameter lies within the angle of influence (defined above) and the bottom of the excavation is below the water table or the excavation is in soft clay (defined above).

Effective Date: 04/01/2009	**Protecting Cast Iron Pipelines**	Standard Number: **GS 1782.010(MA)**
Supercedes: N/A		Page 5 of 8



- REPLACE A
- DO NOT REPLACE C
- REPLACE B IF EXCAVATION IS BELOW WATER TABLE OR IN SOFT CLAY

4.2.2 Case 2

a. The cast iron pipe is **low** pressure, as defined above, **AND**

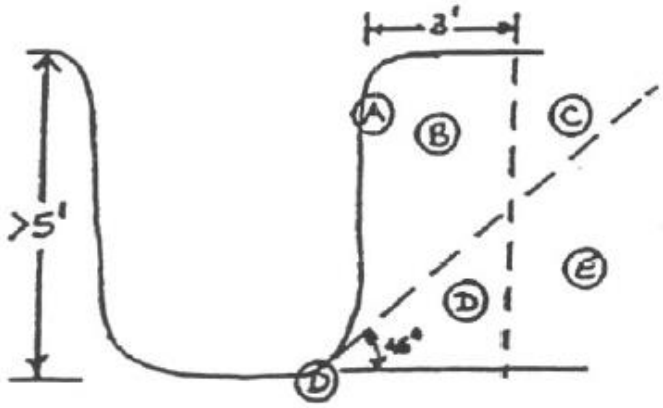
b. the pipe is parallel to a third party trench greater than 5' in depth, lies within the angle of influence, **AND** one or more of the following applies.

i. The pipe is exposed **and** undermined.

ii. The pipe is totally or partially within 3' of the edge of the trench and sheeting is not left in place.

iii. The strain on the pipe caused by, but not limited to, excessive ground movement or inadequate pipe support exceeds 0.05% (500 microstrain). Determine strain according to GS 1782.020(MA) "Determining Pipeline Strain From Soil Displacement".

iv. The pipe is 3" or less in diameter.



- REPLACE A
- DO NOT REPLACE D OR E
- REPLACE B IF SHORING IS NOT LEFT IN PLACE OR IF PIPE IS 3" OR LESS O.D.
- REPLACE B OR C IF STRAIN >= 500 MICROSTRAIN OR PIPE IS 3" OR LESS O.D.

Effective Date: 04/01/2009	Protecting Cast Iron Pipelines	Standard Number: GS 1782.010(MA)
Supercedes: N/A		Page 6 of 8

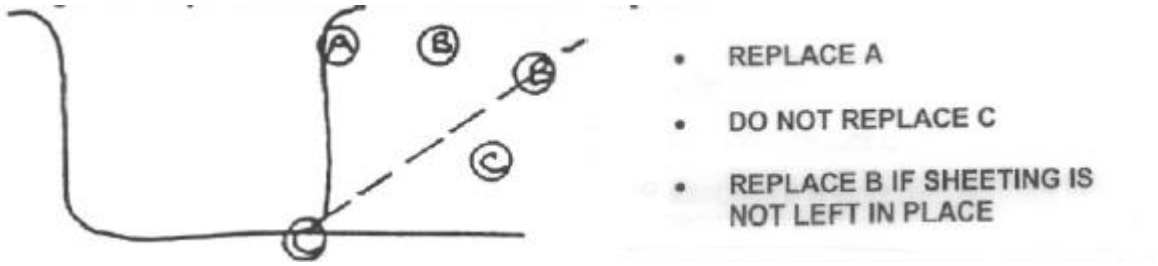
4.2.3 Case 3

a. The cast iron pipe is **high** pressure, as defined above, **AND**

b. the pipe is parallel to **any** third party trench, **AND**

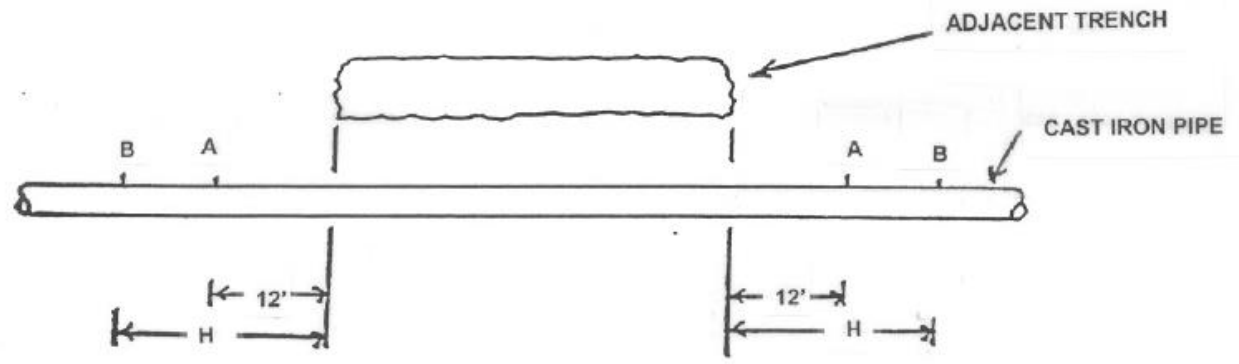
i. the pipe is exposed **and** undermined, or

ii. at least one-half of the pipe diameter lies within the angle of influence, as defined above, and sheeting that may have been used is not left in place.



4.2.4 Length of Replacement - Parallel Trenches

Replace the cast iron a minimum of 12 feet beyond the edge of the trench, measured horizontally, or a distance equal to the depth of the adjacent trench, whichever is greater.



H = Depth of Adjacent Trench

Replace A-A or B-B, whichever is greater

5. CAST IRON REPLACEMENT AND ABANDONMENT PROGRAM

In addition to the conditions requiring replacement of cast iron pipeline indicated above, Engineering is responsible for populating a database with cast iron pipe segments to help prioritize additional candidates for replacement. Typically, this effort is completed on an annual basis in the spring to allow for leak and break history surfacing in the winter months to be evaluated prior to the construction season.

5.1 Selection Criteria

Each segment of cast iron pipe satisfying one or more of the following criteria is selected for further analysis.

a. Its maximum actual operating pressure is greater than ½ psig.

b. It lies underneath the roadway for which the municipality plans resurfacing or reconstruction and the pipe is 8” or less in diameter.

c. It is subject to replacement due to system improvements within a three year period.

d. Its performance history indicates either of the following:

   i. there are one or more pending leaks on the segment, or

   ii. there have been three or more leak or break repairs made within the last four years (a rolling 12 months).

5.2 Prioritization of Pipe Segments

The prioritization is completed automatically in the database by a point system, allowing for replacement or abandonment of the worst pipe segments.

5.3 Evaluation of the Results of Prioritization Model

The prioritized list of cast iron pipe segments shall be reviewed by Engineering. Where sound engineering judgment dictates, modifications to the prioritized list may be made. For each such modification, document the rationale. Additionally, assign point values to any abnormal conditions with a particular pipe segment (e.g.,

relationship(s) found through analysis of the cast iron coupon sampling program).

5.4 Development of Three Year Schedule

Based on the evaluation of the results of the prioritization model, Engineering shall develop a three year schedule for the replacement/abandonment of specific cast iron pipe segments. Add segments to be replaced/abandoned due to system or municipal needs. Update the three year schedule on an annual basis in the spring. Document reasons for modifying the schedule.

6. RECORDS

Accurate, readily accessible records must be kept to verify compliance with this procedure.

Leakage survey records for cast iron encroachments shall be kept for a minimum of five consecutive years after the calendar year to which the records apply.

Records supporting the Cast Iron Replacement and Abandonment Program and Database shall be kept for a minimum of five consecutive years after the calendar year to which the records apply.

Cast iron pipeline replacement records shall be kept for the life of the replacement pipeline.

CAST IRON REPLACEMENT AND ABANDONMENT PROGRAM

This procedure applies to the Massachusetts operating divisions only.

This procedure addresses 220 CMR 113: Operation, Maintenance, Replacement, and Abandonment of Cast Iron Pipelines, Section 113.05: Replacement and Abandonment Program and Procedures. Bay State Gas has developed and implemented this program to evaluate the cast iron pipe to prioritize and schedule failure-prone segments for replacement or abandonment.

The regulation also calls for replacement or abandonment by April 12, 2001 of all cast iron pipe with a nominal diameter of eight inches or less that is known, or has been determined, to have been installed before 1860. Bay State Gas, based on available information, does not believe to have any such pipe operating in its system.

THE PROGRAM

Certain segments of cast iron pipe are identified as *candidates* for replacement based upon certain "selection criteria". These segments are then entered in our data base of cast iron segments which includes characteristics of the pipe, its performance and maintenance history, risk factors, economic factors, etc. Based on these characteristics, point values are assigned. The point values are higher for those characteristics found to be more likely associated with a leak or break, for those characteristics associated with higher risk in the event of a leak or break, and for those characteristics associated with economic benefit to the company. Cast iron segments are ordered by descending total point value. The point value is then used to prioritize and schedule selected segments for replacement or abandonment for each of three years hence.

I. Selection Criteria

Each segment of cast iron pipe satisfying one or more of the following criteria is selected for further analysis:

1. Its maximum actual operating pressure is greater than 1/2 psig.

2. It lies underneath the roadway for which the municipality plans resurfacing or reconstruction and the pipe is 8" or less in diameter.

3. It is subject to replacement due to system improvements within a three year period.

4. Its performance history indicates either of the following:

   a. There is one or more pending leaks on the segment
   b. There have been three or more leak or break repairs made within the last four years (a rolling 12 months).

II. Development of Data Base

For each segment identified in Part I above, gather the following information:

- o City
- o Street name
  - from
  - to
- o Year pipe was installed
- o Diameter of pipe
- o Pressure at which the pipe is operated (maximum actual operating pressure)
- o Length of the segment
- o Number of joint leaks
- o Number of pipe breaks
- o Number of other causes of pipe failure (i.e. drip, valve, etc.)
- o Depth of the pipe
- o Number of encapsulation kits or other effective joint sealing techniques applied to the segment (i.e., keyholes, Avon seals, etc.)
- o Number of joint clamps or leak clamps installed (mechanical type only)
- o Degree of external loads (heavy or light)
- o Any abnormal conditions
- o Soil corrosivity
- o Number of pending leaks
- o Any known chemical properties of the pipe
- o Any known mechanical properties of the pipe
- o Pressure at which the pipe is operated (maximum actual operating pressure)
- o Location of the pipe relative to paving (paved to building line or not)
- o Existence of public building(s), as defined by O&M Procedure 14.30, along the segment
- o Whether or not road reconstruction or repavement is planned
- o Whether or not system improvements to the segment are critical or beneficial to the distribution network
- o Redundancy of mains (if and only if the segment can be retired without disabling the distribution network)

III. Prioritization of Pipe Segments

Prioritize the segments. Prioritization is done by Corporate Engineering on a data base file manager by a point system. Pipe segments for all three operating divisions in Massachusetts are combined at this time for prioritization. This allows for replacement or abandonment of the worst pipe segments, regardless of divisional boundaries.

IV. Evaluation of Results of Prioritization Model

Review the prioritized list of cast iron segments. This is done by Corporate Engineering and divisional Engineering. Where sound engineering judgment dictates, modifications to the list may be made. For each such modification, document the rationale. Additionally, assign point values to any abnormal conditions with a particular pipe segment. Currently, the Company does not have information on the mechanical properties of the cast iron pipe. However, the Company implemented a coupon sampling program in August 1992 as follows:

Coupon Sampling:
Take a coupon from the cast iron pipe whenever:

a. installing a new service tee
b. doing a tie-in or retiring a cast iron main
c. doing a bag-off for any other reason.

A separate data base will be developed and will include for each coupon the date taken, location, pipe diameter, pipe vintage year, pipe condition (external and internal), soil type and pH (determined from USDA maps), the wall thickness, and any other information thought to be relevant to the mechanical properties of the pipe segment as noted in the field. This data base will be analyzed independently of the overall prioritization model. The analysis will focus on relationships between the wall thickness and pipe condition with pipe diameter, vintage year, soil type, and soil pH. If such a relationship(s) is found, it will then be applied uniformly to the prioritization data base based on the segments pertinent characteristics.

V. Development of Three Year Schedule

Develop a three year schedule for the replacement/abandonment of specific cast iron pipe segments. This is done by Corporate and divisional Engineering.

1. Based on the resultant point values, schedule segments of cast iron for replacement.

2. Assess the impact of any abnormal conditions or mechanical or chemical properties of the pipe, as described in Part IV above. Assign points accordingly and adjust the priority list.

3. Modify the schedule as permitted in Part IV above to allow for sound engineering judgment. Document the rationale for the change.

4. Add any segments to be replaced/abandoned due to system or municipal needs.

VI. Administration

1. Time Schedule for Replacement

Develop a new three year schedule each calendar year. It is recommended that the schedule be updated in conjunction with the budgeting process by repeating each of the above steps. It is also suggested that the three year schedule be updated again in the following spring to allow for leak and break history surfacing in the winter months to be evaluated prior to the construction season.

2. Annual Review of Procedures

Review this procedure, 4.20B, and modify accordingly at least once each calendar year or more frequently if needed.

3. Record Keeping

Maintain accurate and readily accessible records to verify compliance with this procedure. Such records are to be kept for at least five consecutive years after the calendar year to which they apply.

VII. Training

Initial training with engineering personnel was effectively conducted on an individual basis when this program was developed. A written plan on initial training was developed in conjunction with the development of the program itself, and is to serve as the written plan for continuing instruction. Every two years, conduct the continuing instruction training session to update appropriate personnel on the Cast Iron Replacement and Abandonment Program.

CAST IRON REPLACEMENT AND ABANDONMENT PROGRAM

This procedure applies to the Massachusetts operating divisions only.

This procedure addresses 220 CMR 113: Operation, Maintenance, Replacement, and Abandonment of Cast Iron Pipelines, Section 113.05: Replacement and Abandonment Program and Procedures. Bay State Gas has developed and implemented this program to evaluate the cast iron pipe to prioritize and schedule failure-prone segments for replacement or abandonment.

The regulation also calls for replacement or abandonment by April 12, 2001 of all cast iron pipe with a nominal diameter of eight inches or less that is known, or has been determined, to have been installed before 1860. Bay State Gas, based on available information, does not believe to have any such pipe operating in its system.

THE PROGRAM

Certain segments of cast iron pipe are identified as *candidates* for replacement based certain "selection criteria". These segments are then entered in our data base of cast iron segments which includes characteristics of the pipe, its performance and maintenance history, risk factors, economic factors, etc. Based on these characteristics, point values are assigned. The point values are higher for those characteristics found to be more likely associated with a leak or break, for those characteristics associated with higher risk in the event of a leak or break, and for those characteristics associated with economic benefit to the company. Cast iron segments are ordered by descending total point value. The point value is then used to prioritize and schedule selected segments for replacement or abandonment for each of three years hence.

I. Selection Criteria

Each segment of cast iron pipe satisfying one or more of the following criteria is selected for further analysis:

1. Its maximum actual operating pressure is greater than 1/2 psig.

2. It lies underneath the roadway for which the municipality plans resurfacing or reconstruction and the pipe is 8" or less in diameter.

3. It is subject to replacement due to system improvements within a three year period.

4. Its performance history indicates either of the following:

    a. There is one or more pending leaks on the segment
    b. There have been three or more leak or break repairs made within the last four years (a rolling 12 months).

II. Development of Data Base

For each segment identified in Part I above, gather the following information:

- City
- Street name
  - from
  - to
- Year pipe was installed
- Diameter of pipe
- Pressure at which the pipe is operated (maximum actual operating pressure)
- Length of the segment
- Number of joint leaks
- Number of pipe breaks
- Number of other causes of pipe failure (i.e. drip, valve, etc.)
- Depth of the pipe
- Number of encapsulation kits or other effective joint sealing techniques applied to the segment (i.e., keyholes, Avon seals, etc.)
- Number of joint clamps or leak clamps installed (mechanical type only)
- Degree of external loads (heavy or light)
- Any abnormal conditions
- Soil corrosivity
- Number of pending leaks
- Any known chemical properties of the pipe
- Any known mechanical properties of the pipe
- Pressure at which the pipe is operated (maximum actual operating pressure)
- Location of the pipe relative to paving (paved to building line or not)
- Existence of public building(s), as defined by O&M Procedure 14.30, along the segment
- Whether or not road reconstruction or repavement is planned
- Whether or not system improvements to the segment are critical or beneficial to the distribution network
- Redundancy of mains (if and only if the segment can be retired without disabling the distribution network)

III. Prioritization of Pipe Segments

Prioritize the segments. Prioritization is done by Corporate Engineering on a data base file manager by a point system. Pipe segments for all three operating divisions in Massachusetts are combined at this time for prioritization. This allows for replacement or abandonment of the worst pipe segments, regardless of divisional boundaries.

IV. Evaluation of Results of Prioritization Model

Review the prioritized list of cast iron segments. This is done by Corporate Engineering and divisional Engineering. Where sound engineering judgment dictates, modifications to the list may be made. For each such modification, document the rationale. Additionally, assign point values to any abnormal

conditions with a particular pipe segment. Currently, the Company does not have information on the mechanical properties of the cast iron pipe. However, the Company will implement a coupon sampling program in August 1992 as follows:

Coupon Sampling:
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A separate data base will be developed and will include for each coupon the date taken, location, pipe diameter, pipe vintage year, pipe condition (external and internal), soil type and pH (determined from USDA maps), the wall thickness, and any other information thought to be relevant to the mechanical properties of the pipe segment as noted in the field. This data base will be analyzed independently of the overall prioritization model. The analysis will focus on relationships between the wall thickness and pipe condition with pipe diameter, vintage year, soil type, and soil pH. If such a relationship(s) is found, it will then be applied uniformly to the prioritization data base based on the segments pertinent characteristics.

V. Development of Three Year Schedule

Develop a three year schedule for the replacement/abandonment of specific cast iron pipe segments. This is done by Corporate and divisional Engineering.

A. Based on the resultant point values, schedule segments of cast iron for replacement.

B. Assess the impact of any abnormal conditions or mechanical or chemical properties of the pipe, as described in Part IV above. Assign points accordingly and adjust the priority list.

C. Modify the schedule as permitted in Part IV above to allow for sound engineering judgment. Document the rationale for the change.

D. Add any segments to be replaced/abandoned due to system or municipal needs.

VI. Administration

A. Time Schedule for Replacement

Develop a new three year schedule each calendar year. It is recommended that the schedule be updated in conjunction with the budgeting process by repeating each of the above steps. It is also suggested that the three year schedule be updated again in the following spring to allow for leak and break history surfacing in the winter months to be evaluated prior to the con-

struction season. For example, when preparing the 19x3 budget, develop the cast iron replacement and abandonment schedule for calendar years 19x3, 19x4, and 19x5. After the winter of 19x2-19x3, update the three year schedule again for calendar years 19x3, 19x4, and 19x5.

B. Annual Review of Procedures

Review this procedure, 4.20B, and modify accordingly at least once each calendar year or more frequently if needed.

C. Record Keeping

Maintain accurate and readily accessible records to verify compliance with this procedure. Such records are to be kept for at least five consecutive years after the calendar year to which they apply.

VII. Training

Initial training with engineering personnel was effectively conducted on an individual basis when this program was developed. A written plan on initial training was developed in conjunction with the development of the program itself, and is to serve as the written plan for continuing instruction. Every two years, conduct the continuing instruction training session to update appropriate personnel on the Cast Iron Replacement and Abandonment Program.