



SAFETY HANDBOOK

Working around

natural gas pipelines

ATCO Gas

works for your
safety

How to use this safety handbook

This handbook is divided into two major sections:

Locating and **Ground Disturbance**.

Important information on what to do should you contact a natural gas pipeline is at the back of the handbook under

Hit and Blowing/Leaking Natural Gas Pipelines and **Natural Gas Fires**.

This safety handbook is for anyone who performs ground disturbance work.

Ground disturbance work includes but is not limited to:

- > digging
- > augering
- > directional drilling
- > driving materials into the ground and/or
- > professional excavation

WHY IS SAFE GROUND DISTURBANCE SO IMPORTANT?

Contact with buried natural gas pipelines can lead to serious injury or death.

Contacts also result in property damage that can cause interruptions in natural gas delivery to others and be costly to repair.

Safety should always be your first priority when working around natural gas pipelines.

The two most important steps to remember:

1) You must contact Alberta One-Call prior to beginning ground disturbance work.

Alberta One-Call will notify an ATCO Gas representative, who will come to your worksite and identify all natural gas lines in your work area.

Contact: 1-800-242-3447 or www.alberta1call.com




2) Hand expose the natural gas line.

You must carefully hand expose the natural gas line if you are disturbing the ground within one metre (three feet three inches) of the outside edges of the locate markings.

Note: Hydrovacing is an acceptable method of hand exposing.

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Locating underground facilities



Calling Alberta One-Call first ensures that locates will be done by an ATCO Gas approved utility locator agent who has access to system mapping information.

CALLING ALBERTA ONE-CALL

The Alberta Occupational Health and Safety Code states you **must contact Alberta One-Call to have underground natural gas facilities located in your work area** (1-800-242-3447 or www.alberta1call.com) before you begin work.

This is a **free service**. (*There may be a fee for unscheduled requests.*)

Alberta One-Call requires **at least two full working days' notice** to do locates. Long weekends and other holiday periods tend to be active times; therefore, more notice is required to meet scheduling requirements.

Alberta One-Call will arrange to have an ATCO Gas representative come to your worksite and identify all natural gas facilities in your work area.

Remember that a main cause of hitting pipeline facilities is failure to obtain an Alberta One-Call locate request.

Note: Some owners of buried utilities do not belong to Alberta One-Call. They must be contacted directly by excavators requiring locates.

Note: All proposed excavation areas should be identified in white

TYPICAL LOCATE METHODS

- 1) The locator will spray **temporary paint markings** on the ground and/or place **locate flags** in the ground to indicate where natural gas facilities are buried. Natural gas markings are required to be yellow.

The paint markings indicate:

- > the **direction** the pipeline runs
- > the **approximate location** of the pipeline and/or other facilities (*The depth of the facility will not be provided*)

Locates are valid for 14 days from the date the locate is completed.

Locate markings may be shown by a single dashed line, flags, lath or pair of dashed lines connected with a "V." The "hand expose zone" (see Figure 3, p.12) extends one metre outward from the marks. Figure 1 describes typical locate marks. Figure 2 explains temporary marking definitions and the international colour code for marking buried facilities.

FIG 1 - Temporary locate markings

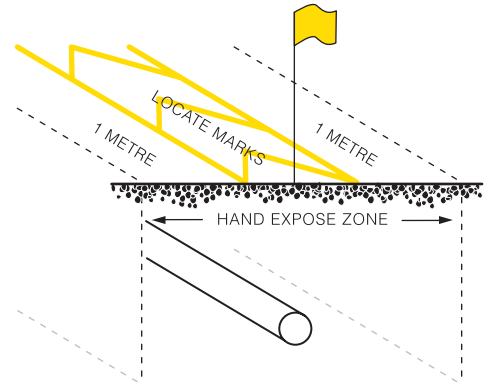


FIG 2 - International colour code for marking buried facilities

WHITE	Proposed excavation
PINK	Temporary survey markings
RED	Electric power lines, cable conduit, lighting cables
YELLOW	Gas, oil, petroleum, gaseous materials
ORANGE	Telephone, cable tv, communication, alarm, signal lines
BLUE	Potable water
GREEN	Sanitary sewers, storm sewers, drain lines
PURPLE	Reclaimed water, irrigation, slurry lines

- 2) **The locator is required to provide you with a locate document.** This document should include a sketch identifying the work area and the **type** of facilities in the ground. You may receive this document in person, via fax or it may be secured to one of the locate flags. *(If the locator determines that Polyvinyl Chloride (PVC) pipeline exists in your dig area, ATCO Gas must supervise any ground disturbance around the pipeline. Please read more information on PVC pipeline on page 19, in the section called Facilities – What You Will See in the Ground).*

- ! 3) If you are on the worksite when the locator is finished identifying underground facilities, **review the document with the locator.** Ensure the locate document sketch matches the temporary paint markings and clearly identifies the work area.

WHAT IF MY PROJECT GETS DELAYED OR REVISED?

What if my activity or weather disturbs the temporary paint markings and/or flags?

The person(s) requesting the locate is responsible for preserving the temporary paint markings and/or flags and protecting the marks from adverse weather. If the markings are no longer visible, you should arrange for new locates.

Locates are valid for 14 days from the date the locate is completed. Should your project be delayed or revised beyond this date, you may need to cancel and reschedule your locates to match your new work start date.

Locates expire after 14 days because:

- > temporary paint markings eventually fade
- > flags may be tampered with
- > new utilities are constantly being installed
- > existing utilities are often upgraded

Be aware of the possibility of other underground facilities in your dig area

(electricity, water, telephone, cable television, etc.).

Ground disturbance

It is extremely important to hand expose the natural gas line.

You must carefully hand expose the natural gas line if you are disturbing the ground within one metre (three feet three inches) of the outside edges of locate markings.

Remember that a main cause of pipeline digging accidents is failure to properly hand expose the natural gas line.

SAFETY FIRST

It is always a good practice to assess what personal protective equipment you should wear prior to beginning a work project.

Consider:

- > safety glasses
- > gloves
- > flame retardant coveralls
- > steel-toed footwear

For ground disturbance work around natural gas pipelines, you should conduct a hazard assessment to avoid injury and potential natural gas ignition.

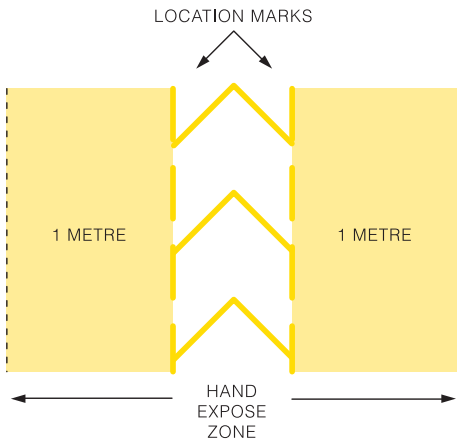
To ensure maximum safety, it is preferred that ground disturbance activities should be completed in **frost-free conditions**. Contact ATCO Gas prior to ground thawing when winter work is necessary.

GROUND DISTURBANCE NEAR THE HAND EXPOSE ZONE

Hand dig or hydrovac **first**; then use mechanical excavation.

All ATCO Gas lines must be hand exposed before beginning any mechanical excavation activity within the hand expose zone located one metre (three feet three inches) on either side of any locate marks.

FIG 3 - Hand expose zone



EXPOSING METHODS

1) Hand Exposure

It is very important to hand expose the natural gas line first.

Use a shovel to expose the line to at least one metre (three feet three inches) outward from both outside edges of the locate marks — this is the hand expose zone.

2) Hydrovacing

A hydrovac is a fast, convenient and safe method for exposing lines. A hydrovac combines water pressure and a vacuum to excavate. It is especially effective for exposing pipelines during frozen ground conditions.

Hydrovacing can replace hand exposure as an acceptable digging method in the hand expose zone.

Note: Hydrovac services are available for all sizes of excavation projects.

Remember that improper hydrovac techniques and equipment can damage natural gas lines.

Continued on next page

Hydrovac Requirements

- > Use a wand tip and suction hose covered with material that will not damage the pipe – Teflon® or rubber.
- > Keep wand in motion at all times, with the wand tip at least 0.3 metres (one foot) from the line. Reduce pressure to finish the exposure.
- > The wand tip should have a three-jet tip or an agitating spinner assembly.
- > Do not exceed pressures of 1,500 PSI or temperatures of 60°C.
- > Damage to the pipe or coating must be reported to ATCO Gas.

Hydrovac Contractors

- > Contractors must carry a Material Safety Data Sheet (MSDS) for natural gas and be aware of emergency procedures.
- > Contractors are responsible for damage that occurs to a company pipeline during hydrovac exposing operations, including incidental damages such as gas loss, customer re-lights, fire department and dangerous goods response.
- > **Cover or barricade all open holes and excavations** until backfilling operations are completed.
- > Minor damage to the coating of a pipeline will be repaired at no charge to the contractor. Contractors are required to provide ...adequate access to pipe for repairs and recoating applications.

- > Contractors are responsible for the public's safety at excavation sites until inspection and backfilling is complete.
- > If damage occurs, contractors must contact the necessary authorities and ATCO Gas immediately. In an emergency, the operator may be asked to render assistance.

EXCAVATION METHODS

Use of mechanical excavation is permitted only after the facility is hand exposed.

Mechanical excavation involves machinery that is powered by a pneumatic, electrical, or chemical energy source of operation. When excavating with machinery (other than a hydrovac):

- > two workers should always be present – the machine operator and a spotter
- > remove small layers of soil in sequence
- > dig parallel to the buried line whenever possible
- > observe the excavation at all times for movement (e.g. cable contact), soil consistency (trench line), or foreign objects identifying underground facilities.
- > keep all mechanical excavation a minimum of 0.3 metres (one foot) away from all gas lines to prevent accidental contact with the gas line. Manually remove soil from the gas line area

Continued on next page

Directional drilling (horizontal boring)

Directional drilling involves the use of mechanical equipment to excavate by drilling horizontally beneath the surface.

Perpendicular drilling: the excavator **must expose the gas line by hand or hydrovac to create a 'daylighted' area extending a minimum of 0.3 metres (one foot) on all sides around and below the pipe. A daylighted area of one metre (three feet) is preferred all the way around the pipe.** Close visual inspection of the area below the pipe is required to **ensure that the drill-head/reamer does not hit the gas line** during the initial push or the pull-back. The drill path must cross under the pipe at the exact point of exposure. **Never assume that the gas line will be at the same depth on either side of the exposure point.**

Parallel drilling: the excavator **must expose a number of points along the gas line by hand or hydrovac** when drilling within one metre of the **outside edges** of the gas line locate markings. This must be done to ensure that the gas line does not deviate from the associated locate marks. The number of exposure points is determined by the drill path and facility depth. At a minimum, exposure points should occur every 30 metres (98 feet) along the gas line. For jobs that extend less than 30 metres (98 feet) along a gas line, exposure points must occur more often.

FIG 4a - Directional drilling

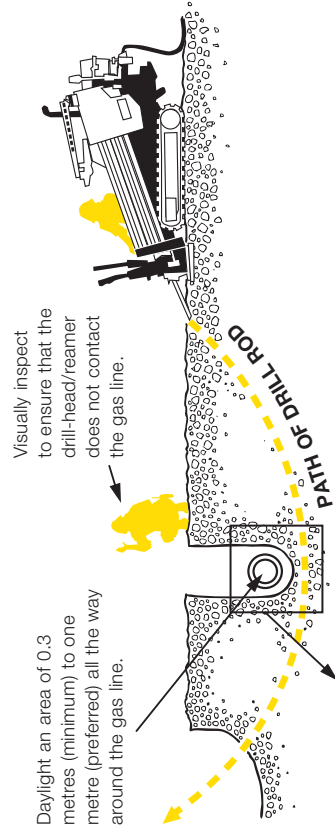
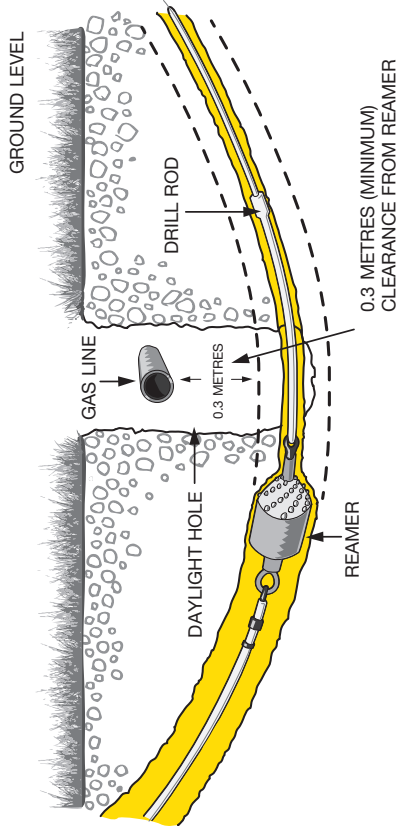


FIG 4b - Directional drilling inset on next page

FIG 4b - Directional drilling



NOTE: Visually inspect to ensure the reamer does not contact the gas line during pull back process.

FACILITIES - WHAT YOU WILL SEE IN THE GROUND

There are four types of ATCO Gas natural gas distribution pipelines:

1) Polyethylene (PE)

- > a type of plastic pipe
- > comes in various colours: yellow, black, orange, peach

2) Steel (ST)

- > appears as rough steel pipes or steel coated pipe (tar, grey paper, yellow jacket, blue, red, green)

3) Polyvinyl chloride (PVC)

- > a type of plastic pipe installed by ATCO Gas in the mid-1960s
- > comes in various colours: white, purple, grey, light blue, peach
- > **exposure of PVC lines requires the supervision and direction of an ATCO Gas company representative** (please provide two full working days' notice to arrange for an inspector)
- > **crossing buried PVC lines with heavy equipment must be done following instructions provided by an ATCO Gas representative**

4) Aluminum (AL)

- > appears as light grey metal or covered with a yellow jacket
- > accounts for less than one per cent of ATCO Gas distribution pipeline in the province

Other facilities:

Mechanical couplings

- > you may see a mechanical coupling on any part of the pipeline system
- > a mechanical coupling is a fitting holding two ends of the pipeline together
- > mechanical couplings can pose a safety issue
- > **if you expose a mechanical coupling, ensure the coupling is supported to restrict movement. Call ATCO Gas as the mechanical coupling may require additional support.**

Sleeves

- > are installed to protect sections of the pipeline and fittings
- > common colours: black, brown, yellow

WHAT IS A TEMPORARY SUPPORT SYSTEM AND IS IT REQUIRED?

A **temporary support system** is a structure used to prevent sag, bending or deflection in pipelines during excavation and backfill. It is usually a structure made of steel or wood.

The **length of the natural gas pipeline** to be undermined is the determining factor on whether a temporary support system is required.

Figure 5 lists the maximum span of pipeline that can be undermined **without supports**:

FIG 5 - Maximum length of unsupported pipe

PIPE SIZE		STEEL SPAN		PRESSURIZED PE		UNPRESSURIZED PE	
MM	(IN.)	M	(FT.)	M	(FT.)	M	(FT.)
15.9	(1/2)	1.5	(5)	1.5	(5)	3.0	(10)
26.7	(3/4)	2.0	(6.5)	1.5	(5)	3.0	(10)
42.2	(1 1/4)	2.5	(8)	2.0	(6.5)	4.0	(13)
60.3	(2)	3.0	(10)	2.0	(6.5)	4.0	(13)
88.9	(3)	3.6	(12)	3.0	(10)	6.0	(19)
114.3	(4)	4.1	(13.5)	3.0	(10)	6.0	(19)
168.3	(6)	5.0	(16)	3.0	(10)	6.0	(19)
219.1	(8)	5.7	(19.0)	3.0	(10)	6.0	(19)
273.1	(10)	6.4	(21.0)	3.0	(10)	6.0	(19)
323.9	(12)	7.0	(23)	3.0	(10)	6.0	(19)
406.4	(16)	7.8	(25.5)				
508.0+	(20+)	8.7	(28.5)				

Note: Maximum length of unsupported PVC pipe is 1.5 metres (5 feet).

If a temporary support system is required:

- > supports must be installed prior to excavating below the pipeline
- > discuss the method and materials to be used with an ATCO Gas representative
- > the property owner or contractor is responsible for supplying all material, labour and equipment required
- > beam(s) placed across the excavation should extend at least one metre (three feet three inches) on either side of the trench, and the pipeline is to be attached to the support beam(s) with nylon slings retaining strips, NOT CHAINS, at intervals no greater than the maximum span of unsupported pipe, as shown in Figure 5

Note: An ATCO Gas representative must inspect temporary support systems.

Figures 6a, 6b and 6c are examples of excavated pipeline with a temporary support system.

FIG 6a - Pole supported pipe

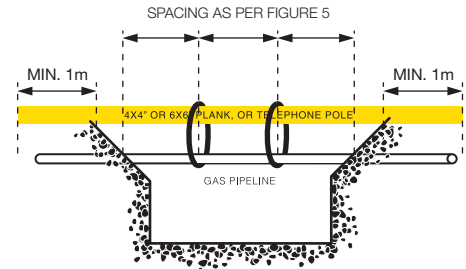


FIG 6b - Plank supported pipe

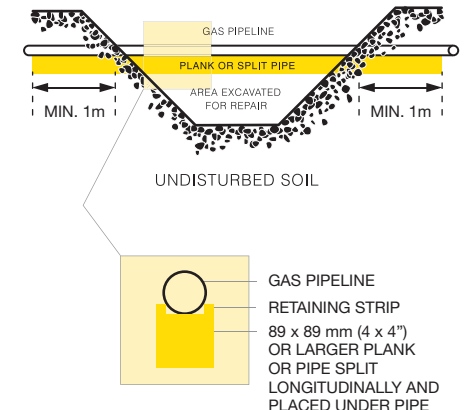
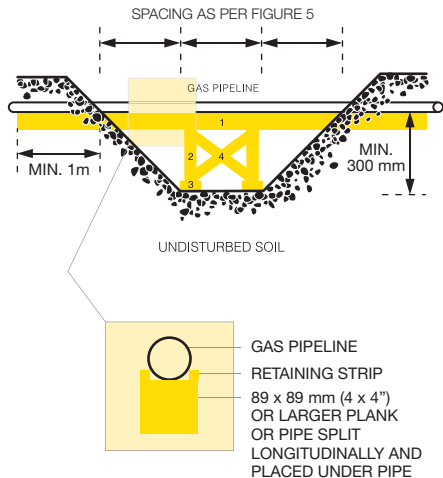


FIG 6c - Truss supported pipe



MATERIALS

1. 89 x 89 mm (4 x 4") OR LARGER TREATED PLANK WITH RETAINING STRIPS
2. 89 x 89 mm (4 x 4") TREATED POST
3. 89 x 184 x 610 mm (4 x 8 x 24")
4. 38 x 89 mm (2 x 4") ANGLE BRACES

Support systems for parallel trenches

Supports are required if the distance from the pipe to the nearest wall of the proposed trench is less than the depth of the proposed trench. Please contact ATCO Gas for the support system design information.

What to do if you contact a natural gas pipeline and there is no apparent gas leak

Report **all contacts** to ATCO Gas. This includes all contact with pipeline, coatings and tracer wire.

Contact may cause damage upstream or downstream that can result in a leak that will require immediate attention.

WHAT DO I NEED TO KNOW ABOUT BACKFILLING?

- 1) Call ATCO Gas for local pipe inspection requirements prior to backfill.
- 2) Compact the fill under the pipe to provide support and prevent stress.
- 3) Requirements governing **depth of cover after backfilling** are specified by individual municipalities; however, certain minimum requirements are legislated provincially:
 - > excavation and backfilling activities should neither remove nor add to the depth of cover without ATCO Gas permission
 - > **use clean, lump-free material to cover the natural gas pipeline**
 - > **do not place frozen dirt, rocks or lumps directly on the natural gas pipeline**
- 4) When backfilling with filcrete, use a two step process. The first mix is brought up to 0.3 metres (1 foot) below the pipe and allowed to harden. The pipe is then sand-padded with a minimum of 15 centimetres (six inches) of cover. A second mix of filcrete then completes the backfill.

Note: Compaction of backfill may be required, especially for high traffic locations. Contact an ATCO Gas representative to help determine when compaction is needed and how it should be done.

Please contact ATCO Gas if you discover a natural gas pipeline with less than 0.6 metres (two feet) of cover.

FOR DEEP EXCAVATIONS WITH PIPE SUPPORTS

ATCO Gas must inspect deep excavation backfills before the natural gas pipeline is concealed. Please call ATCO Gas when the backfill is within 15 centimetres (six inches) of the pipeline. This will help the ATCO Gas representative safely inspect the pipeline and repair any coating damage the support system may have caused.

Backfill must be compacted to provide support for the existing pipe.

Remember that it is important to carefully replace the ground that you disturbed during the backfilling process. Your work should ensure that it does not interfere with the integrity of underground natural gas facilities.

Emergency procedures

EMERGENCY PROCEDURES FOR HIT AND BLOWING/LEAKING NATURAL GAS PIPELINES

- 1) **Clear all people** from the vicinity of the natural gas leak.
- 2) **Shut-off or extinguish any source of ignition** including equipment and vehicles, communication equipment including cell phones, cigarettes and/or open flames.
- 3) **Contact ATCO Gas** for help.

ATCO Gas emergency numbers:

Edmonton and area	780-420-5585
Calgary and area	403-245-7222
All other areas	1-800-511-3447

- 4) **Remain a safe distance away from the leak** while you wait for assistance.



Do not attempt to repair the leak. Allow the natural gas to vent into the atmosphere.

(Attempting to repair the leak yourself can result in property damage and serious injury to yourself and others.)

Provincial legislation requires that the person responsible for causing the natural gas release notify Alberta Environment at the first available opportunity. Call toll-free 1-800-222-6514.

For more information:

For more information on working around natural gas or for service pipeline applications, please contact ATCO Gas.

Edmonton

10035 – 105 Street
Edmonton, AB T5J 2V6
780-420- 7211

Calgary

909 – 11 Avenue SW
Calgary, AB T2R 1L8
403-245-7110

All other areas

310-5678

www.atcogas.com



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