

OPERATING PROCEDURE NATURAL GAS SYSTEM SHUTDOWN/STARTUP

APPLICATION

Safe shutdown of gas service for routine repairs or alterations; restoration of service.

CAUTION: Leaking gas may go unnoticed for a long time. A small leak in a concealed outlet valve can fill a room with an explosive fuel-air mixture. Gas can travel or accumulate until an automatic switch, pilot light, or other ignition source triggers an explosion or fire. Adherence to this procedure is required.

SPECIAL INSTRUCTIONS

- Equipment Required:
 - Safety flashlights or lamps
 - Dry nitrogen tank and appurtenances
 - Current, calibrated combustible gas monitor
 - LBL locks and tags

WORK STEPS A: Remove Building Gas System from Service.

1. Notify the building manager 48 hours in advance that service will be interrupted. Advance notice of 48 hours is required in all cases except emergencies. (See EMRG-024 for emergency gas shutdown procedures.)
2. Post notices at building entrances announcing service interruption and giving the dates and hours during which service will be interrupted.
3. Close the nearest main shutoff valve upstream of building supply shutoff. Attach a lockout device and a LOTO tag to the main shutoff valve as described in PUB-3000. **CAUTION:** Never work on a system or equipment that is controlled only by someone else's LOTO devices and tags. You must also do a lockout and tagout.
4. Burn off gas at an ignition source on the building gas system to decrease pressure. System pressure should drop to about 5 psig (35 kPa), measured upstream of the pressure reducer.
5. Close building service shutoff valve and all outlet valves.
6. Attach nitrogen gas bottle(s) to piping as close to the main shutoff valve as possible. Establish electrical continuity between bottle and piping. **CAUTION:** Use only high-pressure pipe(s)/fittings for the nitrogen connection(s) capable of handling 2200 to 2350 psi (15,200 to 16,200 kPa). **NOTE:** Establish electrical continuity by using all-metal pipe and fittings for the nitrogen supply hookup or by running a single 14-AWG (or greater) bare electrical wire from the nitrogen bottle to the pipe.
7. Open purge valve.
8. Open nitrogen throttle valve to vent remaining line pressure to outdoors. Do not exceed 70 kPa (10 psi) pressure in the gas piping. Make sure that gas is vented away from all possible ignition sources-Monitor vent outlet continuously using a current, calibrated combustible gas monitor.
9. When measured gas concentration has fallen below 2% of the lower explosive limit (LEL), continue purging for 10 more minutes before stopping. See Procedure Table C for more information on LELs.
10. Leave purge valve open.
11. Do not allow smoking, open flames, lanterns, welding, or other sources of ignition in the work area. If cutting torches, welding or other sources of ignition are unavoidable; make sure that any concentrations of leaked gas have been located and dispersed by ventilation.
12. Never leave an open gas pipe unattended. If interruptions in pipe repair or alteration work are necessary, cap off all open pipes and close all valves.
13. Visually inspect the completed piping repair or alteration to confirm that materials, design, fabrication, and installation meet code requirements.
14. When repair work is complete, verify that:

- Equipment and outlets supplied by the system are turned off
 - Manual valves at outlets are turned off
 - Stubouts are capped
 - There are no open fittings
 - Unused outlet valves are plugged or capped.
15. Notify A&E that they can survey piping and can change as-built drawings.
 16. Start up system as described in Procedure Table B.

WORK STEPS-PROCEDURE TABLE B: Check for Leaks and Restore Service.

1. Visually inspect the completed piping repair or alteration to determine that materials, design, fabrication, and installation meet code requirements.
2. Verify that:
 - Equipment and outlets supplied by the system are turned off
 - Manual valves at outlets are turned off
 - Stubouts are capped
 - Fittings are sealed
 - Unused outlet valves are plugged or capped.
3. Leave new pipe joints exposed for the test.
4. Disconnect any equipment that is not to be included in the test from the piping, or isolate it using blanks, blind flanges, or caps. Do not use a valve in a line as a bulkhead between gas in one section of piping and test medium in an adjacent section. Do not subject any valve to test pressure unless it is designed to safely withstand that pressure.
5. Open nitrogen fill valve to pressurize pipe. **WARNING:** Do not use oxygen for pressure testing. Test pressure must be no less than 1-1/2 times the maximum working pressure, but never less than 3 psig (20kPa gauge).
6. Close nitrogen fill valve when test pressure is reached.
7. Use a pressure gauge to monitor pressure loss.
 - If pressure holds for a specified test period, piping is sound.
 - If pressure decreases, check for leaks as described in Step 9.

Test for at least 1/2 hour per 500 cu ft (14 m³) of pipe volume or fraction thereof. If pipe volume is less than 10 cu ft (0.28 m³), a test duration of 10 minutes is permitted.
8. Use a soap-and-water solution to check repaired or altered piping for leaks, concentrating on joints and fittings. Use a current, calibrated combustible gas meter to test the atmosphere in the vicinity of the repair or alteration. **WARNING:** Do not use matches, candles, open flames, N₂, or other leak detection methods that could provide a source of ignition. When leaks are located, repair or replace the affected piping components and retest them as described in this procedure.
9. Record the inspection and tests performed, indicating the section of piping that was inspected and tested.
10. Use a bubble test to check tie-in connections installed after removal of test apparatus.
11. Open supply shutoff valve. Do not discharge purged gas into confined spaces or areas where there are sources of ignition unless you take precautions to perform this operation safely by:
 - Ventilation of the space
 - Control of purging rate
 - Elimination of all hazardous conditions.
12. Open purge outlet valve. Monitor purge outlet continuously during fill process.
13. Crack open main shutoff valve. Fill pipe with gas very slowly. Open less than 1/4 turn.

14. When the combustible gas monitor measures 100% gas at the purge outlet, close the purge valve.
15. Continue filling line until it reaches full pressure.
16. When full pressure is reached, open the main shutoff valve completely.
17. Purge equipment before placing it in operation.
18. When testing, purging, and charging of the system are complete, remove LOTO devices and tags.
19. Inform bldg mgr and tenants that gas service has been restored. Remove notices announcing shutdown.

REFERENCES

PUB-3000, LBL *Environment Health, and Safety Manual*, Technical Support Document 9.1, "Lockout/Tagout."
 EMRG-024-C, *Natural Gas System Emergency Procedure*.

Codes and Standards:

ASME B31.8, *Gas Transmission and Distribution Piping*, 1992 edition.

NFPA 54-1992, *National Fuel Gas Code*.

Uniform Plumbing Code, Ch 12, Fuel Gas Piping, 1991 Edition, with California Plumbing Code.

Purging Principles and Practices, American Gas Association, catalog no. XK0775, Arlington VA, 1975.

CONDITION CODE: COMMENT:

- 10 - No defects found
- 11 - Minor repair required
- 12 - Major repair required
- 13 - Replacement required

RESPONSIBILITIES AND CONTROLS

Rev. No.	SME/Title	REV/Title	Approved/Title	Date	Effective Date
1	 Michael Dong Utility Manager	 James Murphy Maintenance Supervisor	 Ken Fletcher Operations Department Head	5-22-09	5-22-09