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| <b>Description</b>                          | This procedure establishes the guidelines for purging in order to prevent entrapment of an explosive mixture in new or modified gas pipelines. Also, when purging air from new or modified gas pipelines by using natural gas prior to placing them in service or when purging of natural gas prior to maintenance, testing or abandonment. |                             |
| <b>Regulatory Applicability</b>             | <input checked="" type="checkbox"/> Transmission Pipelines<br><input checked="" type="checkbox"/> Regulated Gathering Pipelines (Type A)<br><input checked="" type="checkbox"/> Regulated Gathering Pipelines (Type B)<br><input checked="" type="checkbox"/> Distribution Pipelines  |                             |
| <b>Frequency</b>                            | As required   |                             |
| <b>Reference</b>                            | 49 CFR 192.629  | <i>Purging of Pipelines</i> |
| <b>Forms / Record Retention</b>             | None  |                             |
| <b>Safety and Environmental Precautions</b> | Review all safe and practical methods to reduce the pipeline pressure prior to venting to the atmosphere.   |                             |
| <b>OQ Covered Task</b>                      | 0301 Manually Opening and Closing Valves<br>0311 Adjust and Monitor Flow or Pressure Manual Valve Operation<br>1801 <i>Purging, Abandonment, or Inactivation of Facilities</i>  |                             |



### **Purge Procedure Steps**

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Note: The following precautions should be taken while conducting this procedure:

Safety precautions should be observed during the purging operations. These precautions should include, but are not limited to:

1. Prohibit smoking and open flames in the area
2. Prohibit operation of spark producing equipment such as internal combustion engines, electric motors or switches, etc.
3. In the event the facilities being purged are straight forward without multiple laterals or looping systems that includes only one upstream valve or isolation device and one downstream valve or isolation device with an existing blowdown valve, step 4 does not have to be completed.
4. In the event the purging process is for new construction and/or includes multiple laterals or loop lines, a written purge plan must be developed, approved by District Manager and followed during the purge process. Within the written purge plan, careful consideration must be given to the following:
  - a. Completely purging of extremities of all segments/laterals
  - b. Purge process of any piping "loops" within the system which has the potential of air being reintroduced into the main body of the pipeline system.
  - c. When tying in a poly system and there is not a permanent vent valve:
    - i. There must be a safe method to isolate the blowdown process (i.e., temporary manual valve installed or a set of poly squeezers a safe distance from the purge point)
    - ii. Purge point must be located outside of bell hole, be completely vertical and secured to the ground to prevent movement.
5. (If Necessary) Post warning signs and/or barricade area to control public access
6. Purge only through a vent stack that is at least 6 feet above ground, with secured fittings
7. Each venting area must be supervised by qualified company employees during purging
8. Provide a fire extinguisher of appropriate type and size at the purging area

Precautions should also be taken to prevent static electrical sparks from igniting escaping gas vapors on plastic pipe.



NOTE: When the pipeline is being purged of air using natural gas, the gas must be released into the pipeline at a moderately rapid and continuous flow. If the gas cannot be supplied in enough quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be placed into the line before the gas. The same is true of air being used to purge gas from the pipeline.

1. Conduct a tailgate meeting prior to purging the pipeline. Discuss the following:
  - a) Blowdown and purging safety and possible hazards
  - b) Location of personnel involved and their duties
  - c) Description, use, and location of each piece of work equipment
  - d) Flow of the purge gas
  - e) Location of firefighting equipment
  - f) Pressure of the gas used to purge the pipeline
  - g) Time required
  - h) Method to check air/gas mixture concentration
  - i) Sequence of valve operations
  - j) Presence of liquids or other special conditions
  - k) Use of personal protective equipment
2. Determine the blow off size, pipeline size, length. The source of gas that will be used to purge will need to be analyzed using the CGI and this % of combustible gas will need to be recorded to be compared to in step 4 (below). In the event the CGI registers a reading <80%, additional investigation is required, as the tool's calibration is questionable, a second CGI needs to be used to validate the reading. Purging should not continue until the CGI reading is validated. Determine the inlet control pressure (see table below)
3. Calculate the purging time period (2 minutes per mile)
4. Before purging is completed, a comparable combustible gas percentage obtained in step 2 must be achieved and verified with a CGI
5. Install a pressure gauge at the inlet of the section to be purged
6. Have local law enforcement control traffic as necessary
7. Establish communications with all personnel involved in purging of the pipeline
8. Open the blow off valve at the downstream end of the section to be purged
9. Inject inert gas into the inlet end of the pipeline to rapidly displace at least 2 miles of pipe, if necessary, in order to prevent a hazardous mixture of gas and air
10. Open the inlet valve far enough to quickly obtain the determined control pressure and maintain this pressure for the necessary purging time



11. At the end of the purging time, close the inlet gas flow valve and continue to vent through the downstream blow off valve for an additional minute per mile of pipe being purged
12. Close the downstream blow off valve
13. Open the inlet valve and slowly bring the pipeline to operating pressure
14. Ensure all valves on the system are open to the proper operating position



**Minimum Purge Gas Control Pressure (PSIG) Required for a 2 Minute/Mile Purge Rate**

| PIPELINE<br>LENGTH<br>(MILE) | 2" B/OFF VALVE<br>Inlet Pressure (psig ) |         | 4" BLOWOFF VALVE<br>Inlet Pressure (psig ) |        |          |          | 6" BLOWOFF VALVE<br>Inlet Pressure (psig) |          |          |          |             |          |
|------------------------------|--|---------|--|--------|----------|----------|---|----------|----------|----------|-------------|----------|
|                              | 4" Pipe                                  | 6" Pipe | 6" Pipe                                    | 8"Pipe | 10" Pipe | 12" Pipe | 12" Pipe                                  | 16" Pipe | 18" Pipe | 20" Pipe | 22"<br>Pipe | 24" Pipe |
| 1                            | 6  | 9       | 3  | 3      | 3        | 5        | 2   | 3        | 4        | 5        | 8           | 12       |
| 2                            | 12                                       | 13      | 7  | 5      | 5        | 7        | 3   | 4        | 5        | 6        | 8           | 12       |
| 3                            | 18                                       | 17      | 10   | 7      | 7        | 8        | 5   | 5        | 5        | 7        | 9           | 13       |
| 4                            | 24                                       | 21      | 13   | 10     | 9        | 10       | 6   | 6        | 6        | 8        | 10          | 14       |
| 5                            | 32                                       | 25      | 16   | 12     | 11       | 11       | 7   | 7        | 7        | 8        | 11          | 15       |
| 6                            | 40                                       | 30      | 20   | 14     | 12       | 13       | 9   | 8        | 8        | 9        | 12          | 15       |
| 7                            | 49                                       | 35      | 24   | 17     | 14       | 14       | 10  | 9        | 9        | 10       | 12          | 16       |
| 8                            | 59                                       | 41      | 28   | 20     | 16       | 16       | 11  | 10       | 10       | 11       | 13          | 17       |
| 9                            | 71                                       | 46      | 33   | 22     | 18       | 18       | 13  | 11       | 11       | 12       | 14          | 18       |
| 10                           | 83                                       | 52      | 38   | 25     | 20       | 19       | 14  | 12       | 12       | 13       | 15          | 19       |
| 11                           | 97                                       | 59      | 43   | 28     | 22       | 21       | 16  | 13       | 13       | 14       | 16          | 20       |
| 12                           |  | 66      | 48   | 31     | 25       | 23       | 17  | 14       | 14       | 15       | 17          | 20       |
| 13                           |  | 73      | 54   | 35     | 27       | 25       | 19  | 15       | 15       | 15       | 17          | 21       |
| 14                           |  | 81      | 60   | 38     | 29       | 27       | 21  | 16       | 16       | 16       | 18          | 22       |
| 15                           |  | 90      | 67   | 42     | 32       | 29       | 22  | 18       | 17       | 17       | 19          | 23       |
| 20                           |  |         |  | 63     | 45       | 40       | 31  | 24       | 22       | 22       | 24          | 28       |
| 25                           |  |         |  | 90     | 62       | 52       | 42  | 31       | 28       | 28       | 29          | 33       |
| 30                           |  |         |  |        | 81       | 66       | 54  | 39       | 35       | 33       | 34          | 38       |
| 35                           |  |         |  |        |          | 82       | 68  | 47       | 42       | 40       | 40          | 44       |
| 40                           |  |         |  |        |          |          | 84  | 57       | 50       | 46       | 46          | 50       |
| 45                           |  |         |  |        |          |          |   | 67       | 58       | 54       | 53          | 56       |
| 50                           |  |         |  |        |          |          |   | 79       | 67       | 61       | 60          | 63       |



| PIPELINE<br>LENGTH<br>(MILE) | 8" BLOWOFF VALVE<br>Inlet Pressure (psig) |          |          | 10" BLOWOFF VALVE<br>Inlet Pressure (psig) |          |          | 12" BLOWOFF VALVE<br>Inlet Pressure (psig) |          |          |          |
|------------------------------|---|----------|----------|--|----------|----------|--|----------|----------|----------|
|                              | 20" Pipe                                  | 22" Pipe | 24" Pipe | 24" Pipe                                   | 26" Pipe | 30" Pipe | 34" Pipe                                   | 36" Pipe | 42" Pipe | 48" Pipe |
| 1                            | 2   | 3        | 3        | 2  | 2        | 3        | 2  | 3        | 6        | 10       |
| 2                            | 3   | 3        | 4        | 2  | 3        | 3        | 3  | 3        | 6        | 11       |
| 3                            | 3   | 4        | 5        | 3  | 3        | 4        | 3  | 4        | 6        | 11       |
| 4                            | 4   | 5        | 5        | 3  | 4        | 5        | 4  | 4        | 6        | 11       |
| 5                            | 5   | 5        | 6        | 4  | 4        | 5        | 4  | 4        | 7        | 12       |
| 6                            | 6   | 6        | 6        | 5  | 5        | 5        | 4  | 5        | 7        | 12       |
| 7                            | 7   | 7        | 7        | 5  | 5        | 6        | 5  | 5        | 7        | 12       |
| 8                            | 7   | 7        | 8        | 6  | 6        | 6        | 5  | 6        | 8        | 12       |
| 9                            | 8   | 8        | 8        | 6  | 6        | 7        | 6  | 6        | 8        | 13       |
| 10                           | 9   | 9        | 9        | 7  | 7        | 7        | 6  | 6        | 8        | 13       |
| 11                           | 10  | 9        | 10       | 8  | 7        | 8        | 6  | 7        | 9        | 13       |
| 12                           | 10  | 10       | 10       | 8  | 8        | 8        | 7  | 7        | 9        | 14       |
| 13                           | 11  | 11       | 11       | 9  | 9        | 9        | 7  | 7        | 9        | 14       |
| 14                           | 12  | 12       | 12       | 9  | 9        | 9        | 8  | 8        | 10       | 14       |
| 15                           | 13  | 12       | 12       | 10   | 10       | 10       | 8  | 8        | 10       | 15       |
| 20                           | 17  | 16       | 16       | 13   | 13       | 12       | 10   | 10       | 12       | 16       |
| 25                           | 22  | 20       | 19       | 17   | 16       | 15       | 12   | 12       | 14       | 18       |
| 30                           | 27  | 24       | 23       | 20   | 19       | 17       | 14   | 14       | 15       | 20       |
| 35                           | 32  | 29       | 27       | 24   | 22       | 20       | 17   | 16       | 17       | 22       |
| 40                           | 38  | 34       | 32       | 28   | 26       | 23       | 19   | 18       | 19       | 24       |
| 45                           | 44  | 39       | 36       | 32   | 29       | 26       | 21   | 21       | 21       | 25       |
| 50                           | 51  | 45       | 41       | 37   | 33       | 29       | 24   | 23       | 23       | 27       |



**Notes:**

- (1) Purge pressures that exceed 100 psig are not shown in the table. Possible detonation of flammable gases could create unsafe pipeline pressures. Longer purge times (greater than 2 min/mile) and lower purge pressures should be used. See Figure 5-3 for geometry and operating conditions used to calculate the purge pressures in Table 5-1.
- (2) Add 5 psig to the pressures shown in Table 5-1, if purging is done through a crossover arrangement and the pressure is measured at the crossover valve. Example: A 30" pipe, 13 miles long, is to be placed into service. A 10" blowdown is to be used for venting. A fifty percent safety factor is selected. Table 5-1 shows that 30" pipe, 13 miles long, requires a natural gas inlet pressure of 9 psig. The length of time is 13 miles times 2 minutes per mile or 26 minutes. After 26 minutes have elapsed, the venting continues for an additional 13 minutes more. Then the blowoff valve is closed.

*\*Source: AGA Purging Principles and Practice Third Edition 2001\**



### **Blowdown Procedure/Safety Precautions**

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The following Safety precautions should be taken while conducting this blowdown procedure including, but are not limited to:

- 1) Proper PPE
- 2) Prohibit smoking and open flames in area
- 3) Prohibit operation of spark producing equipment such as internal combustion engines, electric motors, or switches, cell phones, or other ignition sources
- 4) (If Necessary) Post warning signs and/or barricade area to prevent public access
- 5) Purge only through a vent stack that is at least 6 feet above ground level with secured fittings
- 6) Each venting area must be supervised by qualified company employees during blowdown.

Precautions should also be taken to prevent static electrical sparks from igniting escaping gas vapors on plastic pipe

### **Blowdown Procedure Steps**

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- 1) Conduct tailgate meeting prior to blowing down the pipeline. Discuss the following, but not limited to:
  - a) Blowdown safety and possible hazards
  - b) Location of personnel and their duties
  - c) Description, use, and location of each piece of work equipment
  - d) Where blowdown will occur
  - e) When electrical high lines are an issue, it is recommended that a liquids truck be used with a long enough high-pressure hose to safely vent gas away from electrical lines or an anchored directional fitting (non-threaded)
  - f) Sequence of valve operations
  - g) Presence of liquids or other special conditions
  - h) Use of proper personal protective equipment
  - i) Continuous monitoring of weather conditions such as (wind direction, thunderstorms, etc.) and its effects concerning surrounding facilities for possible ignition sources
  - j) A review of the impact on facilities and customers (including points of receipts, delivery and farm taps) including both upstream and downstream. Affected customers shall be notified prior to work being started
- 2) Install a gauge at various locations to determine the complete system blowdown. Ensure gauge is working properly prior to installation





- 3) Secure necessary local permits and have local law enforcement control traffic as necessary
- 4) Establish communications with all personnel involved in blowdown
- 5) Blowdown stack to be at least 6 feet above ground level
- 6) Shut in all affected valves
- 7) Apply WTG's lock-out tag-out procedure
- 8) Eliminate all potential sources of ignition, such as automobiles, cell phones, two-way radios and all other non-intrinsically safe devices
- 9) Begin blowdown using a continuous and moderately rapid flow
- 10) A slug of inert gas may be used to prevent a hazardous mixture of gas and air
- 11) Upon completion of blowdown allow extra time to ensure complete depressurization of segment
- 12) Check pressure gauges to ensure the pipeline is completely blown down. Ensure pressure gauges are working properly
- 13) Use a CGI to determine the area safe before introducing an ignition source and continue to check periodically to ensure there is no gas build up
- 14) Monitor gas supply and pressure to remaining facilities that are still in-service (upstream and downstream)