

11-F Odorization

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1.0 SCOPE

The chapter describes the odor intensity levels, testing procedures, and equipment maintenance for odorization of the DENC and DESC distribution *pipeline* systems.

2.0 REGULATORY REFERENCES

49 CFR Part 192 § [192.625](#)

3.0 ODORIZATION PROCEDURES [[192.625](#)]

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3.1 General

In accordance with 49 CFR Part 192.625 natural *gas* distributed by DENC and DESC is odorized so that it is readily detectable by a person with a normal sense of smell. The odor intensity is described as a percentage of gas-in-air as measured by odor level detection instruments. The gas delivered in the DENC and DESC pipeline systems *shall* be odorized to be readily detectable at 1% gas-in-air.

The only exception to this requirement is for gas from DENC and DESC's supplier(s) used to feed instrumentation such as flow and pressure controllers at delivery stations.

3.2 Qualification of Odorization Testing Equipment Operators

All of the following *must* be true in order for a person to test odorization levels:

1. No known smelling impediments.
2. Has been qualified in accordance with DENC and DESC's Operator Qualification Program.
3. Employees Operator Qualified to perform odorant checks *should* have their sense of smell verified as adequate during the annual *OQ* re-evaluations.

3.3 Stationary Monitoring

Stationary odorization testing equipment *may* be installed at various locations throughout the pipeline system based on:

1. Population.
2. Location of delivery stations.
3. Relative location of other stationary monitoring points.
4. Gas flow (Ensure that test points are in locations of active flow so recently delivered gas is sampled.)

DENC and DESC test procedures for stationary monitoring are located in [section 3.5\(b\)](#) of this procedure.

3.4 Portable Monitoring

Portable odor intensity testing equipment is available. This equipment is used to monitor odor levels at the extremities of DENC and DESC transmission and distribution systems and in systems that do not have stationary monitoring points. Typical check points may include: meter sites, chart recorder locations and regulators stations. DENC and DESC test procedures for portable monitoring are located in [section 3.5\(b\)](#) of this procedure.

3.5 DENC and DESC Odor Intensity Test Procedure

- (a) Odor intensity test locations are to be maintained in GIS, and should be reviewed at least annually by the operations manager with input from *Engineering* ensure adequate system coverage (based on sources of supply, system tie-ins, new pipelines with minimal load, etc).

State Specific: South Carolina

Odorant intensity tests at locations for each local office should be spaced out throughout the month to ensure that all of the odor intensity tests are not taken during the same week. To accomplish this, each odor intensity test location shall be designated with an "inspection week" attribute in GIS (1, 2, 3, or 4).

(b) When conducting odor intensity tests with stationary or portable units, the following shall be conducted by DENC and DESC personnel:

- (1) Approved Odor intensity test instruments shall be used at the calibrated levels to conduct odor intensity tests. Instrument information shall also be entered into Essentials
- (2) Record as required.
- (3) Follow the guidelines in [section 3.7](#) to report any unacceptable odor intensity levels.

3.6 Sniff Tests

A sniff test is a qualitative test conducted without an instrument, using only the tester's sense of smell to determine if a gas odor is detectable. No gas-in-air concentrations are determined or recorded. Sniff tests are conducted during low flow tests to confirm the gas is odorized sufficiently and readily detectable. Orders involving the installation, removal or replacement of gas meters shall document the detection of odorant. If odor is not readily detectable, record it appropriately on the order and report the problem to the supervisor or manager immediately. An "n/a" response will open a mandatory comment field so that the technician can explain why the odorant test could not be performed.

3.7 Response to Unacceptable Odor Levels

- (a) If gas is found not to be readily detectable the employee shall immediately notify their supervisor. The respective supervisor/manager shall coordinate with measurement, service, construction, etc in order to develop an immediate and continuous plan of action to ensure safe system operations. This action may include:
- (1) Directing personnel to conduct additional odor intensity tests to determine the extent of the odor loss. Additional checks outside of the monthly scheduled checks should be documented appropriately.
 - (2) Directing personnel to conduct additional *leak* survey and leak checks of the impacted gas system and customer premises with emphasis on schools, plants, malls, churches and other occupied public buildings.
 - (3) Contacting Gas Control and/or Gas Measurement to determine if an odorant injection unit at a gas interchange connection has malfunctioned or stopped working.
 - (4) Requesting an increase in odorant injection from DENC and DESC's supplier
 - (5) Directing personnel to purge gas at a safe point at or near the end of the system in an effort to increase flow and draw additional odorized gas into the impacted gas system.
 - (6) Notifying management chain of all "Not Readily Detectable" tests found within a system.
 - (7) Contacting Gas Measurement personnel to obtain and employ a portable odorant injection unit if necessary, see [section 3.9](#).

- (8) Determine if system pressure can be lowered to increase gas flow velocity.
 - (9) Determine if a temporary wick type odorant bottle could be installed.
 - (10) Directing personnel to interrupt service to customers to ensure safety in the event that odorant levels cannot be maintained at "readily detectable" levels.
- (b) If gas has an excessive odor intensity level an unusual high number of leak calls may be received in the affected areas due to incomplete breakdown of odorant during combustion. An investigation following the steps above should be implemented to determine the cause of excess odor intensity levels.
- (c) Any remedial action taken and documentation of new readings shall be noted on the appropriate odorant report, see [section 5.0](#). The report shall be scanned to the account, if applicable, and filed appropriately.

3.8 Odor Fade

Odor fade, the decrease in odor potency, may occur in pipeline systems due to physical and/or chemical processes within the piping systems. Odor fade occurs predominantly in installations of new pipe rather than in existing pipe, and is more pronounced in new steel pipe of larger diameters and longer lengths. However, it can also occur in plastic pipe and in smaller and/or shorter pipe installations.

The primary causes of odor fade include:

1. Pipe wall adsorption/absorption – Until the inner pipe walls of new pipelines become saturated, odorant molecules will adhere (adsorb) to or absorb into the pipe walls.
2. Iron oxide deposits – Iron oxide in the form of rust and mill scale on the internal pipe wall chemically react with mercaptans in the gas stream. This causes the mercaptans to oxidize into compounds that have almost no odor.
3. Liquid absorption – Liquid hydrocarbons such as natural gas distillate and compressor oils have the ability to draw odorant molecules from the gas stream and absorb them.
4. Low or no flow – Dead end pipelines and pipelines with little to no flow experience increased odorant adsorption/absorption rates.
5. High pressure – Higher operating pressures increase the odorant molecule adsorption capacity of steel pipe walls.
6. Chemical decomposition – The potency of odor molecules can diminish over time in pipeline systems that are subject to extended periods of stagnant flow conditions.

Odor fade can often be controlled by adjusting the pipeline pressure and gas flow rate. When feasible, the pipeline system pressure can be lowered to generate a higher flow rate. This will reduce the rate of odorant loss in the gas stream.

However, situations may arise where lowering the pressure is not sufficiently effective or not feasible due to system design and demand. In such situations, supplemental odorization may be needed to remedy the lack of odorant. Injecting significant amounts of odorant into pipelines to saturate the internal walls of the pipeline with odorant ("pickling") may be necessary to prevent odorant from being absorbed out of the gas stream during normal operation.

3.9 Supplemental Odorization

The Manager – Measurement Services must approve the use, method and implementation plan before any supplemental odorization activity may be initiated.

- (a) Supplemental odorization is utilized to boost the odorant level in pipeline systems where odor fade cannot be adequately controlled through changes in pressure and/or flow rate. Several methods may be employed to supplement odorant levels depending on the amount of additional odorant needed and characteristics of the affected pipeline system. The primary methods/odorizers utilized by DENC and DESC include:
- (1) Wick odorizer – The wick type odorizer is similar in operation to an oil lamp. A wick is inserted in a small tank of odorant where it becomes saturated with odorant. The top of the wick is exposed to the gas stream. As gas flows across the wick it picks up the odorant. Wick type odorizers are used primarily to supplement odorization in very small distribution systems.
 - (2) Pump odorizer – The pump type odorizer utilizes a piston-driven pump to inject precise amounts of liquid odorant from a storage tank into the gas stream. Except for very small distribution systems, the pump type odorizer is the most common type of odorizer used for supplemental odorization in pipeline systems.
- (b) Supplemental odorization should be initiated at or near the *upstream* tie-in location of a new section of *main* or existing main where normal supplier odorization rates are found to be insufficient. Odor intensity monitoring should be conducted at dead ends and at the end point of the pipeline system to establish an appropriate odorization rate. If the odor intensity is not readily detectable, additional injections using a portable odorant injection unit (contact Measurement personnel to obtain a unit and a qualified operator) and other steps may be necessary to return the odor intensity to a readily detectable level.

Note: The mercaptans and sulfides used as odorants are liquid hydrocarbons. Liquid hydrocarbons, in sufficient concentration, can swell and soften most plastic pipe materials. Odorants should never be introduced into a plastic pipe system in a concentrated liquid state.

3.10 Odorization Equipment Maintenance

[3.10.1 General](#)

[3.10.2 Inspections and Maintenance – Pump Odorizers](#)

[3.10.3 Inspections and Maintenance - Wick Odorizers](#)

3.10.1 General

- (a) This maintenance procedure applies to odorization equipment in service on active pipelines.
- (b) Only trained and qualified employees will complete these maintenance procedures for odorization equipment.
- (c) Required inspections and maintenance shall be documented on the appropriate forms, see [section 5.0](#). Forms are to be completed and approved. The original of the form shall be maintained on file in the regional office for a period of 3 years.

3.10.2 Inspections and Maintenance – Pump Odorizers

Pump odorization equipment in service on active pipelines shall be inspected and maintained on a monthly and annual basis as described below:

- (a) Monthly Inspection (not to exceed 45 days)

- (1) Check odorant tank level
- (2) Check operation of pump

- (4) Check for odorant and gas leaks
- (5) Verify pressures
 - (i) Supply pressure; 75 psig
 - (ii) Expansion tank; 25 psig
 - (iii) Bulk odorant tank; 30-35 psig
 - (iv) Actuator pressure:
 - (A) 30 psig for 100-200 psig pipeline pressure
 - (B) 40 psig for 200-500 psig pipeline pressure
 - (C) 50 psig for 500-900 psig pipeline pressure
 - (D) 60 psig for 900-1400 psig pipeline pressure
- (6) Check for controller alarm indications
- (7) Record battery voltage
- (8) Inspect for battery corrosion
- (9) Record cumulative pounds of odorant injected
- (10) Record cumulative number of pump strokes
- (11) Record odorant injection rate
- (12) Verify unit fails to time injection (if applicable)
- (13) Verify current month cumulative odorant injected is greater than prior month
- (14) Verify current month cumulative pump stroke count is greater than prior month
- (15) Verify any custom controller programming for specific site

(b) Annual Inspection (not to exceed 15 months)

- (1) Complete Monthly Inspection items above
- (2) Change filters
 - (i) Gas filter

(iii) Verometer filter

(3) Inspect and rebuild pump if necessary

(4) Replace batteries

(5) Inspect and replace solenoid valves if necessary

(6) Clean and service pneumatic relay valve and replace if necessary

(7) Test regulator set pressures and service if necessary

(i) Supply pressure

(ii) Bulk odorant tank pressure

(iii) Expansion tank pressure

(iv) Actuator pressure

(8) Test expansion tank relief valve set pressure and service if necessary

(9) Inspect overflow protector and service as necessary

(c) Spare Parts Inventory

Spare parts shall be maintained in inventory as per the following list:

(1) 3-way solenoid valve (2)

(2) Pneumatic relay valve

(3) Gas filter replacement filter element

(4) Bulk odorant filter element replacement kit

(5) Pump seal replacement kit

(6) Verometer filter element kit

3.10.3 Inspections and Maintenance - Wick Odorizers

Wick odorization equipment in service on active pipelines shall be inspected and maintained on a monthly basis, not to exceed 45 days, as described below;

1. Check *downstream* odor intensity level

2. Check for odorant and gas leaks

See the appropriate system Operator Qualification Program.

Also see information regarding the AEGIS Odorant question for Service Technicians and Clerks/Dispatch CIS in [6.0 Related Documents](#).

5.0 DOCUMENTATION/FORMS

System specific forms should be used where applicable.

Odor intensity test reports shall be retained for a period of at least 5 years (current year with precedent 5 years kept on file) - either in a compliance binder or in the digital compliance recordkeeping system.

State Specific: South Carolina

- Essentials Documentation System
- [Odorant Check Report](#) (PDF file)

6.0 RELATED DOCUMENTS

AEGIS Odorant question for Service Technicians and Clerks/Dispatch CIS.

- Click to view information for Service Technicians as a [PowerPoint presentation](#) or in a [PDF file](#).
- Click to view information for Clerks/Dispatch CIS as a [PowerPoint presentation](#) or in a [PDF file](#).

7.0 APPENDICES

None at this time.

(UNCONTROLLED IF PRINTED)