


**Pipeline and
Hazardous Materials
Safety Administration**

ODORIZATION ISSUES



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CONTACT INFORMATION



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85 Years Ago...

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New London, Texas
School Explosion
March 18, 1937

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GAS REPORTS

(11) Respond promptly to a report of gas odor in or near a building, unless covered by emergency plan

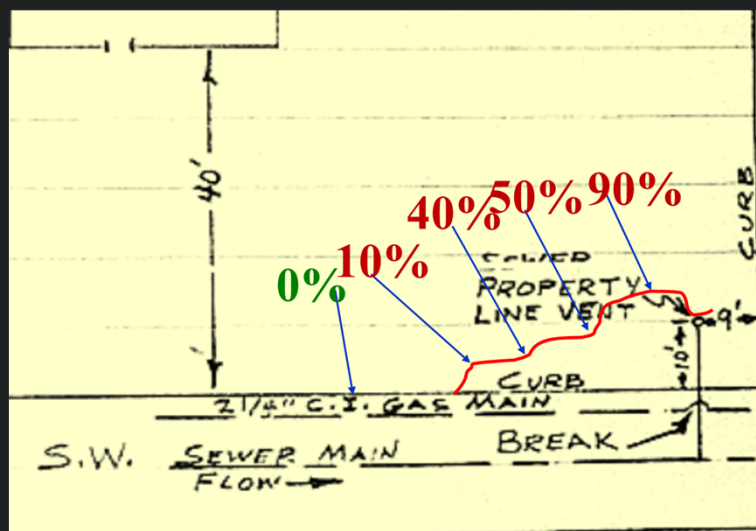
§192.605(b)



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PLOT GAS MIGRATION



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Odorant Concentration Verification



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QUESTION



- Which pipelines must always be odorized?
- Distribution lines—
 - OPS Interpretation, Sept. 10, 1980
 - *Section 192.625(a) requires that gas in distribution lines have a natural odor or be odorized to the limit prescribed. Since service lines are distribution lines, they are subject to the odorization requirements of §192.625(a). The exception from odorization provided by §192.625(b) for some transmission lines does not affect the requirement to odorize gas in distribution lines connected to an unodorized transmission line.*

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QUESTION

- What is the minimum allowable odorant injection rate for regulatory compliance?
- There is no injection rate specified in the code. The only requirement for injection rates is in 192.625(e)
 - Equipment for odorization must introduce the odorant without *wide variations* in the level of odorant.

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- So what is “wide variation” - OPS interpretation October 31, 1973

An acceptable range for variation of odorant concentration would be within a range no lower than a concentration which is readily detectable at one-fifth of the lower explosive limit by the typical person . . . The intent of the regulations is that the operator would not make variations in odorant concentration that could cause unwarranted public reaction. For the most part, each gas operator has determined the range of odorant concentration needed in its system for compliance with regulatory standards.

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WHY ODORIZE?

- Regulations – 49 CFR 192.625(a)
 - A combustible gas in a distribution line must contain a natural odorant or be odorized so that at a concentration in air of one-fifth of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell.

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WHY ODORIZE?

- Liability
 - Odorization of a gas system is done with a single purpose in mind: Provide the public with an effective warning device to alert them when there is a possible problem.




It's also the LAW!

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POSSIBLE CHANGES!

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COMPLYING WITH 49 CFR 192.625

- Readily detectable
- 1/5 LEL
- Class location
- Odorant selection
- Odorizers and injection rates
- Periodic sampling

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WHAT IS READILY DETECTABLE?

- **Ready** - "in a ready manner: as a : without hesitating : **WILLINGLY** b : without much difficulty..."
- **Detectable** - "1 : to discover the true character of 2 : to discover or determine the existence, presence, or fact of..."
- **Readily detectable odor** – *an odor that can be discovered, determined or whose existence can be identified in a ready manner, without hesitating or much difficulty.*

Merriam-Webster Dictionary, on-line edition

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WHAT IS READILY DETECTABLE?

- The odor of gas should be one that a spouse, family, or member of the general public would quickly recognize, prompting them to take appropriate action.

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NORMAL SENSE OF SMELL?

University Of Pennsylvania Smell Identification Test - UPSIT

- Use a wide variety of testing personnel
- Testing or "qualifying" a sense of smell
- Sensonics "Smell Identification Test"
 - <http://www.sensonics.com>

Gas Company Smell Test

Availability In Stock

SKU: GST

A simple and very cost-effective way to meet government standards, and ensure that your workforce can smell the odor of natural gas.

Price: \$1.90



Smell Identification Test

Availability In Stock

SKU: SIT 001

The Smell Identification Test (UPSIT) is our comprehensive 40-item test and is the only olfactory test on the market today that can be self-administered. It is the most reliable (test-retest $r=0.94$) and accurate olfactory test available.

Provides an absolute indication of smell loss (anosmia, mild, moderate, or severe microsomia) as well as an index to detect malingering. Norms from nearly 4,000 men and women spanning the entire age range provide a basis for examinee percentile rank. Available in American, Arabic, British, Chinese (Simplified), Chinese (Traditional), Dutch, French, German, Italian, Japanese, Portuguese, and Spanish.



More Views

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TEST POINTS

- End of system, farthest point in pipe miles from odorizer.
- Areas of low or changing flow rates.
- Known problem areas.
- Downstream of areas where liquids collect.
- New construction, steel or plastic.
- Random test locations.

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REGULATIONS AND COMPLIANCE

- Required levels of odor for compliance.
 - What limits have companies prescribed in their O&M Manuals?
 - Even though the regulations state 1/5 LEL, if an operator has set more stringent levels the testing personnel must follow the O&M and react accordingly.
- The same holds true for injection rates described in the O&M Manual.

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FACTORS WHICH AFFECT ODOR QUANTITY

- Odorizer malfunction
- Contaminants in the odorizer
- Distillate or other liquids
- Pipewall adsorption
- Oxidation

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FACTORS WHICH AFFECT ODOR INTENSITY OR PERCEPTION

- Anosmia - odor blindness
- Smoking
- Colds and Allergies
- Physical condition – age, gender, exposure
- Psychological effects

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DOCUMENT REVIEW CAN FIND -

- Incorrect reporting of odor intensity.
- Lack of variation in reported odor levels.
- Erratic readings at same location.
- Consistent change in odor levels
 - Change in sense of smell
- Lack of required information.
- Failure to follow company standards.

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GUIDANCE

1. The one-fifth LEL is based on the operators' gas composition.
2. Sniff tests are qualitative tests that should be performed by individuals with a normal sense of smell. Considerations such as gender, age, smoking habits, colds, and other health-related conditions such as allergies or colds that could affect the sense of smell should be considered in selecting individuals to perform sniff tests.
3. Records should reflect the person actually doing the sniff test.
4. Some operators conduct sniff tests with two individuals, to get more conclusive results.

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GUIDANCE

5. Test locations to verify odorant levels should include system end points (extremities).
6. Operators must have written procedures for the testing of odorization.
7. Operator needs to specify the frequency of odorization tests.
8. The operator should retain records of the odor level and odorant concentration test results.
9. Odorizer injection rates are not stand-alone proof of adequate odorization.

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GUIDANCE

10. Special attention to odorization requirements should be applied to transmission (and transmission laterals) lines where class 3 areas exist.
11. Class location studies are needed to substantiate unodorized pipelines.
12. Operator's line designation plan may help in the determination of line classification of transmission or lateral.

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MAY BE ADVERSELY AFFECTED BY:

- Environmental Conditions
 - dust and/or smoke
 - humidity
 - presence of oxidizers
 - temperature extremes
 - changes in atmospheric pressure
 - radio frequency interference (RFI)

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ODORATOR



Operating Information

The ODORATOR mixes natural or propane gas with air in concentrations from zero to approximately 2% for natural gas or 1% for propane. The operator slowly opens the linear flow metering valve which allows sample gas to enter the instrument and then he sniffs the mixed exhaust at the exhaust port. This operation is continued until the odorant level in the exhaust is readily detectable at which time the operator presses and holds down the “read” button to observe the relative percent gas concentration in air on the digital display. Correction charts are included for both correcting and interpolating the instrument’s readings over its full measurement range and when used at elevation.



measurement range and when used at elevation

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