

PRINCIPLES OF ODORIZATION

A discussion of odorant, odorizers, and odorization

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INTRODUCTION

Odorization is a process we are mandated to know about, and with on daily basis. So why is it that no one likes to work with odorant? Could it be the distinctive smell that gets on our clothing, causing problems with family, friends, neighbors, and the public in general?

Why do we odorize? We odorize primarily because it is a legal requirement. We also odorize for the public safety. We must inject odorant into natural gas in order to alert or warn of possible dangers (i.e. leaks). It was first proposed in Germany in the 1880's by Von Quaglios' use of ethyl mercaptan as a means of lead detecting the escape of blue water gas. However, most people have heard about the New London tragedy. In 1937, there was an explosion that leveled an elementary school in New London, Texas, killing 293 people of which the majority were children. For this reason, it is important that we understand the tremendous responsibility of knowing and implementing the Odorization process.

ODORIZATION REGULATION

It is imperative that we understand the rule on Odorization as stated in the Code of Federal Regulations, 49CFR, Part 192"L" (Operations). Review this regulation for a better understanding of the complete rule. Section 192.625 – Odorization of Gas, states

“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 (20%) of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell.”

Odorization is a simple yet complex task, with companies using differing methods to inject and monitor its effectiveness.

ODORIZER TYPES

- Wick
- Drip
- Absorption By-Pass
- Injection Pumps
- Electronic Pulse By-Pass
- Meter Driven Pump

Each type of odorizer employs a different method of injection. The type and method will depend on your Odorization needs and requirements. In Section 192.625, it states, *“Equipment for Odorization must introduce the odorant without wide variations in the level of odorant.”*

The selection of the type of odorizer will also depend on a variety of factors, all affecting the odorant concentration in the pipeline.

- Flow Rates
- Pressures
- Gas Quality
- Pipeline Quality
- Odorant Type

MONITORING ODORANT LEVELS

Title 49 Part 192.625 states *“... the gas is readily detectable by person with a normal sense of smell”*. What is a normal sense of smell? There are differing factors that determine the sense of smell i.e. sex of an individual (a woman's sense of smell is more sensitive than a man's sense of smell); age of an individual (older people may experience a partial loss of smell). There can be certain causes of masking or distraction that will not allow an individual to differentiate the smell of odorant, i.e. sinus infections, smoking, colds, perfumes, household cleaning products, or distraction such as a phone or car. All of these are outside the realm of the control of the gas utility company. However, an understanding will help design and validate an Odorization System.

One of the methods used in monitoring odorant concentration is the “sniff” test. This test utilizes both an electronic instrument and the human nose (as stated in the regulation). Always follow the recommendations and

procedures issued by the manufacturer when using the equipment. Three (3) units currently used in the industry are:

- Heath Consultants Odorator
- YZ Industries DTEX
- Bacharach Odorometer

It is critical that we train and qualify the employee. We must test the employee's sense of smell, test his understanding of the equipment, and ensure the employee doing the testing understands and has knowledge of the complete Odorization system. Without this ongoing testing and qualification process, a successful monitoring program will be jeopardized.

Sniff Tests are performed at both random and fixed locations within a system to ensure the level of odor intensity. A random test may be performed daily at an appliance on the customer's premises or at a meter set by the customer service technician. Fixed tests are routinely conducted near the tail end of any odorized system. The frequency for sniff tests varies from company to company. This testing may be completed once a month (for over five hundred customers within the system) or once a week. Remember, no matter which method is used or how often it is used, accuracy is only as good as the individual performing the test.

Monitoring is accomplished with on line analyzers, such as, titrators, analyzers, and chromatographs. Each type of instrument gives real-time information of total sulfur, or in some cases, individual mercaptan component levels. Several manufacturers use electrochemical sensors or cells while others use GC columns for detection or lead acetate tape technology.

Regardless of the manufacturer, your technician must be trained on its calibration and operation. Although these instruments do not meet the Title 49 192.625 for reporting, they can play an important part of your total Odorization program. These instruments can give you real time information at the central office and in some cases, correct the odorizer levels before an incident occurs.

DOCUMENTATION

Documentation is also a critical part of the odorant monitoring system. The paper trail starts when the odorant is injected and ends with the sniff test. Most companies implement their own checklists for the technicians to complete. They also provide forms that must be filled out weekly or monthly to document items such as amount of odorant injected per volume, inspection reports at time maintenance is performed on odorizer, date and time of alarms, odor concentration test, and date odorant was purchased. Odorant monitoring is not complete until the paperwork is complete as stated in

Code 49 192.625 *"receiving a written verification from their gas source that the gas has the proper concentration of odorant."* The key word is *written*.

FADING

Odorant fade is a problem that all companies face. Odorant fade occurs when the odorant levels begin to vanish, caused by:

- Rust in pipeline
- Distillate (liquids)
- Natural Sulfurs
- Location of monitoring
- New pipe (steel and plastic)

When fading occurs, companies will employ a technique called "pickling". This method increases the odorant injection until a level is obtained and has returned back to the proper LEL reading.

SYSTEM DESIGN

When selecting an odorant system, several considerations should be examined to ensure a system properly meets the needs of the customer and company:

- Location where system is placed
- Gas Flow Volumes
- Type of measurement equipment
- Type of odorant
- Type of reporting desired (local or remote)
- Injection Rate
- Electric or Solar Driven
- Type of Injection System (pump or pulse bypass)
- New or Old Pipeline System (fading is always an issue)

When selecting the system, be sure to have equipment manufacturer give several options.

DOT OPERATOR QUALIFICATION RULE

The Operator Qualification Rule is a new rule recently enacted under subpart G of the DOT CFR Title 49. The Operator Qualification Rule covers tasks done in the performance of operation and maintenance activities on a pipeline. These tasks are identified as "covered tasks". Any individual performing a covered task must be qualified to perform that task, or must perform the task under the observation of an individual who is qualified to perform that task. Each Company must identify the task, have a written qualification plan, a method of evaluation,

a method of qualification, and written documentation of the personnel.

Odorization –DOT 192.625

- Understanding Abnormal Operating Condition
- Understanding the Regulation
- Understanding Equipment being used
- Understanding type of Odorant used
- Understanding type of Test required
- Understanding proper procedures

CONCLUSION

Hopefully, this information has increased your awareness of the importance of an odorant system. As you have seen, there are many factors that contribute to the odorant operation. Always remember, the primary reason for Odorization is the safety of the public, our friends, loved ones, and associates with whom we work.