

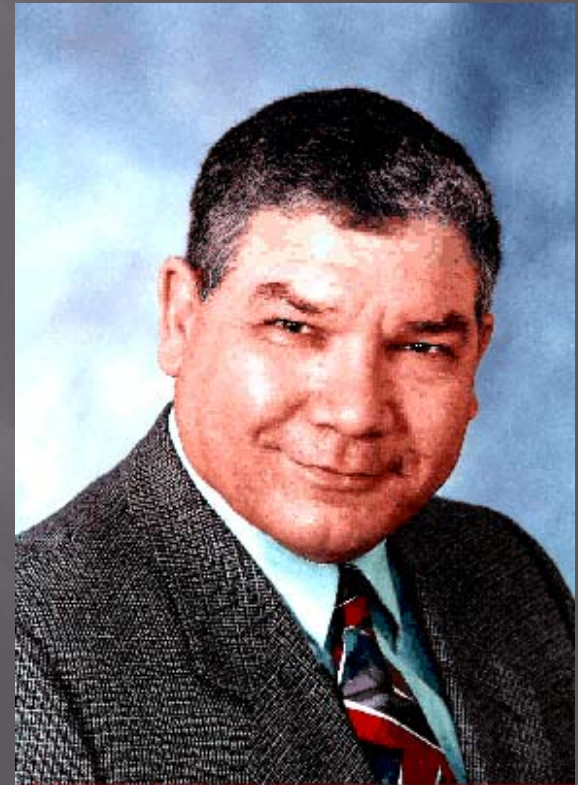
# Odorization of Gas

Subpart "L"

# Wayne St. Germain

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**70 Years  
Ago...**



New London, Texas  
School Explosion

March 18, 1937

# Before



*London High School  
before Explosion*

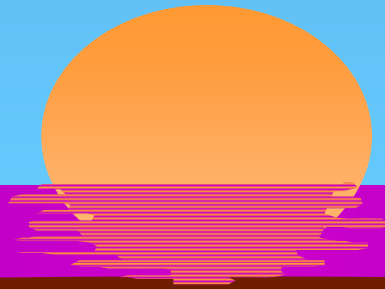
# After



**Pipeline  
Safety  
Regulation  
begins...**

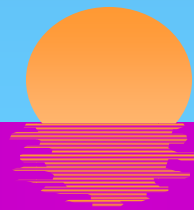
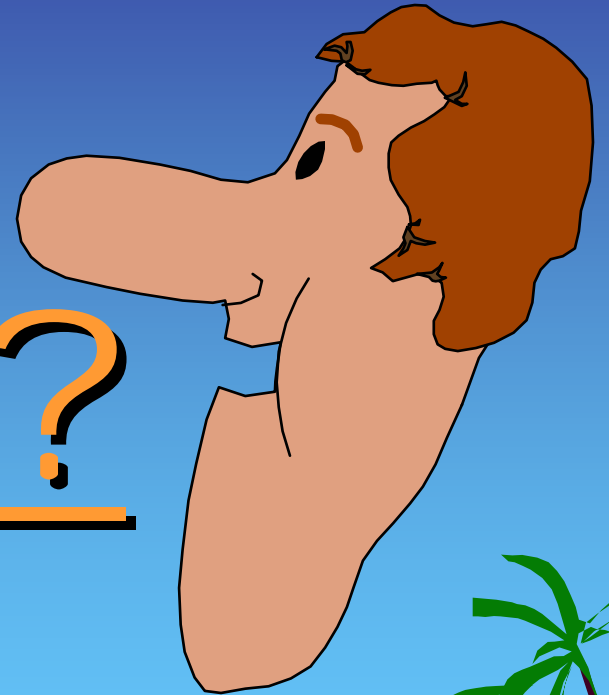


# Odorization of Gas





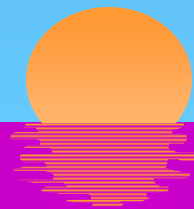
# Why Odorize?





*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....*

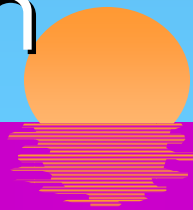
***It's also the LAW!***





# Factors Which Affect Odor Quantity

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





# Factors Which Affect Odor Intensity or Perception

- ⇒ Gender
- ⇒ Physical condition
- ⇒ Masking
- ⇒ Psychological

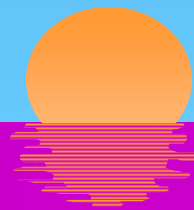
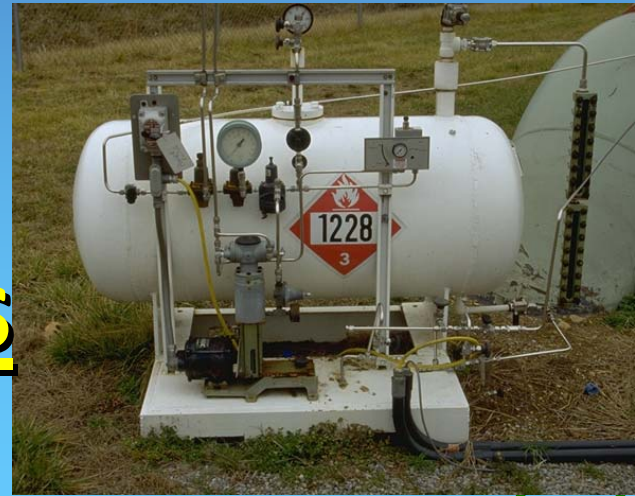




# Odorization of Gas (192.625)

- ⇒ Combustible gas in a **distribution line** must:
  - ⇒ Contain a natural odorant, or
  - ⇒ Be odorized

**At ALL Times**





THE MIRAGE

THE MIRAGE  
LAS VEGAS  
NEVADA  
1981

Pinã Colada  
Odorant!!

THE MIRAGE



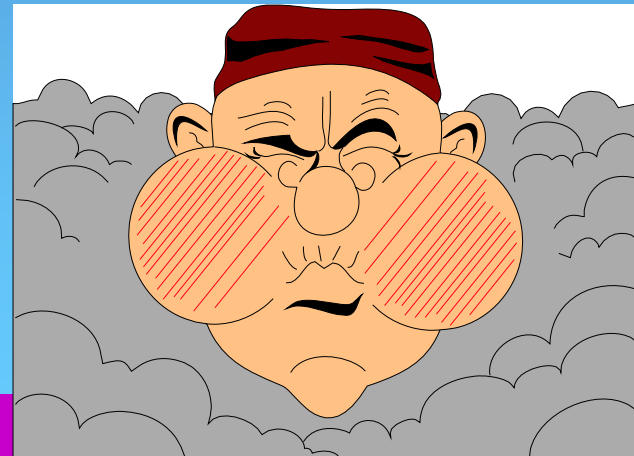


THEATRACE



# Detection Level

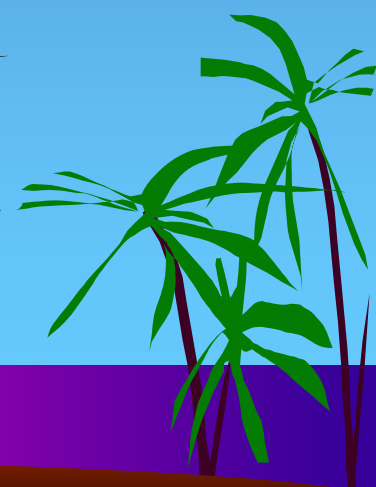
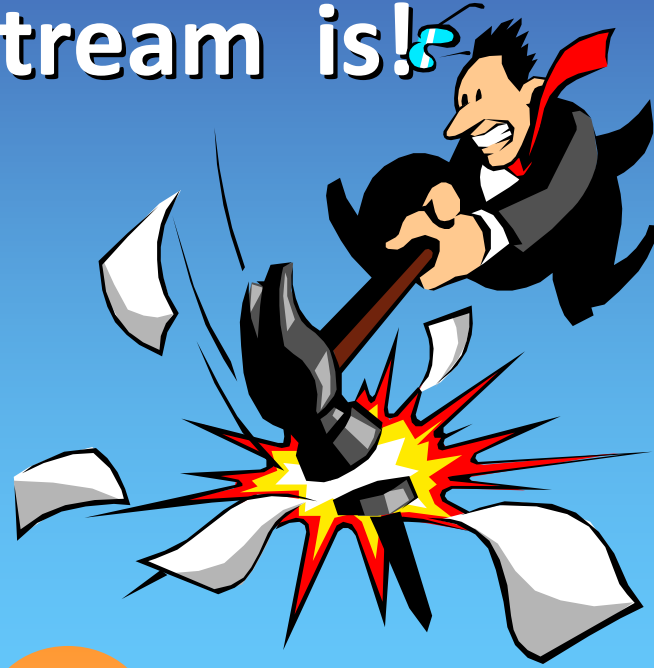
➔ Must be detectable at one-fifth of the Lower Explosive Limit (LEL) by a person with a **NORMAL** sense of smell.





# Detection Level

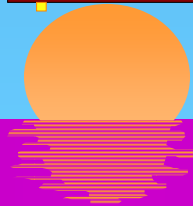
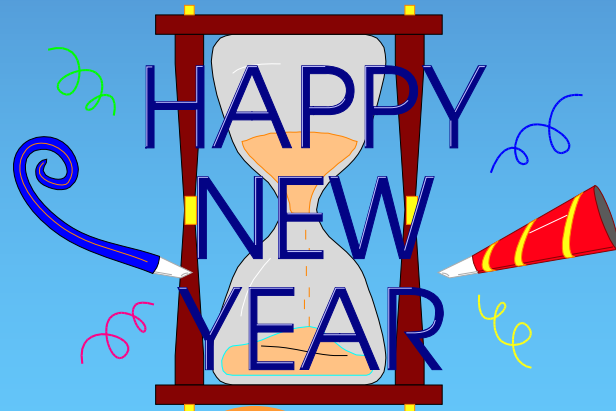
➔ Must know what the LEL of your particular gas stream is!





# Transmission Lines

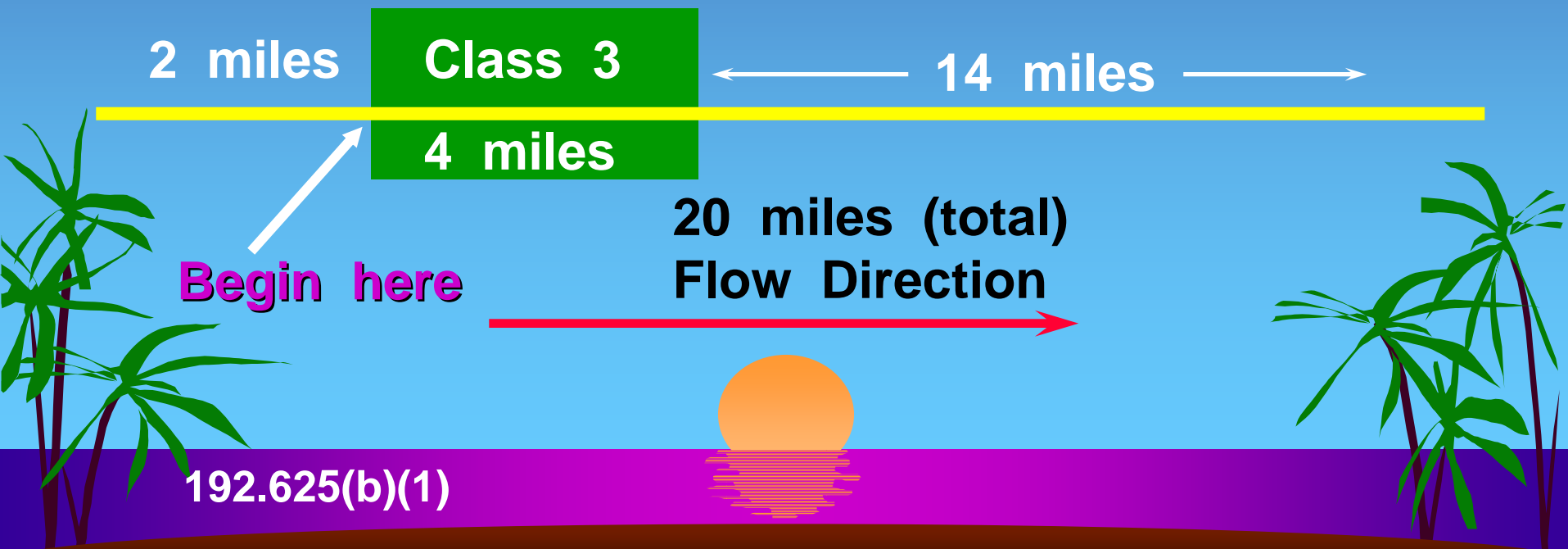
➔ As of January 1, 1977,  
transmission lines in class 3 and  
4 areas must be odorized; unless

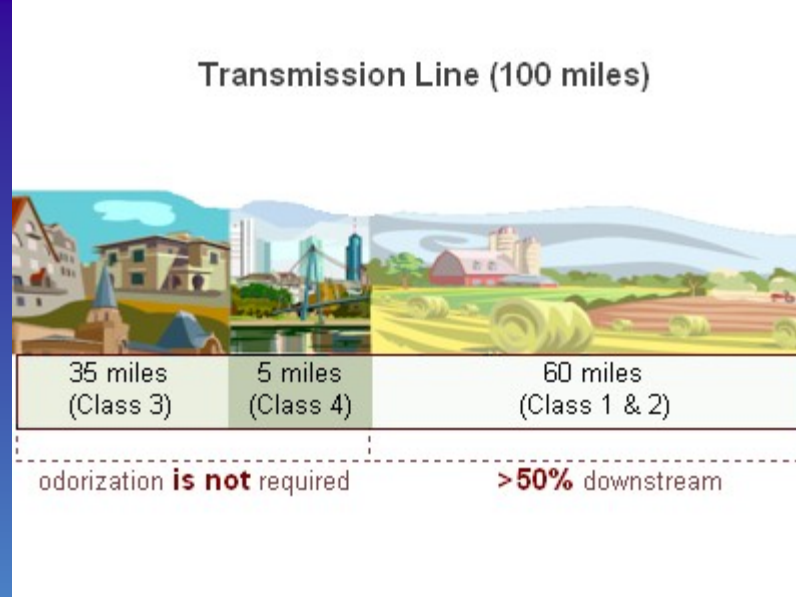




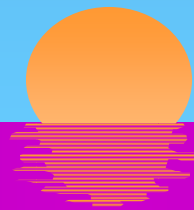
# Transmission Lines

➡ At least 50% of the length of the line **DOWNSTREAM** from that location is class 1 or 2.



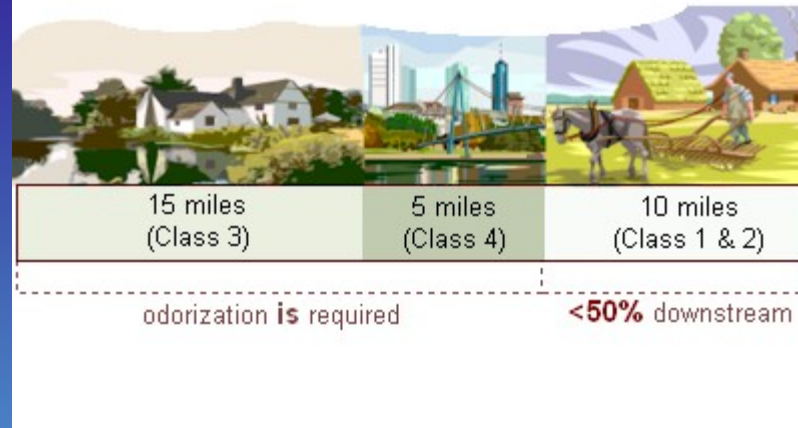


➡ In illustration above, the total length of transmission line is 100 miles. The first 40 miles (40% of the line) are in Class 3 and 4 locations, and the 60 miles downstream (60% of the line) are in Class 1 and 2 locations. Since more than 50% of the line downstream from the Class 3 and 4 locations is in a lower class location, the line does not require odorization.

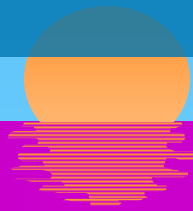




### Transmission Line (30 miles)

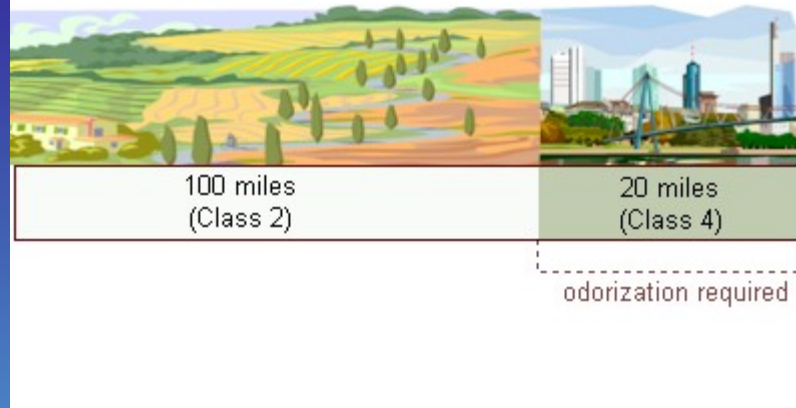


➡ In this illustration, the total length of the transmission line is 30 miles, with the first 20 miles (67%) in Class 3 and 4 locations, and the final 10 miles (33%) in Class 1 and 2 locations. This line would require odorization since the downstream segment in Class 1 and 2 locations is less than 50% of the total length.





### Transmission Line (120 miles)



➡ In illustration 3, the 120-mile transmission line terminates with a 20-mile segment in a Class 4 location. This 20-mile segment must be odorized because there is no line downstream in a Class 1 or 2 location.





# Transmission Lines

⇒ Exceptions continued

⇒ Transports gas to any of the following facilities which received unodorized gas prior to May 5, 1975:

⇒ Underground storage field;

⇒ Gas processing plant





# Transmission Lines

➔ Exceptions continued

➔ Transports gas to any of the following facilities which received unodorized gas prior to May 5, 1975:

➔ Gas dehydration plant; or

➔ Industrial plants where;

◆ Odorant causes unfit product; or

192.625(b)(2)(iii)(iv)(A)





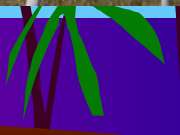
# Transmission Lines

→ Exceptions continued

→ Transports gas to any of the following facilities which received unodorized gas prior to May 5, 1975:

→ Industrial plant where

- ◆ Reduces activity of a catalyst
- ◆ Reduces chemical reaction

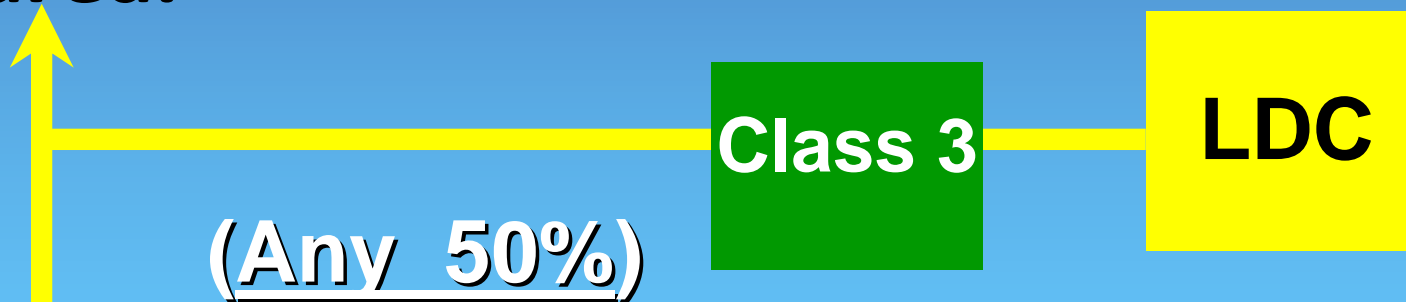




# Transmission Lines

⇒ Exceptions continued

⇒ At least 50% of a lateral line serving a distribution center is in class 1 or 2 area.



192.625(b)(3)



# Transmission Lines

- ➔ Exceptions continued
- ➔ The combustible gas is hydrogen intended for use as a feedstock in a manufacturing process.

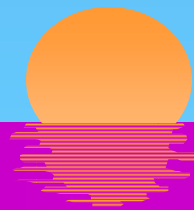


192.625(b)(4)



# The Odorant

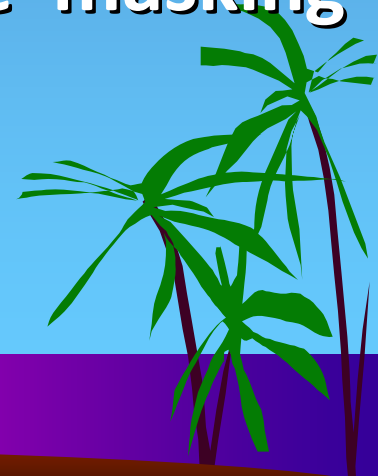
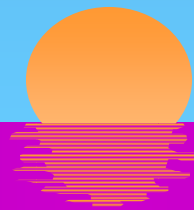
- ➔ The odorant may not be deleterious to people, materials or pipe.
- ➔ Combustion products may not be toxic to breathe or corrosive to materials exposed to combustion products.





# Other Considerations

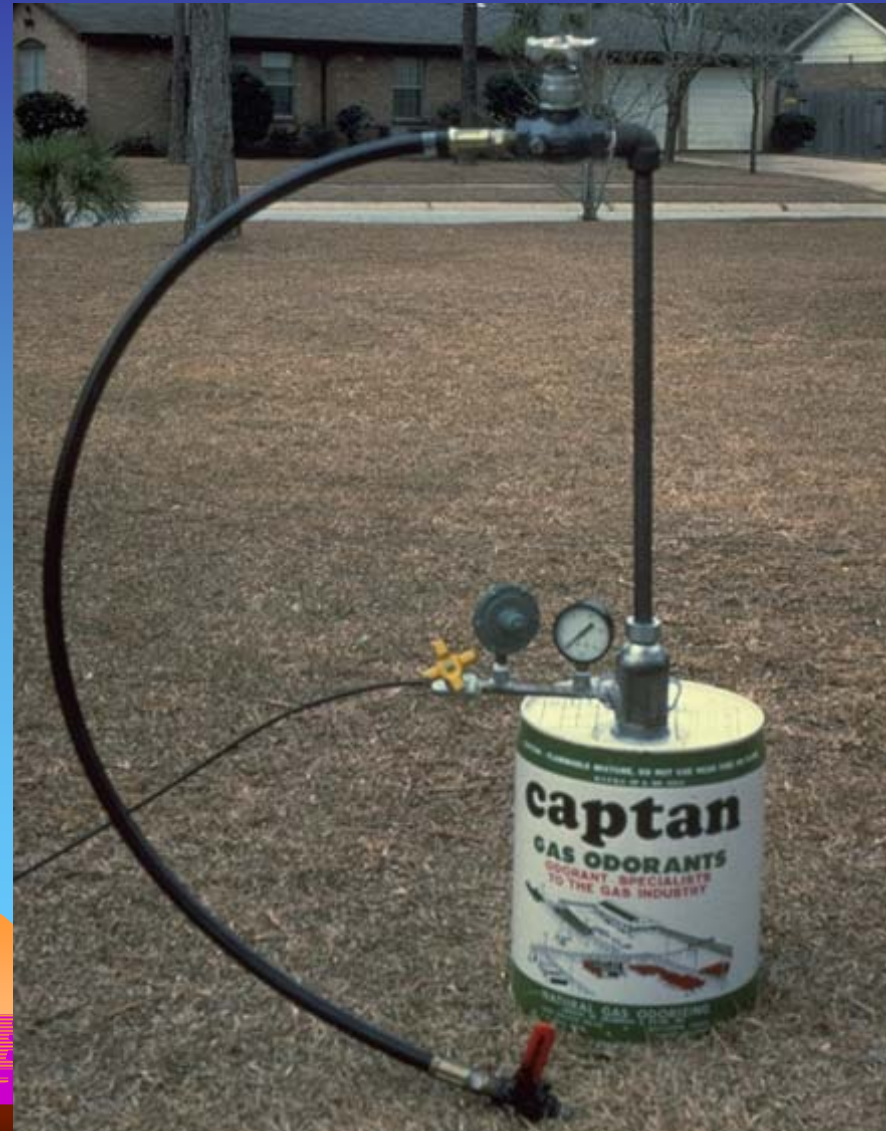
- ⇒ Which blend to use for the desired results
  - ⇒ Soil absorption
    - ◆ Soil types
  - ⇒ Reaction with gas stream composition
    - ◆ Heavy ends present can cause masking





# Odorizing Equipment

- ➔ The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.
- ➔ Must introduce the odorant without wide variations.



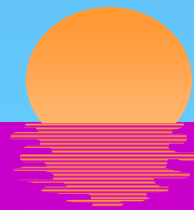
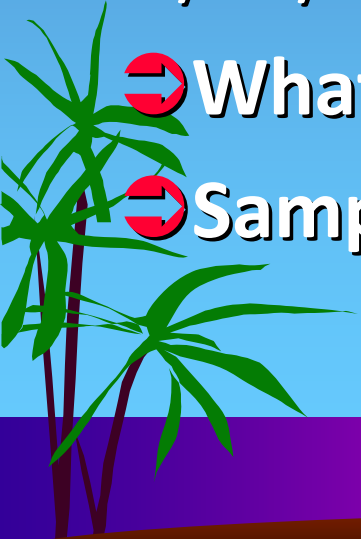


# Sampling

➔ Each operator must conduct periodic sampling of combustible gases using an instrument capable of determining the percentage of gas in air at which the odor becomes readily detectable. (as of 10/15/2003)

➔ What's periodic?

➔ Sample where?





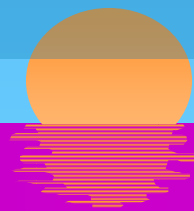
# Sampling



➔ Operators of master meter systems may comply with this requirement by -

➔ (1) Receiving written verification from their gas source that the gas has the proper concentration of odorant; and

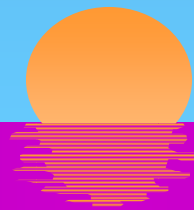
➔ (2) Conducting periodic "sniff" tests at the extremities of the system to confirm that the gas contains odorant.





# Equipment

➔ “Sniff tests” and tracking leak complaints are good supplements.



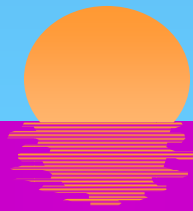


# Odor Complaints (as of 10/15/2003)

§192.605 Procedural manual for operations, maintenance, and emergencies.



➡ (b) (11) Responding promptly to a report of a gas odor inside or near a building, unless the operator's emergency procedures under §192.615(a)(3) specifically apply to these reports.





# The Value of Regular Odorization Audits by the Operator





# Why Audit Odorization?

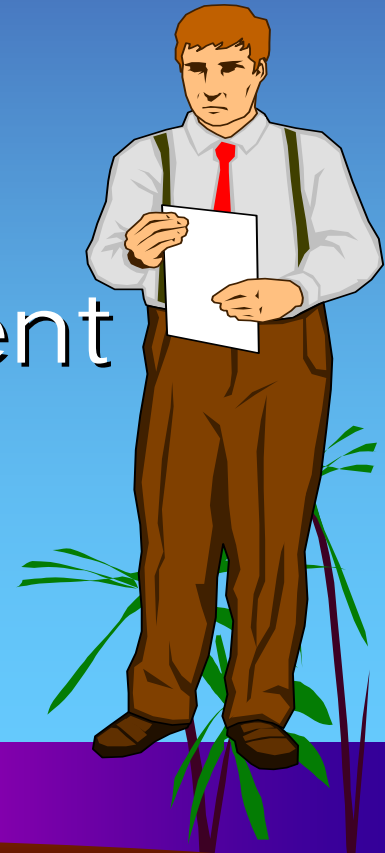
- ⇒ Insure that odorization is continuous
- ⇒ Verify that odorization is consistent
- ⇒ Make sure the odorant works
- ⇒ Meet regulatory requirements





# Conducting the Odorization Audit

- ⇒ Records and Documentation
- ⇒ Odorizing equipment
- ⇒ Personnel qualifications
- ⇒ Test points and equipment
- ⇒ Overall leak call rate





# Records and Documentation

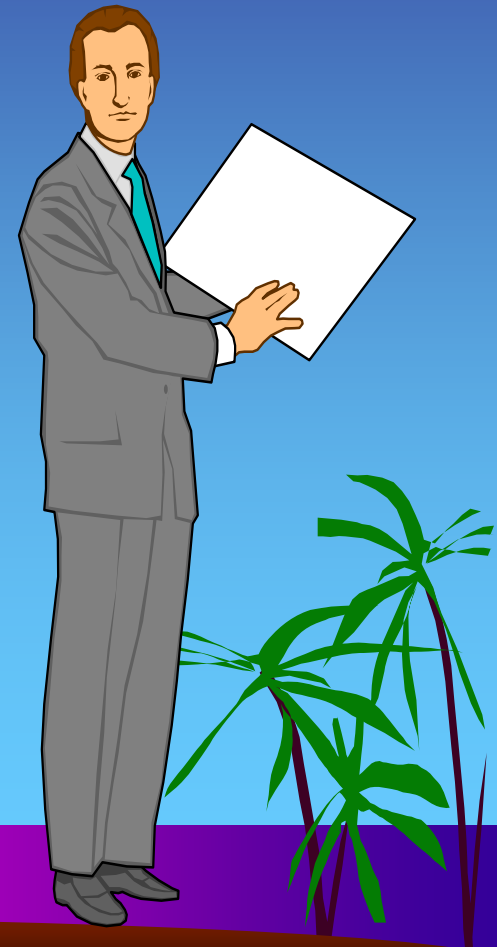
- ➔ Injection rates
- ➔ Amounts and types of odorant purchased
- ➔ Odorizer inspection reports
- ➔ Test results from odor concentration meter tests





# Records and Documentation

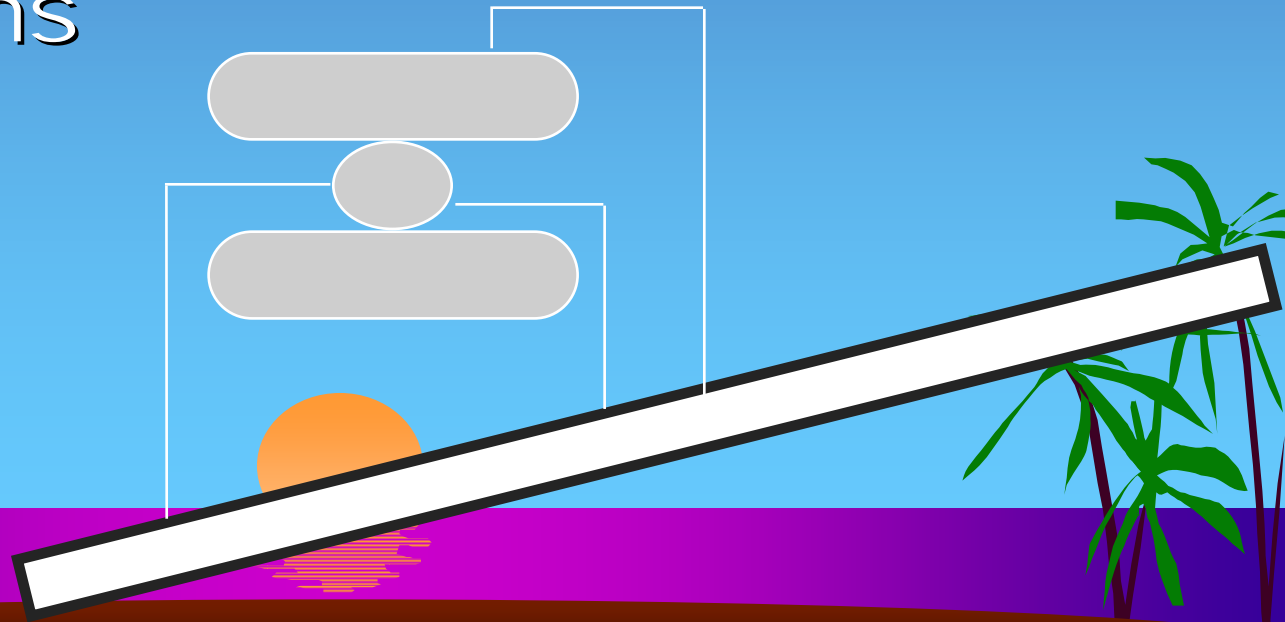
- ⇒ Training records
- ⇒ Types of odor calls received
- ⇒ Results of odor call investigations
- ⇒ Total number of odor calls received





# Odorizing Equipment

- ⇒ Types of odorizers
- ⇒ Type of odorant used
- ⇒ Maintenance activity
- ⇒ Locations





# Personnel Qualifications

- ⇒ Training on test instruments
- ⇒ Sense of smell
- ⇒ Variations in sensitivity
- ⇒ Training for the masses
- ⇒ "Nasal Appraisal"





# Test Points and Equipment

- ➔ Location of test points
- ➔ Testing frequency
- ➔ Odor concentration meters
- ➔ Chromatographs

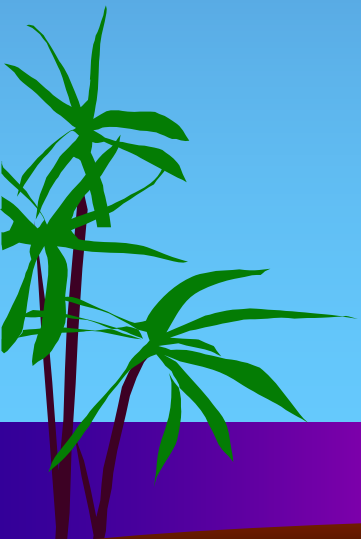
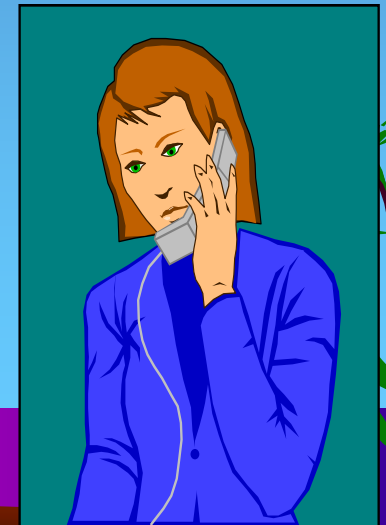




# Leak Call Ratios

⇒ Frequency of calls

⇒ Types of leaks/sources found





# Evaluation

- ➔ Is the odor continuous?
- ➔ Is the odor consistent?
- ➔ Is the program working as designed?





# Conclusion

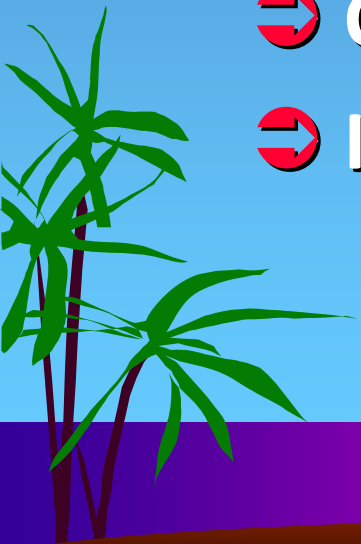
- ➔ Operator knows what he is doing
- ➔ Program meets its goals
- ➔ Operator is serious about Public Safety





# Odorization Recap

- ➡ Example of use of “Performance Language”
- ➡ Lots of Recordkeeping (all operators)
- ➡ More Recordkeeping (transmission operators who don’t odorize)
- ➡ OQ covered tasks and ramifications
- ➡ Critical to incident investigations
- ➡ Internal Audits are important





# THE END

