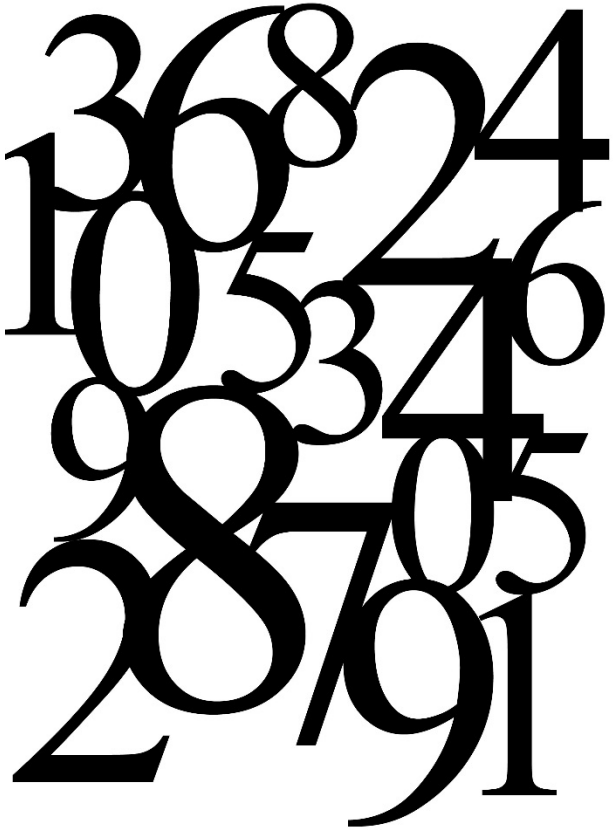
Odorant
When is enough really enough…

Mt. Snow, Vt

Don Ledversis,
Rhode Island Division of Public Utilities and Carriers

Odorant has to work every second of everyday…

31.5 Million seconds a year



Trick Question:

Do you have any un-odorized gas in your company?

How about?

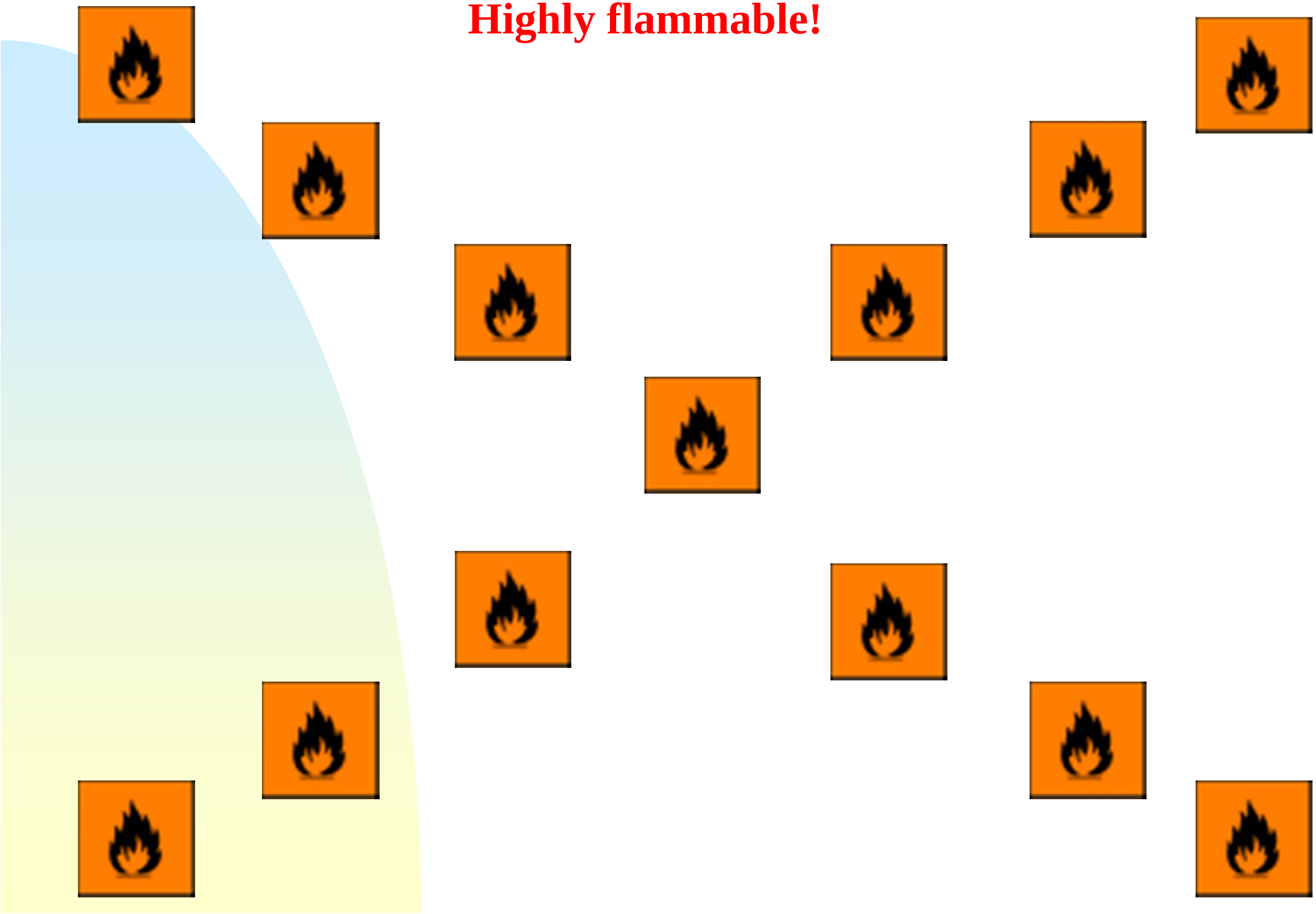
LNG

Boil off
Vaporize
LNG Truck deliveries

Not a Trick Question:

Is odorant flammable, yes or no?

Highly flammable!

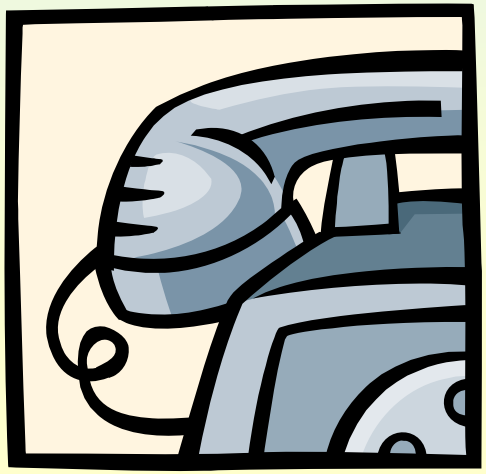


Highly flammable!

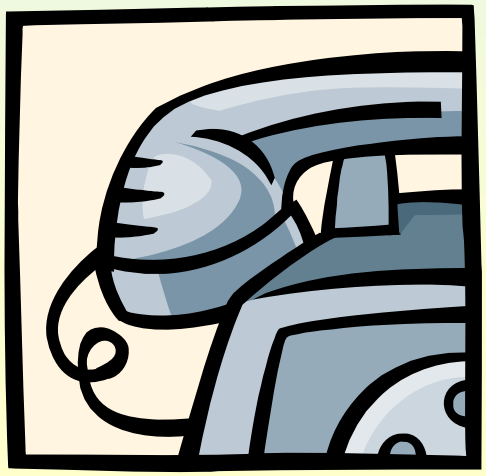
§193.2513 Transfer Procedures

Has anyone ever called in an odor?

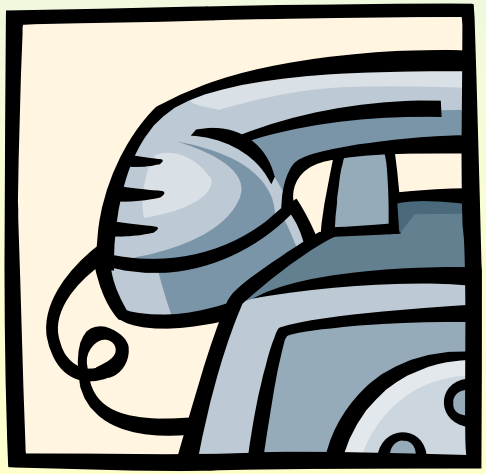
Does not have to be to your own company.



Has anyone ever called in an odor to a propane company?



Has anyone ever called in an odor while in a different country?

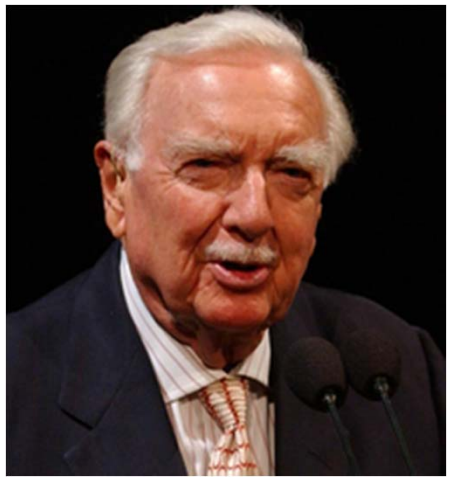


13
JobCentre
BARKAT HOUSE
KARNAC BOOKS
Transco
Piping gas for you
SMELL GAS ?
CALL FREE
0800 111 999

SMELL GAS ?
CALL FREE
0800 111 999

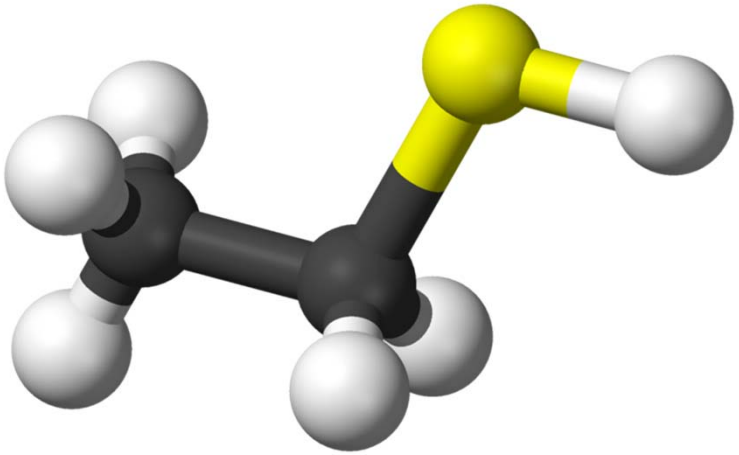
March 18, 1937 London School, New London, Tx.

- 295 + Died



Odorless, the smell is added.

THE ADVENTURES OF CAPTAIN MERCAPTAN
BGE*NATURAL GAS SAFETY HERO CHALLENGE



Tertiary Butyl Mercaptan

The Odorant is very potent

1 drop odorizes

100,000 Cubic Feet of gas

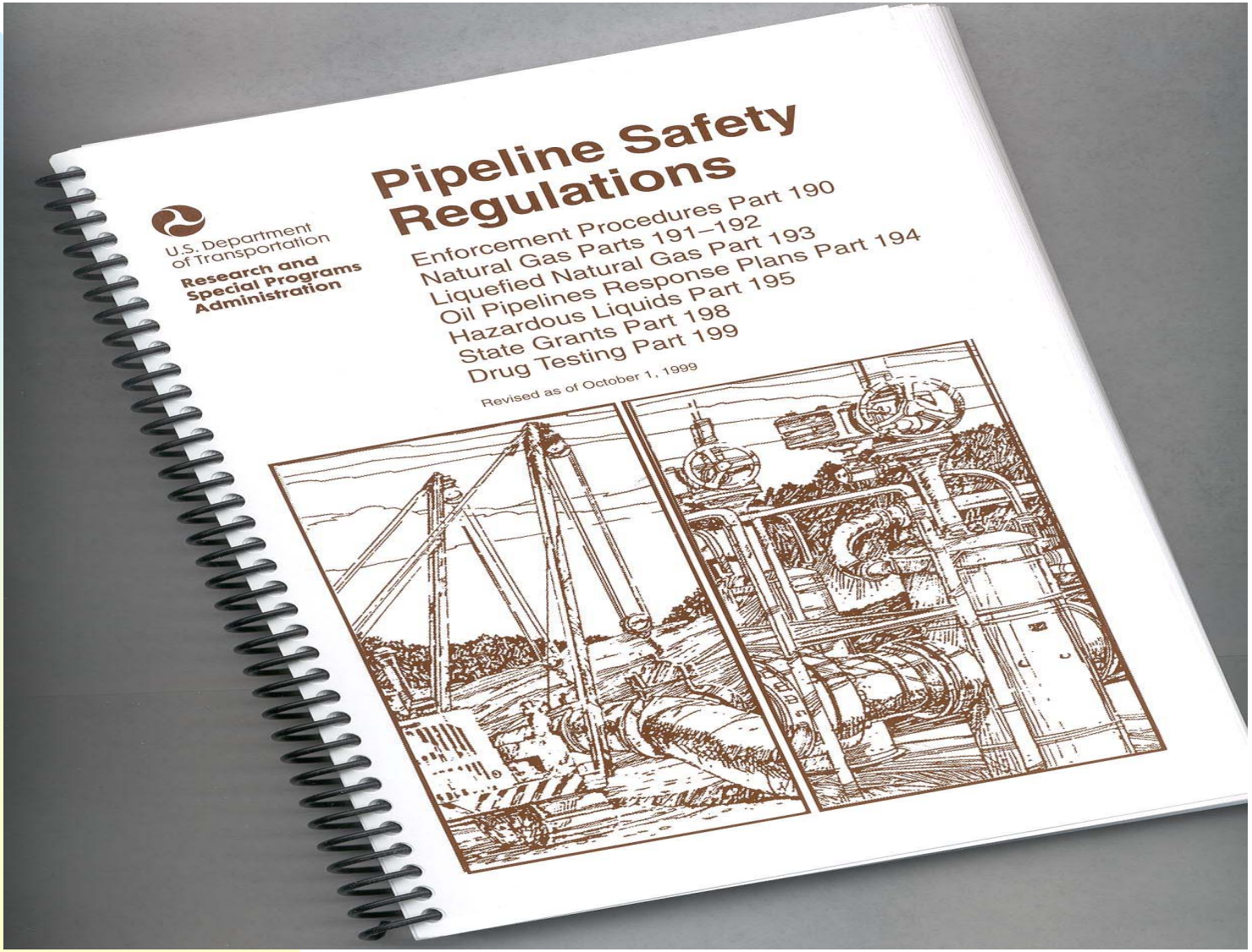
Propane also is odorless, the smell is added.

Very Potent

1 lb odorizes

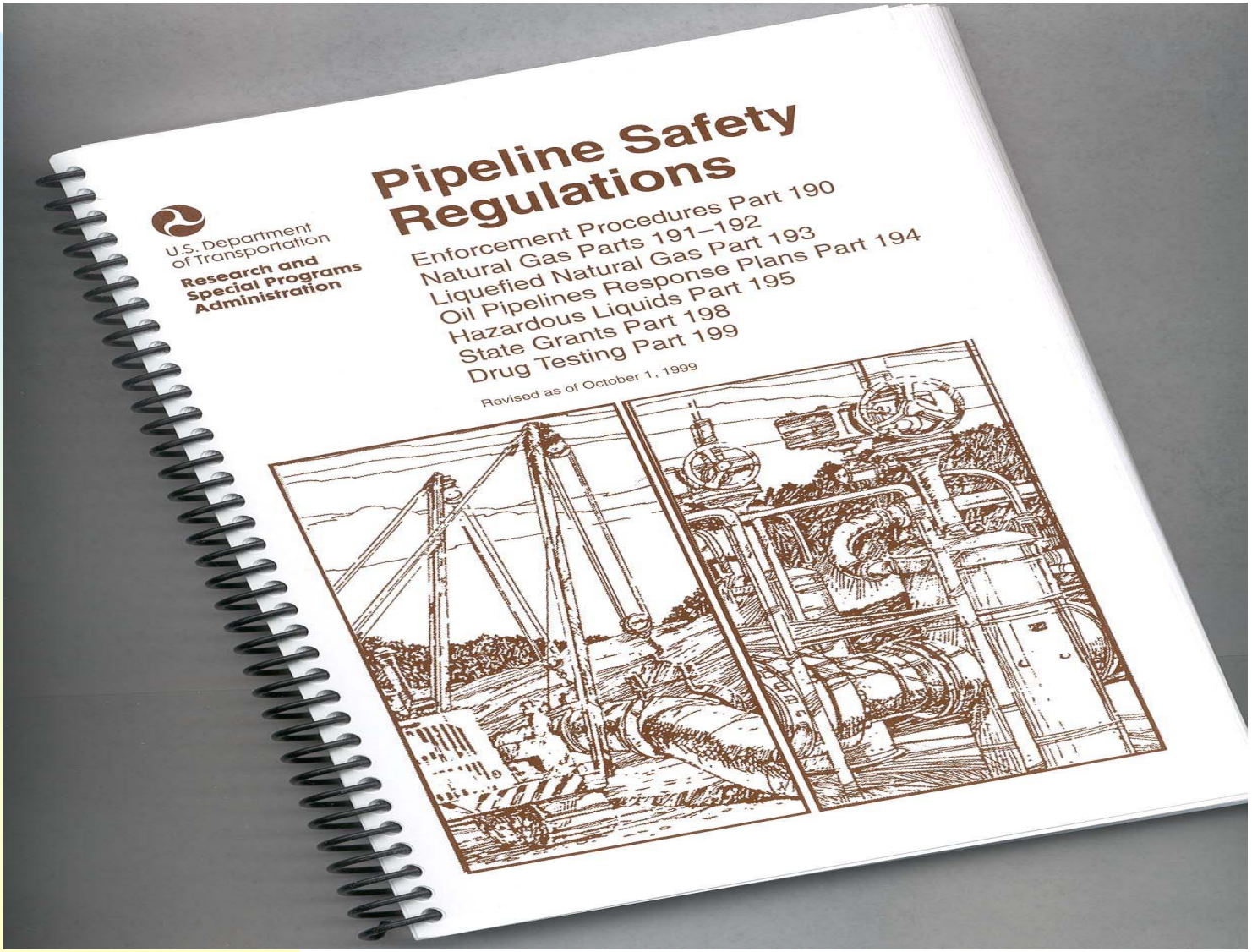
10,000 gallons of propane

Federal Code CFR 49 Part 192



§192.616(d) Educate the public.

Federal Code CFR 49 Part 192



§192.625 Odorization of gas.

(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.

(b) After December 31, 1976, a combustible gas in a transmission line in a Class 3 or Class 4 location must comply with the requirements of paragraph (a) of this section unless:
(1) At least 50 percent of the length of the line downstream from that location is in a Class 1 or Class 2 location;
(2) The line transports gas to any of the following facilities which received gas without an odorant from that line before May 5, 1975:

(i) An underground storage field;
(ii) A gas processing plant;
(iii) A gas dehydration plant; or
(iv) An industrial plant using gas in a process where the presence of an odorant:

(A) Makes the end product unfit for the purpose for which it is intended;
(B) Reduces the activity of a catalyst; or
(C) Reduces the percentage completion of a chemical reaction

(3) In the case of a lateral line which transports gas to a distribution center, at least 50 percent of the length of that line is in a Class 1 or Class 2 location.; or

(4) The combustible gas is hydrogen intended for use as a feedstock in a manufacturing process.

(c) In the concentrations in which it is used, the odorant in combustible gases must comply with the following:

(1) The odorant may not be deleterious to persons, materials, or pipe.

(2) The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

(d) The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.

(e) Equipment for odorization must introduce the odorant without wide variations in the level of odorant.

(f) To assure the proper concentration of odorant in accordance with this section, 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. 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.

Inspection Form 2014 (2) Questions

New Standard Form 2 Gas Distribution Inspection Form 2015 [Compatibility Mode] - Word

STANDARD INSPECTION REPORT OF A GAS DISTRIBUTION OPERATOR

Unless otherwise noted, all code references are to 49 CFR Part 192. S – Satisfactory U – Unsatisfactory N/A – Not Applicable N/C – Not Checked

If an item is marked U, N/A, or N/C, an explanation must be included in this report.

			S	U	N/A	N/C
.605(b)(1)		**ODORIZATION OF GAS PROCEDURES**				
	.625 (a)	Distribution lines must contain odorized gas – must be readily detectable by person with normal sense of smell at one-fifth of the Lower Explosive Limit.	X			
	(f)	Periodic gas sampling, using an instrument capable of determining the percentage of gas in air at which the odor becomes readily detectable.	X			

Comments: No issues found

10/06/2015

<u>Inspection Form 2015</u> - (8) Questions!

§192.625(a)

.605(a)	ODORIZATION of GAS PROCEDURES	S	U	N/A	N/C
	.625(a) Distribution lines must contain odorized gas. – must be readily detectable by a person with a normal sense of smell at $^{1}/_{5}$ of the Lower Explosive Level (LEL).	X			

Natural Gas LEL = 4.5 - 5%

1%

Propane LEL = 2.5%

½%

.605(a)	ODORIZATION of GAS PROCEDURES	S	U	N / A	N / C
	.625(a) Distribution lines must contain odorized gas. – m detectable by a person with a normal sense of smell	X			

Hint: answer next 7 questions first

§192.625(b)

ODORIZATION of GAS PROCEDURES	S	U	N/A	N/C
.625(b) Odorized gas in Class 3 or 4 locations (if applicable* Transmission only)			X	

Class 2 Greater 10 but < 46

Class 3 Greater 46

*Note: Exemptions

ODORIZATION of GAS PROCEDURES	S	U	N/A	N/C
.625(b) Odorized gas in Class 3 or 4 locations (if applicable Transmission only)			X	

Prove it's class 1 or 2

§192.625(c)(1)

.625(c)(1)	(1) The odorant may not be deleterious (harmful) to persons, materials, or pipe.

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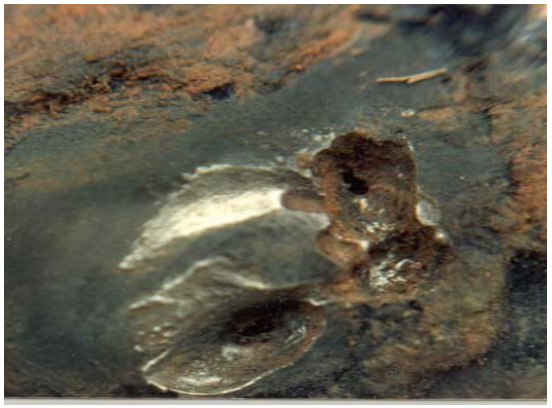
Any odor calls that required hospitalization?

.625(c)(1)	(1) The odorant may not be deleterious (harmful) to persons, materials, or pipe.

Any internal corrosion?



.625(c)(1)	(1) The odorant may not be deleterious (harmful) to persons, materials, or pipe.

Did you have a spill eat through the spill tank?

§192.625(c)(2)

.625(c)(2)	The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

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Prove it's not Toxic

.625(c)(2)	The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

Letter from vendor

.625(c)(2)	The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

Prove it's not corrosive in combustion

.625(c)(2)	The products of combustion from the odorant may not be toxic when breathed nor may they be corrosive or harmful to those materials to which the products of combustion will be exposed.

Customer complaints

Stove components corroded

§192.625(d)

.625(d)	**The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.**

.625(d)	The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.

Prove it's not soluble

.625(d)	**The odorant may not be soluble in water to an extent greater than 2.5 parts to 100 parts by weight.**

Lab report from vendor

§192.625(e)

.625(e)	**Equipment for odorization must introduce the odorant without <u>wide variations</u> in the level of odorant**

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Proof no wide variations

.625(e)	**Equipment for odorization must introduce the odorant without <u>wide variations</u> in the level of odorant**

Procedure for injection rates

.625(e)	**Equipment for odorization must introduce the odorant without <u>wide variations</u> in the level of odorant**

When is there an AOC?

.625(e)	**Equipment for odorization must introduce the odorant without <u>wide variations</u> in the level of odorant**

Did you have any AOC's?

§192.625(f)

.625(f)	assure the proper concentration of odorant… must conduct periodic sampling must use an instrument that instrument must determine the percentage of gas in air at which the odor becomes readily detectable.

2.3 Tests. GPTC

(a) Odor concentration tests should be conducted by personnel having a normal sense of smell and trained in the operation and use of odor concentration meters and procedures. A reference for determining odor intensity of natural gas is ASTM D6273.

(b) Sniff tests are qualitative tests that should be performed by individuals with a normal sense of smell. Such tests should be conducted by releasing small amounts of gas for a short duration in a controlled manner to determine whether odorant is detectable.

(c) A normal sense of smell may be affected by smoking, eating spicy foods, chewing tobacco or gum, or the presence of other strong odors. It may also be affected by health-related conditions, such as a head cold, that may interfere with the sense of smell. Prolonged or repetitive exposure to gas should be avoided because the sense of smell will fatigue with extended exposure to odorant.

(d) A program should be considered to periodically check personnel who perform odorant sampling to verify that they possess normal olfactory senses.

Periodic sampling: Frequency

WEEKLY

Bi-monthly

Daily

Monthly

ONCE A YEAR

Periodic sampling: Criteria?

LAST HOUSE ON THE STREET

Dead end mains

Low flow

New construction

RIVER CROSSINGS

Periodic sampling: Where?

Show me the records!

Did you miss any inspections based on your frequency?

Suppose the location was closed? Skip it, don’t worry?

Only one person testing 15 locations a day.

Is the travel time between locations accurate?

Show me the records!

Is the travel time between locations accurate?

Google search says 22 minutes travel?

Your record says tech was there in 11.

Show me the records!

All odorant locations have about the same time for each reading?

The Instrument. (one-fifth of the lower explosive limit)

Instrument.

Show me the training records!

Instrument.

Suppose machine reads 0 TDL, 0 RDL!

Instrument.

Do you have trained people for a work stoppage, vacations, sick!

Instrument.

Show me the calibration records!

How often? Manufacturer Recommends…

Send all the machines out at once?

Instrument.

Show me the OQ records!

NGA Covered task #68

Instrument.

Do you have a spare!

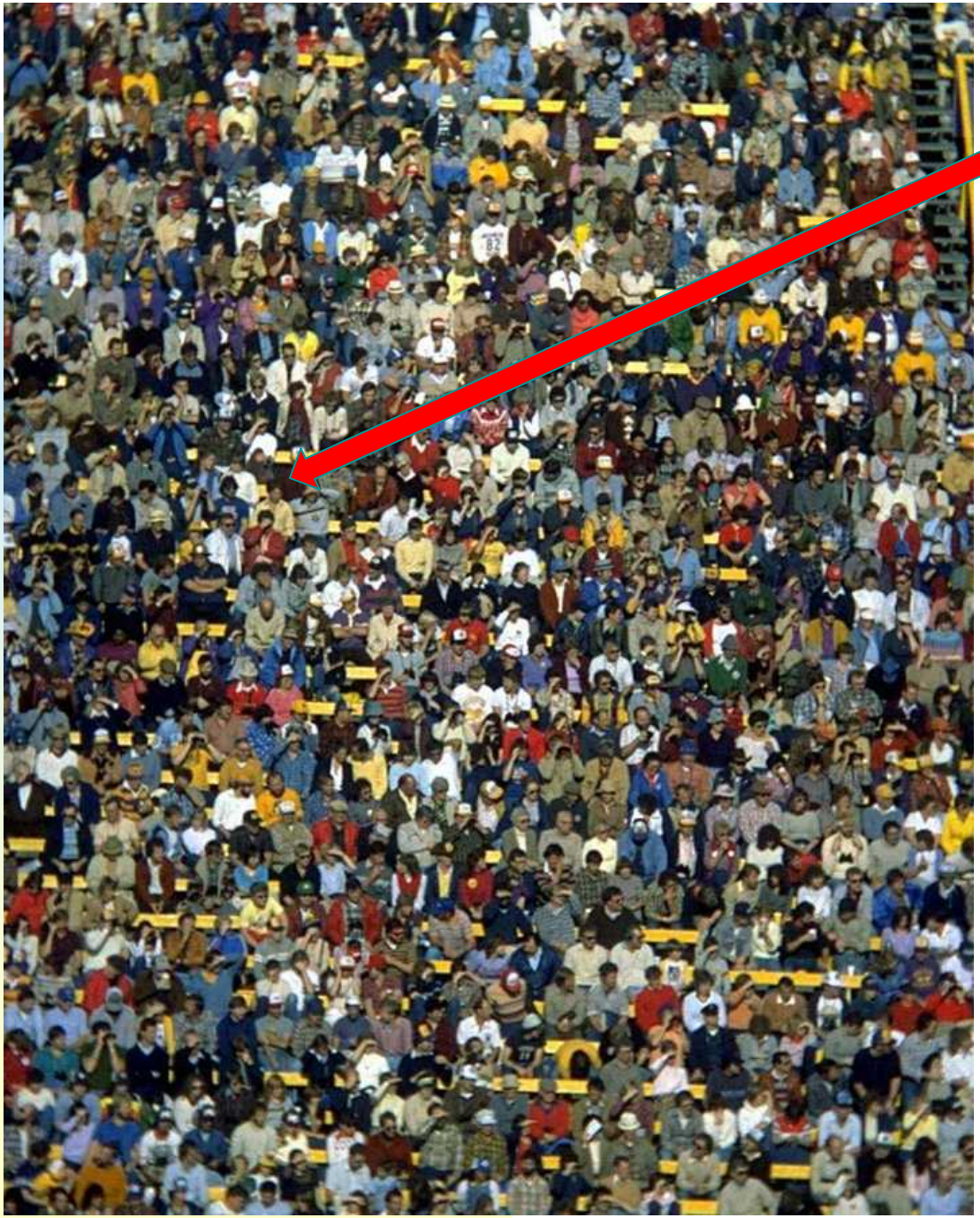
Instrument.

Is your tech in a D&A plan?

Does your tech have a normal sense of smell?

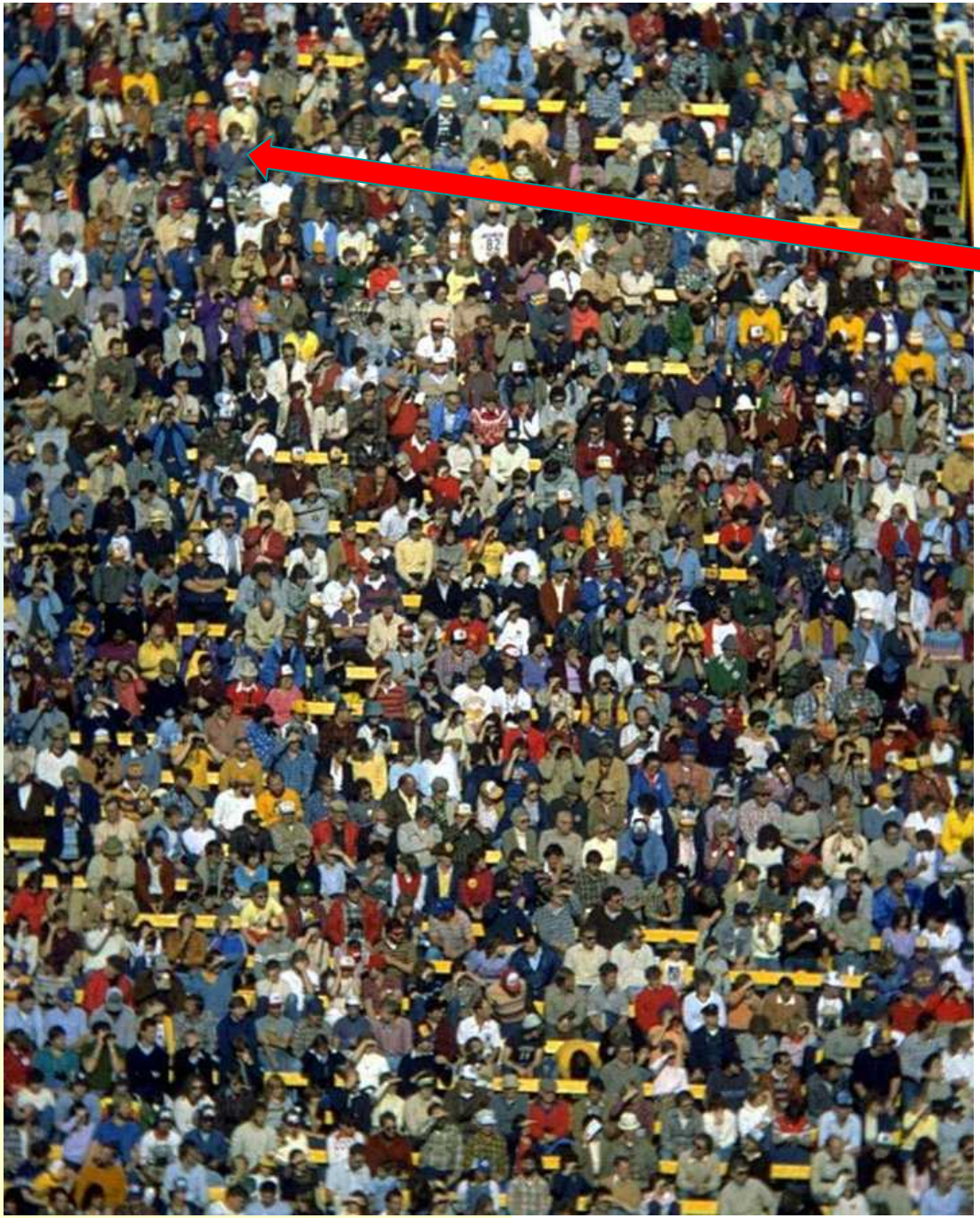
TACO BELL

Put it in your procedure!

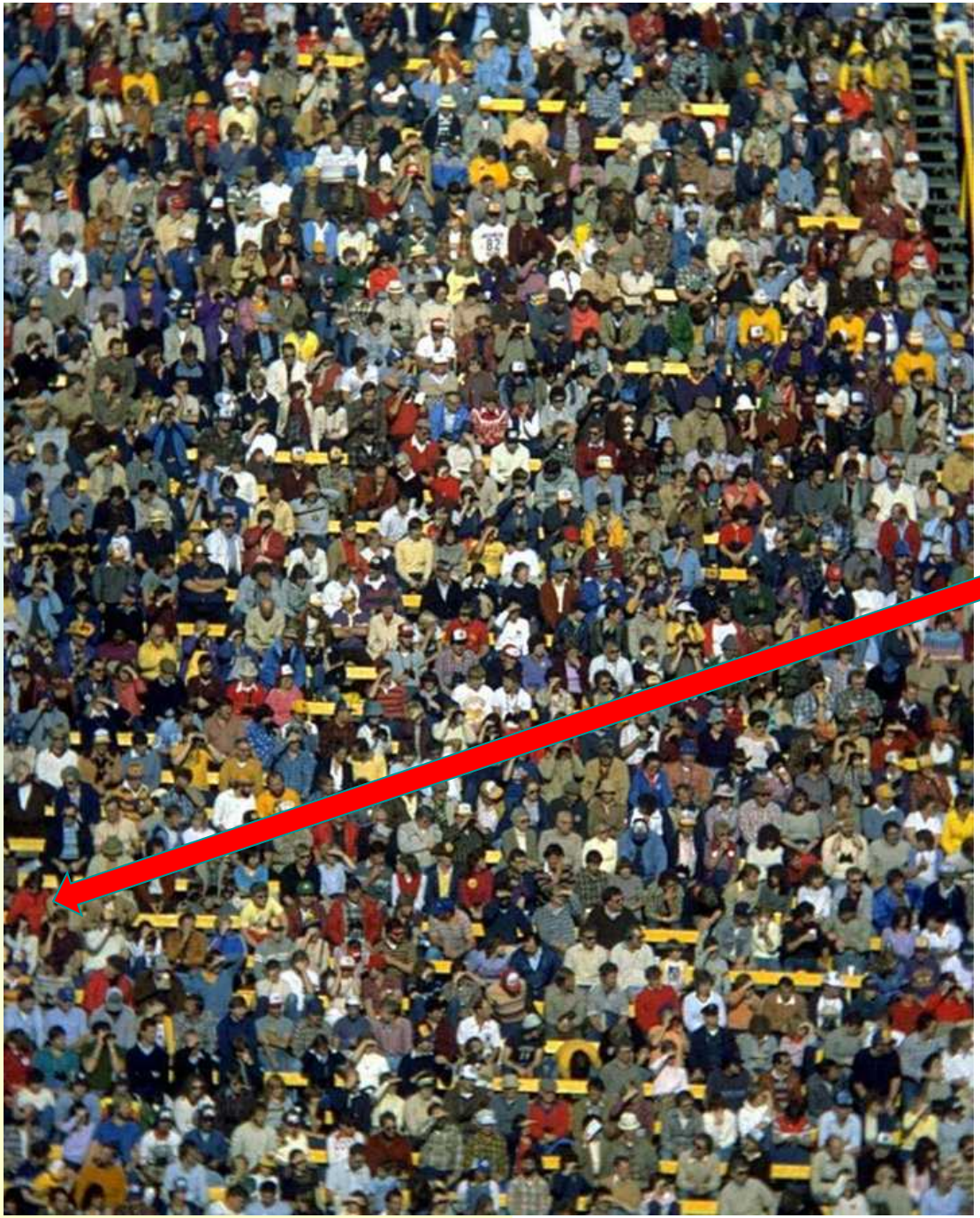


Normal sense of smell

Diminished sense of smell
(olfactory fatigue)

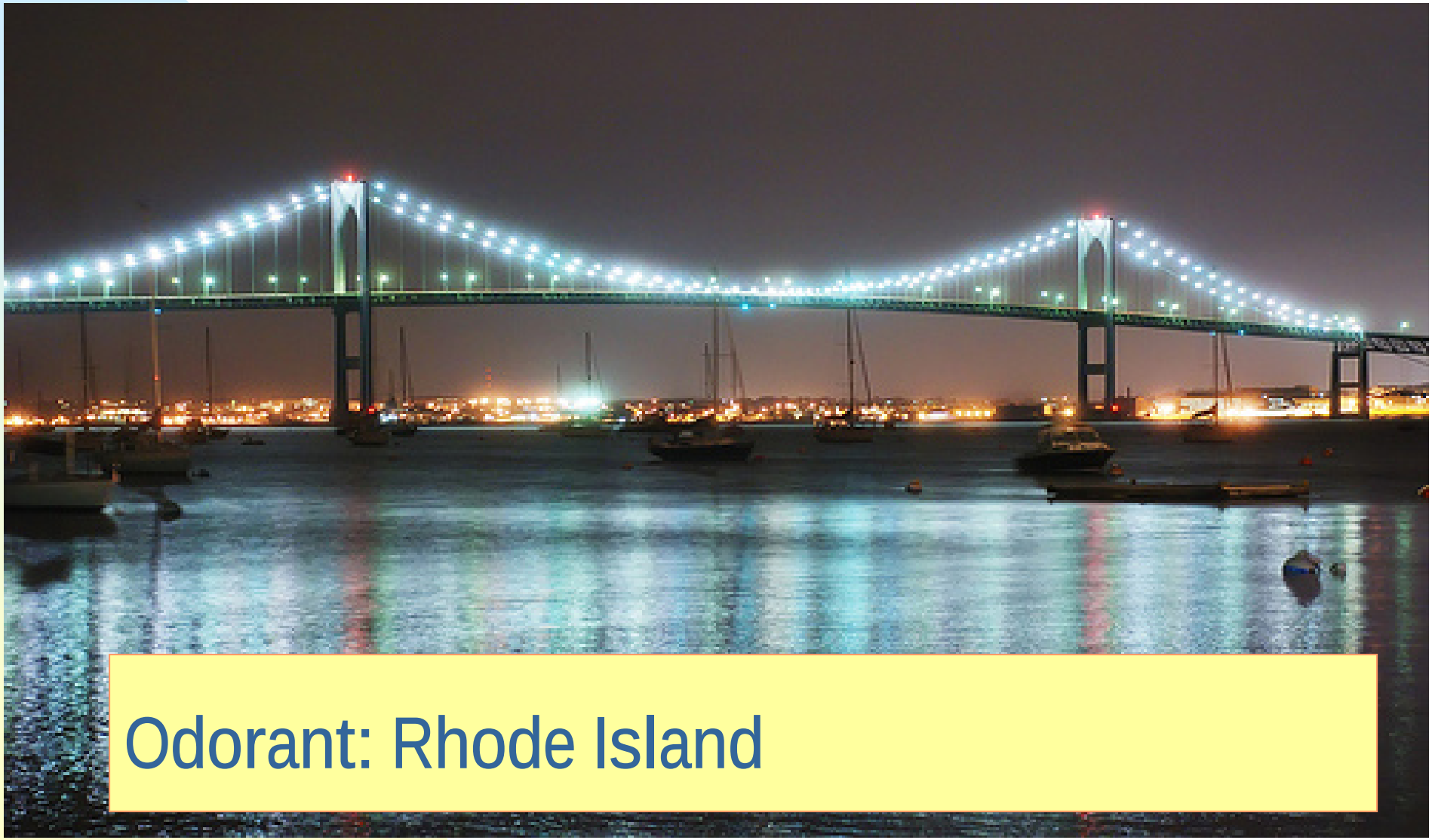


Age and gender



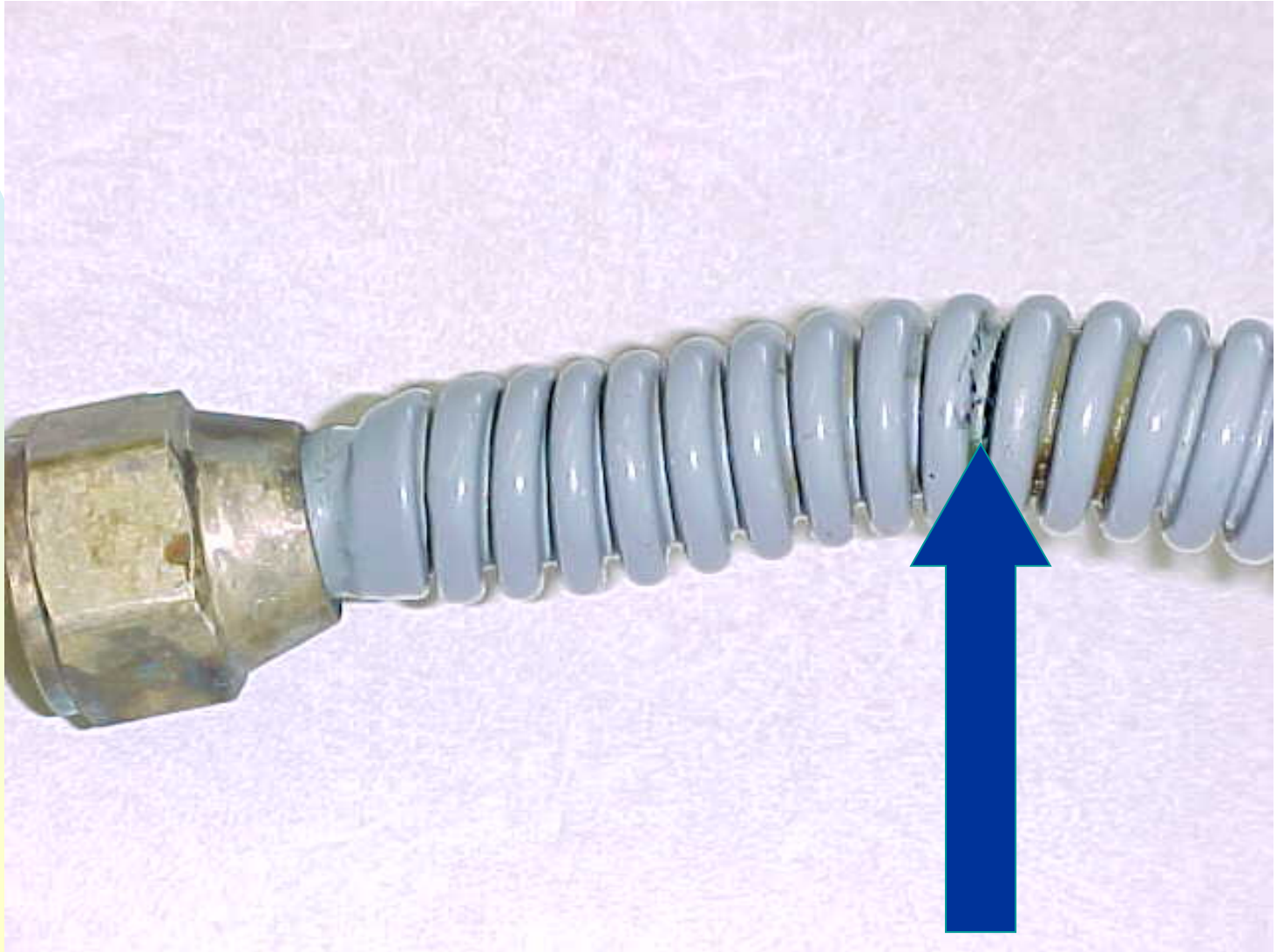
Has a sinus cold

Change your tune



Odorant: Rhode Island

Brass Flex Hose #1



Hose cracked at stove leaking for 2 weeks

Tenant next door:

complains to maintenance she smells something coming from the apartment next door.

Maintenance worker:

“Its probably someone just cooking”

Two weeks later: Picture window 75 feet away from the building

Brass Flex Hose #2

Note kinked area caused by improper installation, slip not not freely turning as required at installation.

Why did he not smell gas?

Reportable Incident 2015

DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
OFFICE OF PIPELINE SAFETY

PIPELINE SAFETY REGULATIONS

PART 191
ANNUAL REPORTS, INCIDENT REPORTS
AND
SAFETY RELATED CONDITION REPORTS
(Current through Amendment 14)

A Neurologist

A supermodel

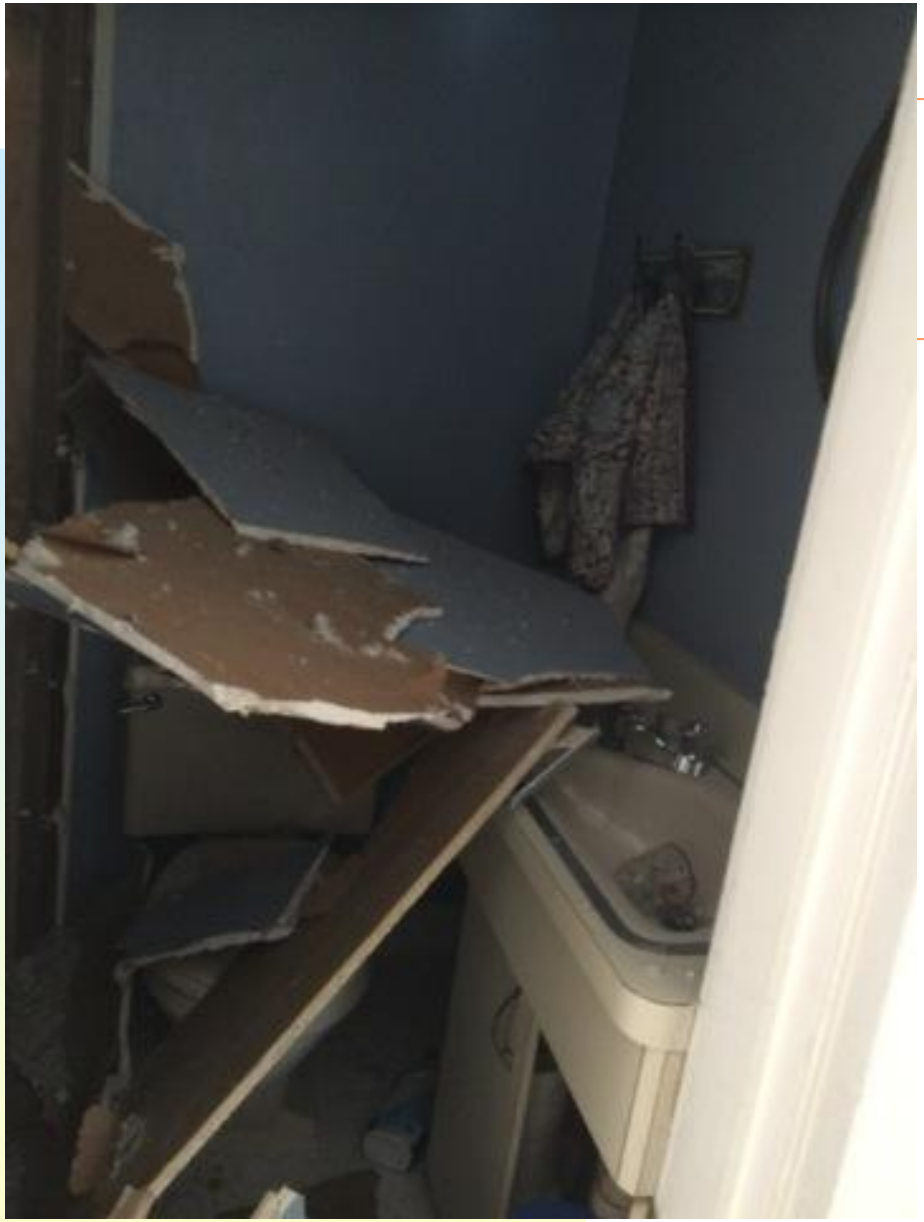
and a gas explosion

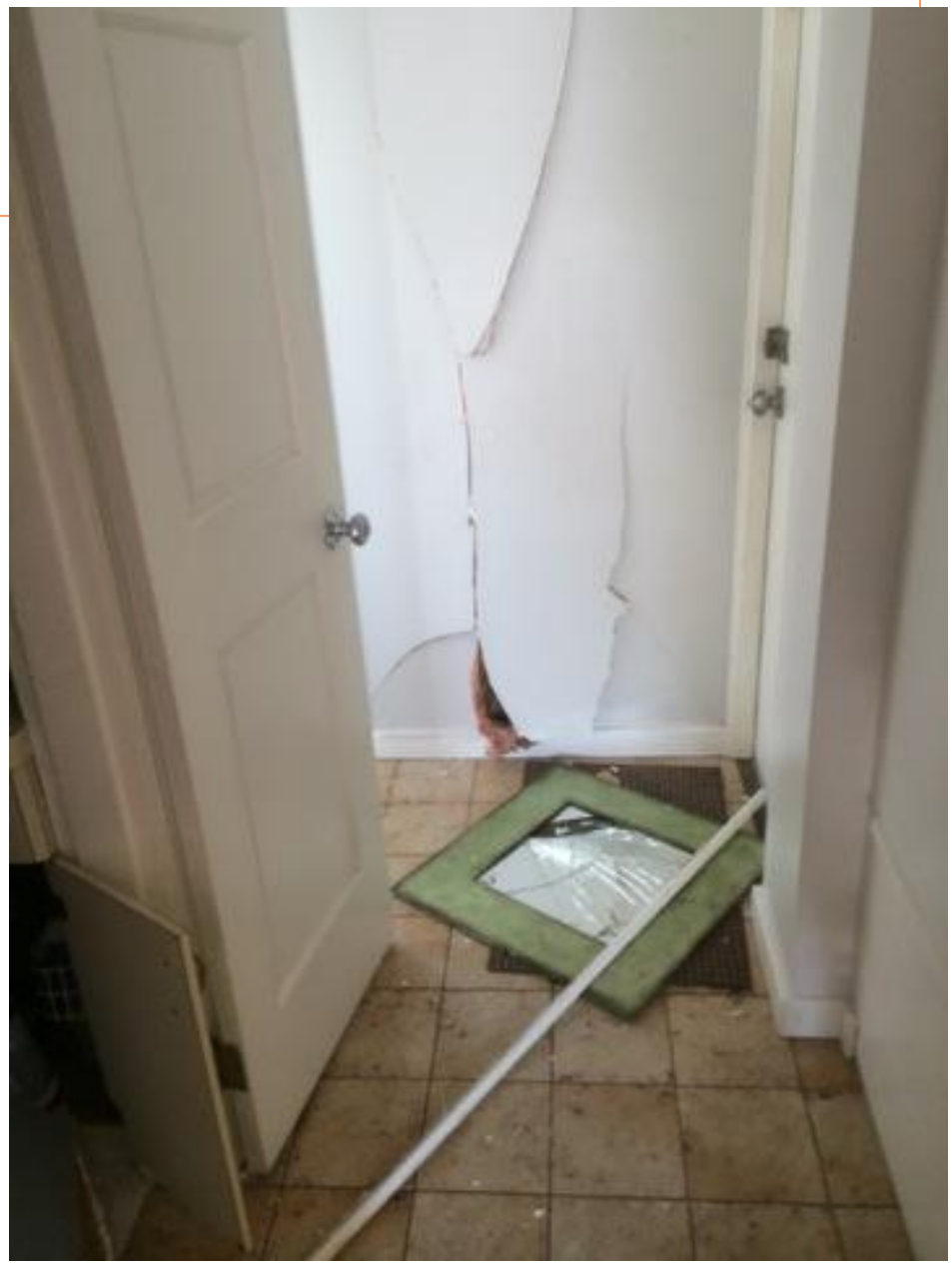
22/02/2015

A Neurologist from New York asks

“Can I use your bathroom?”

Hits the light switch



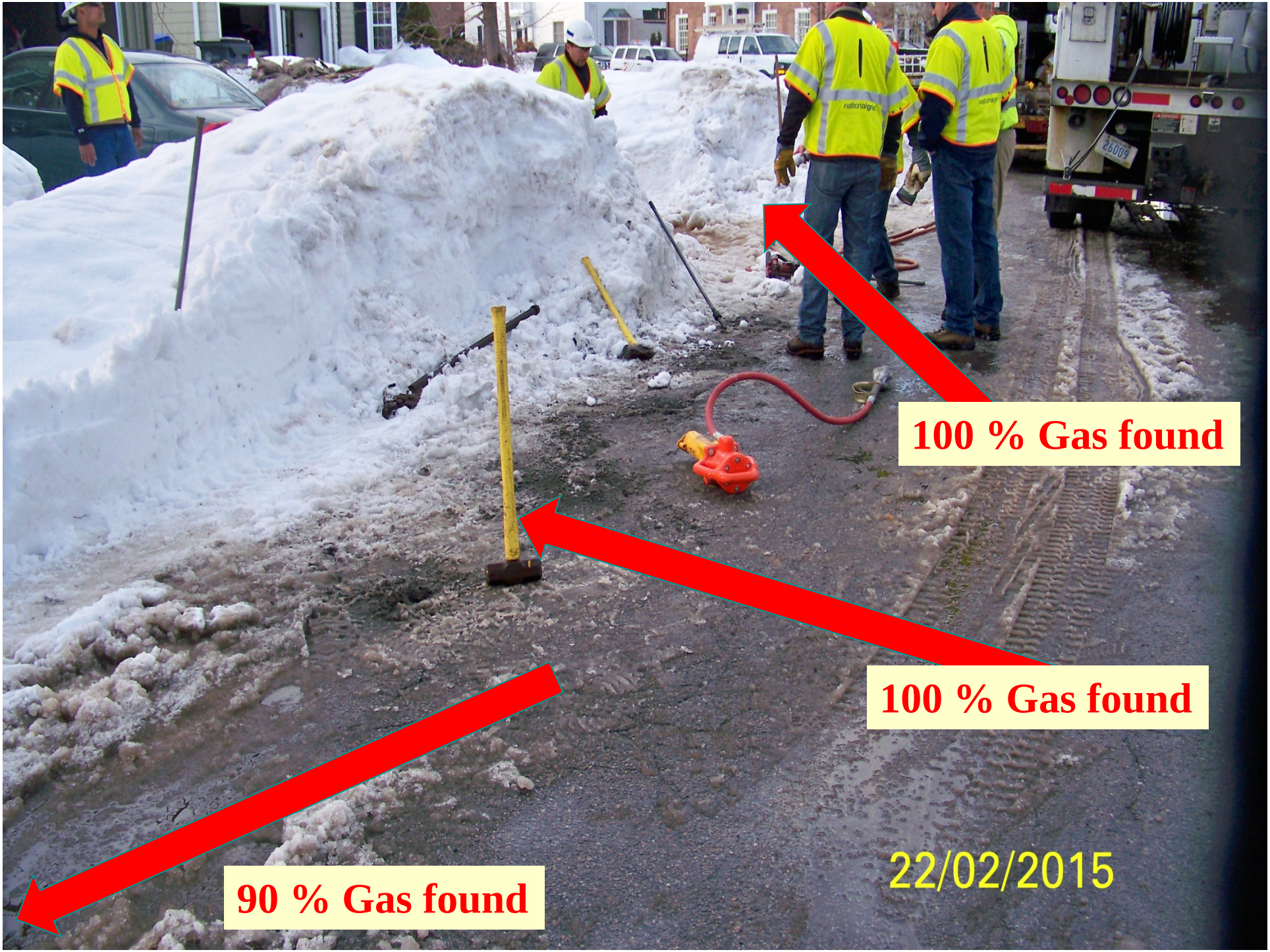


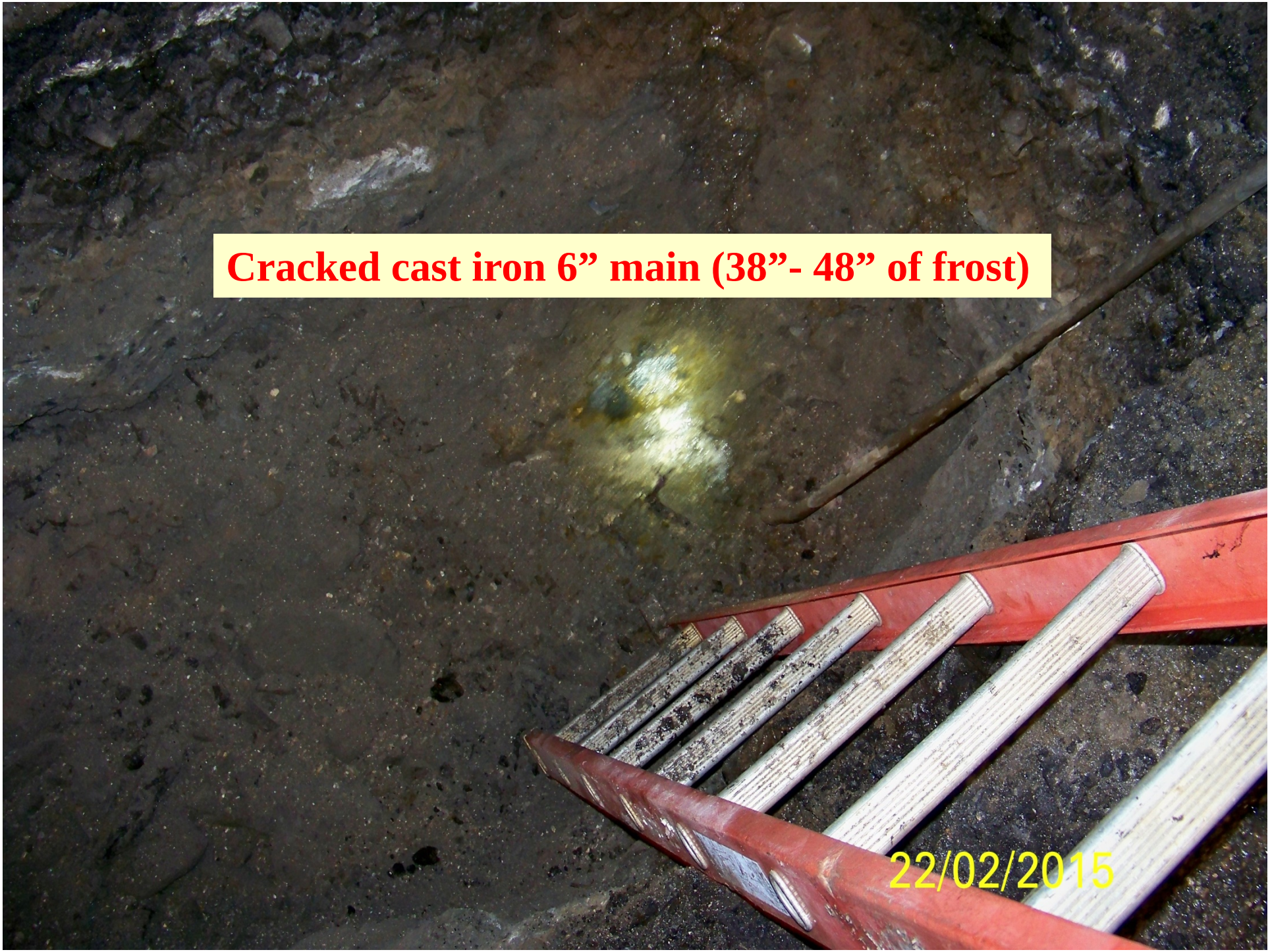
Why did he not smell gas?

78 % Gas found
22/02/2015
GAS-EXPLORER

78 % Gas found
22/02/2015

8 % Gas found
22/02/2015


100 % Gas found
100 % Gas found
90 % Gas found
22/02/2015


Cracked cast iron 6” main (38”- 48” of frost)
22/02/2015

An Important Safety Bulletin from the Northeast Gas Association with regard to Natural Gas Odorant

The purpose of this notice is to provide customers and natural gas piping, appliance and equipment contractors with additional safety information on natural gas odorant and the potential for odor fade. Northeast Gas Association members that are gas suppliers, transmission and local distribution pipeline operators adhere to the United States Department of Transportation (DOT) and their respective state regulators' rules and regulations regarding the odorizing of natural gas. Even though a distinctive odor is added to natural gas to assist in the detection of leaks, you should not rely solely on your sense of smell to determine if a gas leak exists or if natural gas is present. Some persons may not be able to detect the odorant because they have a diminished sense of smell, experience olfactory fatigue, or the odor is being masked by other odors in the area. In addition, certain conditions such as **odor fade** may cause the odorant to diminish so that it is not detectable.

Odor fade (loss of odorant) occurs when the level of odorant in the gas is reduced due to physical and / or chemical processes including adsorption, absorption and oxidation. In gas piping systems, odor fade occurs dominantly in installations of new pipe rather than in existing pipe. It is more prone to occur in new steel pipe of larger diameters and longer lengths. However, it can also occur in plastic pipe and in smaller and shorter pipe installations. New pipe installations or additions of new pipe segments may require the conditioning of the pipe before it is placed into service to prevent occurrence of odor fade. If a natural gas leak occurs underground, the surrounding soil may cause odor fade. Other factors that may cause odor fade include: conditions related to the construction and configuration of customer's facilities; the presence of rust, moisture, liquids or other substances in the pipe; and gas composition, pressure and/or flow. Intermittent, little or no gas flow over an extended period of time may also result in the loss of odorant until gas flow increases or becomes more frequent. Many appliance manufacturers include in their installation manuals information on the potential for odorant fade.

Customers and contractors are warned to take heed of the following recommendations:

Do not purge the contents of a gas line into a confined space. Purging of a gas line should only be done by a licensed, qualified professional and should be done in a well-ventilated area or by venting the contents to the outside atmosphere. Always use gas detection equipment during purging operations or when otherwise working on gas piping systems to ensure that no natural gas is present that may result in a combustible or hazardous atmosphere.

Do not rely on your sense of smell alone to detect the presence of natural gas. Consult your local plumbing code, mechanical code, fuel gas code and/or your department of building and safety for more information. When installing gas appliances or equipment, the manufacturer's instruction manual should be followed in accordance with the local code authority.

For additional information on natural gas safety, please visit our website: www.northeastgas.org

NGA

Strike 2
Cast iron low pressure no flow dead end main

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For additional information on natural gas safety, please visit our website: www.northeastgas.org

NGA

Strike 3
Brand new low pressure plastic gas main recently installed

P.S.

Do you have a new plastic pipe main written (pickle) procedure?

Might want to write one.

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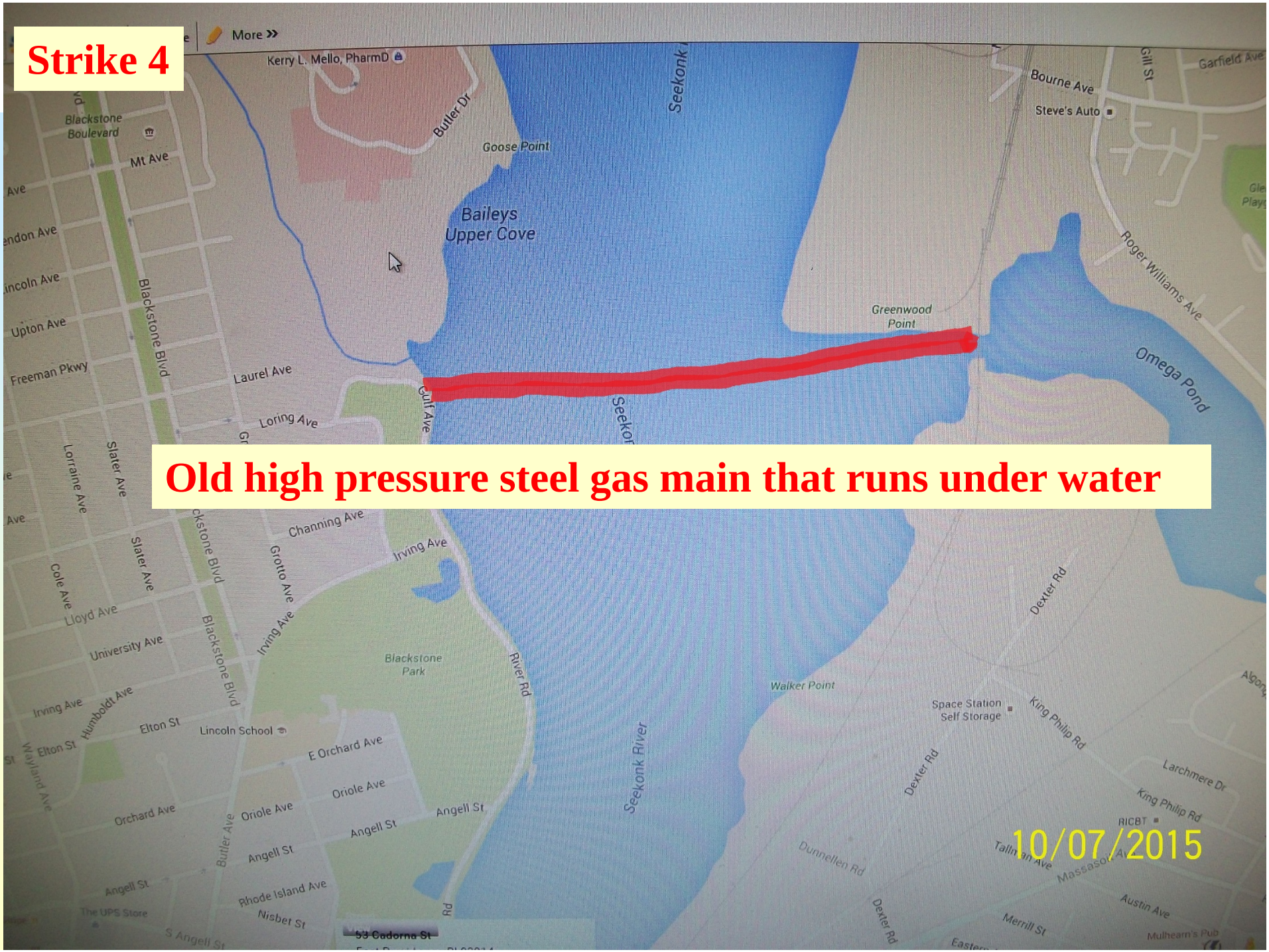
NGA

Strike 4



Old high pressure steel gas main that runs under water

An Important Safety Bulletin from the Northeast Gas Association with regard to Natural Gas Odorant

The purpose of this notice is to provide customers and natural gas piping, appliance and equipment contractors with additional safety information on natural gas odorant and the potential for odor fade. Northeast Gas Association members that are gas suppliers, transmission and local distribution pipeline operators adhere to the United States Department of Transportation (DOT) and their respective state regulators' rules and regulations regarding the odorizing of natural gas. Even though a distinctive odor is added to natural gas to assist in the detection of leaks, you should not rely solely on your sense of smell to determine if a gas leak exists or if natural gas is present. Some persons may not be able to detect the odorant because they have a diminished sense of smell, experience olfactory fatigue, or the odor is being masked by other odors in the area. In addition, certain conditions such as **odor fade** may cause the odorant to diminish so that it is not detectable.

Odor fade (loss of odorant) occurs when the level of odorant in the gas is reduced due to physical and / or chemical processes including adsorption, absorption and oxidation. In gas piping systems, odor fade occurs predominantly in installations of new pipe rather than in existing pipe. It is more pronounced in new steel pipe of larger diameters and longer lengths. However, it can also occur in plastic pipe and smaller and/or shorter pipe installations. New pipe installations or additions of new piping systems may require the conditioning of the pipe before it is placed into service to prevent occurrence of odor fade. If a natural gas leak occurs underground, the surrounding soil may cause odor fade. Other factors that may cause odor fade include: conditions related to the construction and configuration of the customer's gas facilities; the presence of rust, moisture, liquids or other substances in the pipe; and gas composition, pressure and/or flow. Intermittent, little or no gas flow over an extended period of time may also result in the loss of odorant until gas flow increases or becomes more frequent. Many appliance manufacturers include in their installation manuals information on the potential for odorant fade.

Customers and contractors are warned to take heed of the following recommendations:
Do not purge the contents of a gas line into a confined space. Purging of a gas line should only be done by a licensed, qualified professional and should be done in a well-ventilated area or by venting the contents to the outside atmosphere. Always use gas detection equipment during purging operations or when otherwise working on gas piping systems to ensure that no natural gas is present that may result in a combustible or hazardous atmosphere.

Do not rely on your sense of smell alone to detect the presence of natural gas. Consult your local plumbing code, mechanical code, fuel gas code and/or your department of building and safety for more information. When installing gas appliances or equipment, the manufacturer's instruction manual should be followed in accordance with the local code authority.

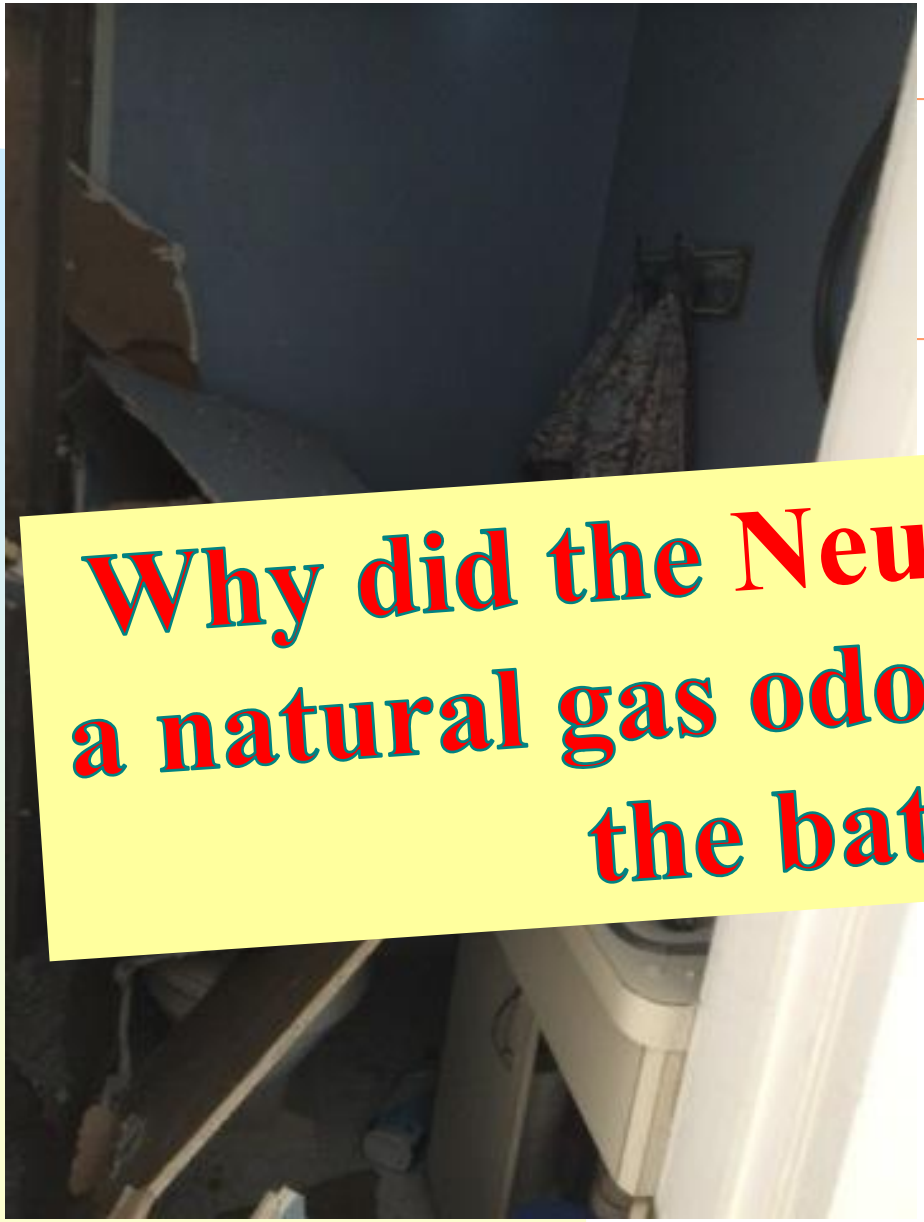
For additional information on natural gas safety, please visit our website: www.northeastgas.org

NGA

Strike 5

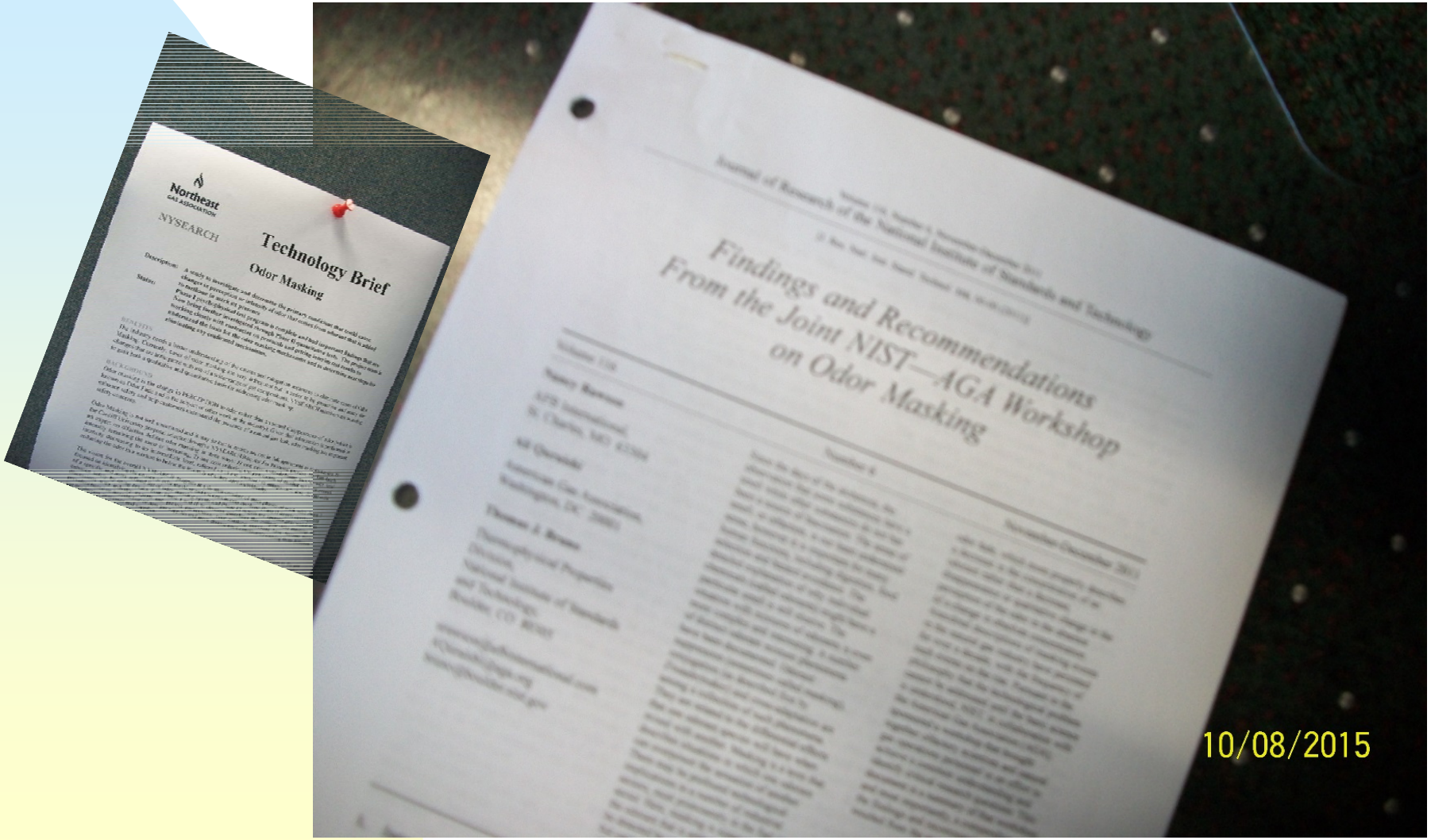
No odorant test stations in Providence!

GEORGE
CLOONEY
MARK
WAHLBERG
THE
PERFECT STORM
OWN IT ON VIDEOCASSETTE &



Why did the Neurologist not smell a natural gas odor when he entered the bathroom?

Odor Masking (Odor vs Odor)

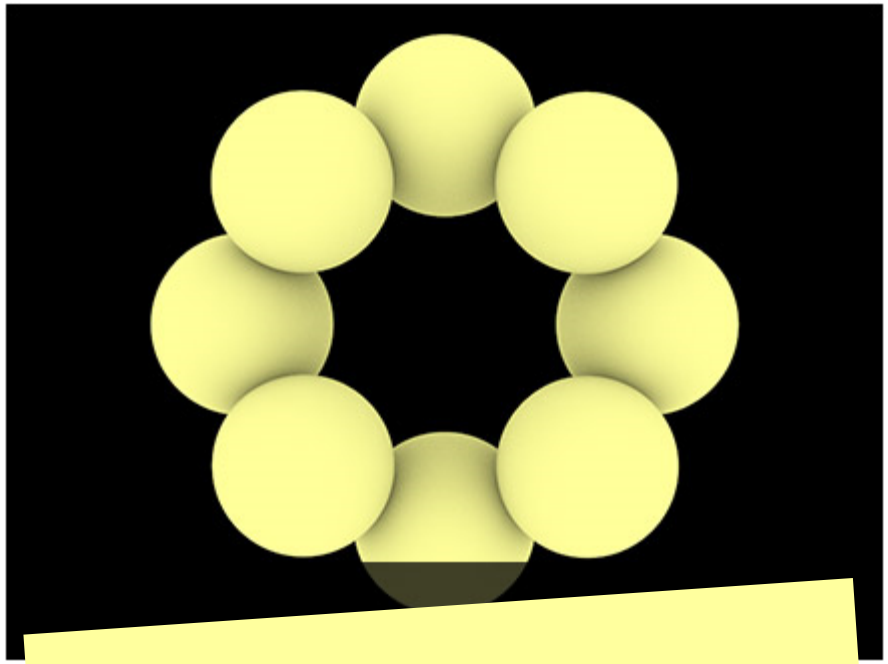


Dr. Tim Jacob: Olfaction expert (sense of smell)

Defines Odor masking as;

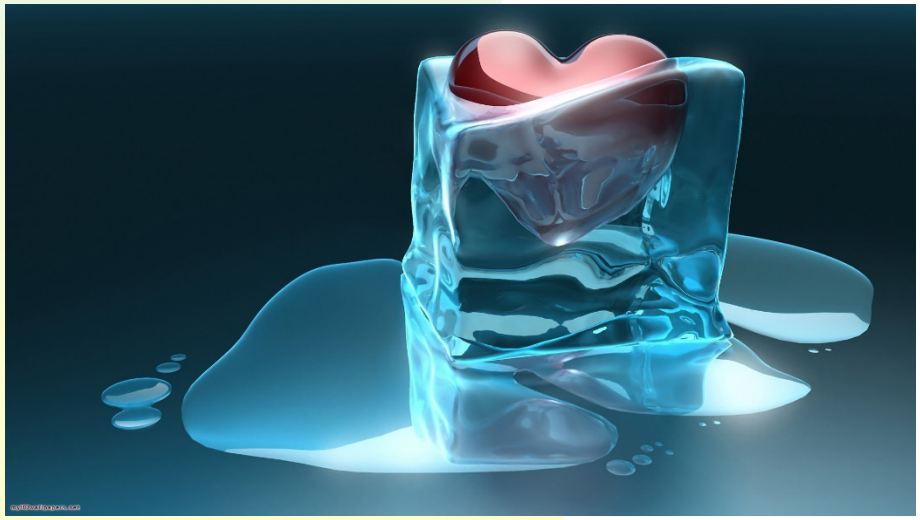
1) One odor overwhelms the other…

2.) One odor reduces the perception of the other…



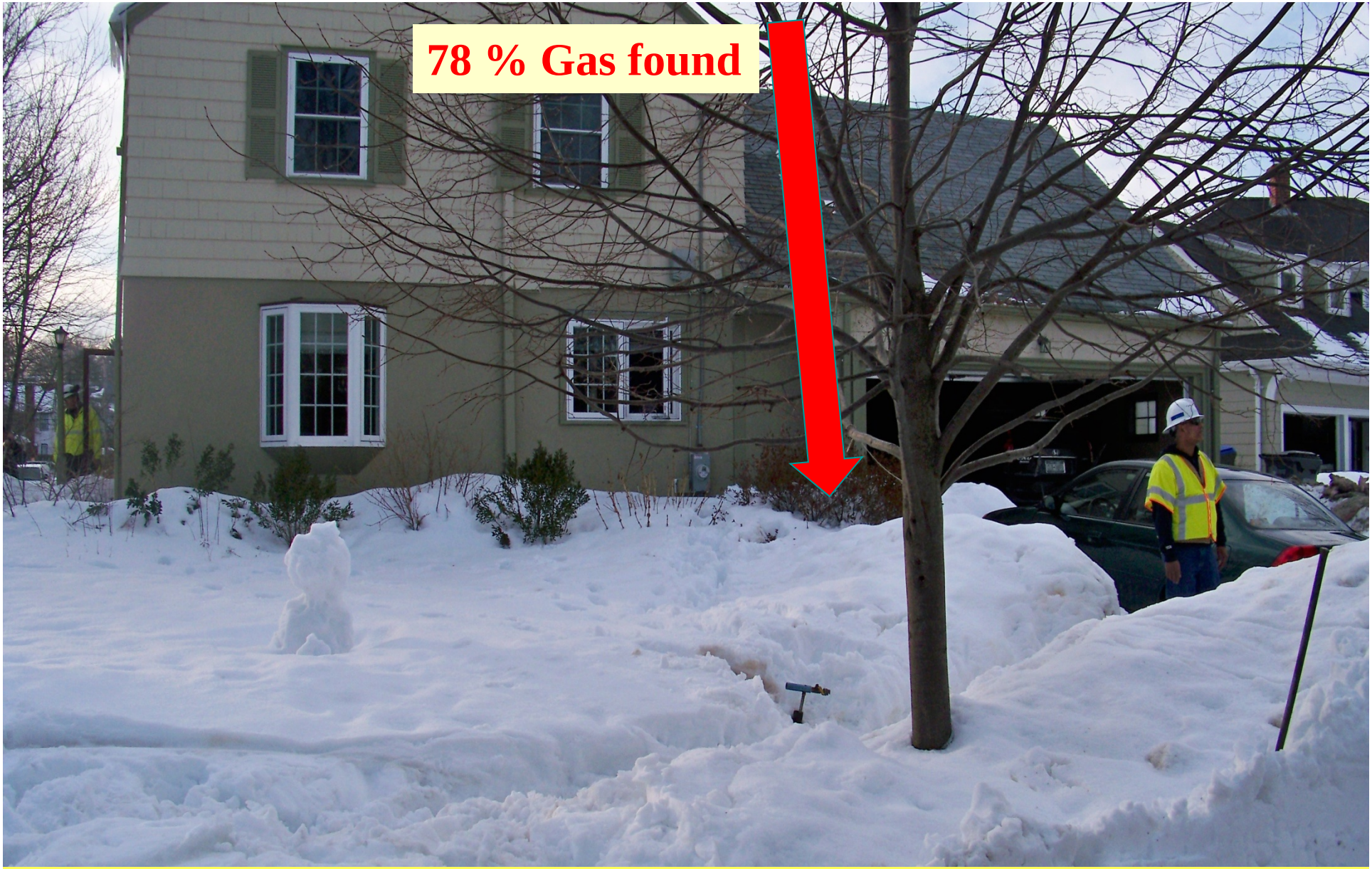
Chemical reaction

3) One odor reduces the odor in a mixture to below the intensity of either odor individually.



So, in conclusion (odor masking)

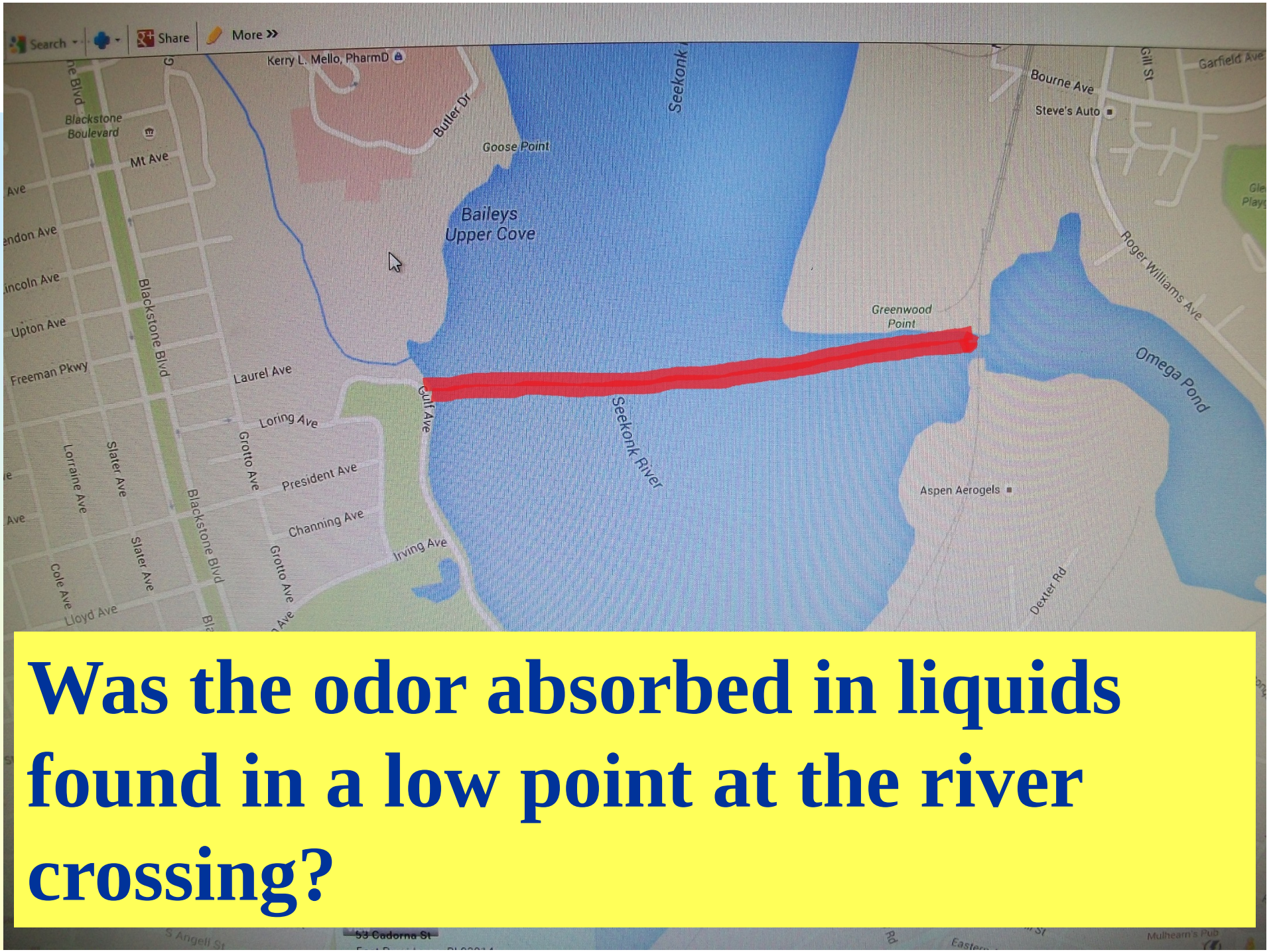
VS



Was the odor stripped out in the soil)

Was there odor fade in the low flow dead end cast iron main?

Was the odor absorbed in the new plastic gas main?



Was the odor absorbed in liquids found in a low point at the river crossing?

Add odorant test points in Providence and Pawtucket.

Add 4 more odorant test points to account for dead end systems.

Conduct a statewide odorant study (Round 1 is completed results were ok, will now test under different flow rates)

Test all take stations from transmission lines.

Time’s Up…

The End