STANDARD OPERATING PROCEDURES

130.00 GAS DETECTION EQUIPMENT, RESPONSE TO NATURAL GAS LEAKS AND CARBON MONOXIDE ALARMS

DALLAS FIRE-RESCUE

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130.0 GAS DETECTION EQUIPMENT

A. General

1. Air monitoring is performed for different reasons. The purpose of monitoring will vary with the situation as well as the actual, potential, or anticipated hazards. The basic impetus remains the same: to provide information regarding the type and relative quantity of hazards present.
2. The Dallas Fire-Rescue Department purchases detectors that monitor and detect several different types of vapors or gases.
    a. In many instances the gas detectors have combustible gas indicator (CGI) capabilities. These instruments, in addition to detecting specific gases, will measure the percentage of the Lower Explosive Limit (LEL) of a vapor or gas in air or parts-per-million (ppm) per percentage of air.
    b. Most of the instruments, especially those available to personnel other than the Hazardous Materials Response Team (HMRT), are portable, have a replaceable battery supply, and are safe to operate in hazardous atmospheres (intrinsically safe). These gas detectors are very reliable and have fast response times toward contaminants for which they were designed.

B. Gas Detectors

1. Other than the HMRT, the Department utilizes four types of detectors; a one (1) gas, a two (2) gas, a four (4) gas, and a four (4) gas with a Photo Ionization Detector (PID) detector.
2. Description of gas detector monitoring capabilities:
    a. One (1) Gas Detector:
        1) Measures carbon monoxide in parts per million (ppm).
        2) Measures specified gases and vapors in parts per million (ppm).
        3) Utilizes one (1) 3 volt 2/3 A lithium battery.
        4) Return to the HazMat Coordinator (810) for battery replacements or annual calibration.

b. Two (2) Gas Detector:
   1) Measures carbon monoxide in ppm.
   2) Measures methane in ppm.
   3) Measures % of Lower Explosive Limit (LEL).
   4) Utilizes (2) replaceable AA alkaline batteries.
   5) Batteries can be replaced by station personnel, but for all other maintenance, the unit should be sent to Hazmat Coordinator (810) or Asst. Hazmat Coordinator (835) for calibration or repairs.

c. Four (4) Gas Detector:
   1) Measures Carbon Monoxide in ppm.
   2) Measures Hydrogen Sulfide in ppm.
   3) Measures % of Lower Explosive Limit (LEL).
   4) Measures % Volume of Oxygen in the atmosphere.
   5) Utilizes Nickel-Metal Hydride (NiMH), Lithium Ion (Li-Ion), or four (4) replaceable AA alkaline batteries.

d. Four (4) Gas with PID Detector:
   1) Measures Carbon Monoxide in ppm.
   2) Measures Hydrogen Sulfide in ppm.
   3) Measures % of Lower Explosive Limit (LEL).
   4) Measures % Volume of Oxygen in the atmosphere.
   5) Senses Volatile Organic Compounds (VOCs).
   6) Utilizes Nickel-Metal Hydride (NiMH), Lithium Ion (Li-Ion), or four (4) replaceable AA alkaline batteries.

3. The Hazardous Materials Response Team, in addition to the gas detectors listed above, has specialized monitoring devices and equipment that utilize catalytic sensors, solid state sensors, photo-ionization, flame-ionization, infrared, photo-acoustic spectroscopy and RAMAN laser technology.

C. Gas Detector Locations

1. Emergency Operations Division
   a. Engines
   b. Trucks
   c. Battalion Chiefs

d. Inspection &Life Safety Education Division

e. Arson Investigation Division

f. Special Operations Division

g. Urban Search &Rescue (Technical Rescue)

h. HazMat Response Team, station # 3

i. HazMat Coordinator (810)

D. Calibration

1. Each detector will be turned on to check operational readiness and calibration on the first work day of each month. If any detector is found to be out of calibration, it shall be sent to the Hazmat Coordinator (810) through interdepartmental mail.
2. The HazMat Coordinator (810) will be responsible for maintaining a monitor calibration database to verify any detector's calibration dates.

E. Repair

1. Gas detectors which require maintenance will be sent to Hazmat Coordinator (810). A memo will be attached to the detector describing the problem or issue.
2. The HazMat Coordinator (810) will be responsible for ensuring detectors are repaired in as timely a manner as possible.
3. Loaner / Replacement - The HazMat Coordinator (810) will maintain an inventory of loaners and/or replacement detectors.

F. Response to Natural Gas Leaks

1. General
   a. Natural gas is an odorless, tasteless, and colorless gas, mainly composed of Methane. The utility companies add a non-toxic chemical odorant called Mercaptan to the gas to allow for quick detection of gas leaking into the atmosphere.
   b. As natural gas escapes into the atmosphere, it dissipates rapidly, as it is lighter than air. Heavier than air gasses, such as propane or gasoline fumes, would settle and accumulate near the ground.

c. Natural gas has a narrow combustible range. It will only ignite when there is an air-to-gas mixture of between 5 and 15 percent. Any mixture containing less than 5 percent or greater than 15 percent natural gas will not ignite.

2. Policy

Dallas Fire-Rescue will respond to and monitor all incidents that involve, and are suspected of involving natural gas and, if possible, identify the source of leak.

a. The Airspace Model AI-1201, 2-gas monitor, will be carried on all Engine companies and will be utilized to monitor the atmosphere.
    1) The Airspace Model AI-1201, 2-gas monitor, measures the parts per million (ppm) of Carbon Monoxide (CO) and Methane (CH4).
    2) When monitoring the atmosphere for natural gas, if the Airspace monitor reads 5000 ppm, it will go into full alarm.

b. Full turnout gear, including SCBA, shall be worn when investigating a suspected natural gas leak.
    1) The decision to downgrade PPE will be at the discretion of the Incident Commander (IC) after atmospheric monitoring has been performed.

c. Officers on scene should consider calling Station 3, Hazmat Coordinator (810), or Asst. Hazmat Coordinator (835) if unsure of what assets are needed on scene. If their capabilities are not sufficient to mitigate the hazard, they should consider requesting a Hazmat response.

3. Dispatch Procedures for gas leaks and On Scene Operational Procedures

a. The dispatcher, upon receiving a call for a suspected natural gas leak, will attempt to determine from the caller if the leak is outside or inside a structure. If the leak is outside, and is not a cut gas line greater than 1 ½", the dispatcher will:
    1) Dispatch the nearest engine company to investigate the leak, utilizing the Airspace Model AI-1201 2-gas monitor.
        i. If the readings on the monitor reach 5000 ppm, or 10% of the LEL, the monitor will go into full alarm.
        ii. If the monitor goes into full alarm, the company officer will request a Hazmat Response to the location.
    2) Request the gas company to respond to the scene.
    3) If the engine company dispatched to the call does not have a working 2 gas monitor, it is the company officer's responsibility to inform Fire

Dispatch of that fact. The fire company will continue on to the location and Fire Dispatch will dispatch the nearest engine company that does have a working 2 gas monitor.

b. If the gas leak is outside and the source is a cut gas line greater than 1 ½" in diameter, the dispatcher will:
    1) Dispatch the nearest engine company to respond to the scene to begin monitoring the scene for levels of natural gas.
    2) Dispatch Hazmat to the scene.
    3) Notify the gas company and request they respond to the scene.
    4) Upon arrival of the engine company, they will:
        i. Monitor the air for natural gas levels utilizing the Airspace AI-1201 2-gas monitor.
        ii. Deploy a charged hose line.
c. If the gas leak is inside of a structure, and it is not a high occupancy structure (e.g., hospital, school, business complex, high rise, or nursing home), the dispatcher will:
    1) Dispatch the nearest engine company to investigate the leak utilizing the Airspace AI-1201 2-gas monitor.
    2) If the Airspace 2-gas monitor reaches 5000 ppm, which is 10% of the lower explosive limit (LEL), they will:
        i. Evacuate the structure.
        ii. Shut off the gas at the meter.
        iii. Open doors and windows to ventilate the structure.
        iv. Wait a few minutes and re-check the air quality.
    3) If needed, request the gas company to respond.
d. If the leak is inside a high occupancy structure, the Dispatcher will:
    1) Dispatch the nearest engine company to investigate the leak.
    2) Dispatch Hazmat to provide air monitoring and assist in locating the source of the leak.
    3) If the Airspace 2-gas monitor reaches 5000 ppm, which is 10% of the lower explosive limit (LEL):
        i. Evacuate the structure.
        ii. Shut off the gas at the meter.
        iii. Open doors and windows to ventilate the structure.

iv. Wait a few minutes and re-check the air quality.

4) If needed, request the gas company to respond.

G. Response to Carbon Monoxide Alarms

1. General

a. CO is a naturally occurring by product of burning gasoline, diesel, natural gas, wood, charcoal, and other fuels. It is an odorless, tasteless, and colorless gas. CO is lethal in high doses over a short period of time or in small doses over a long period of time. CO poisoning can result from an inefficient or malfunctioning furnace, space heater, or other fuel-burning appliance or from other forms of incomplete combustion such as fireplaces or charcoal grills. It is absorbed by the blood over a period of time causing a range of side effects. Initial signs or symptoms of CO poisoning may include: dizziness, nausea, irregular breathing, headaches, fatigue, confusion and disorientation.

b. The types and severity of symptoms will vary due to the level of exposure, length of exposure and the physical condition of the individuals exposed. Persons that are at a high risk due to CO poisoning include: unborn babies and infants, persons with heart/lung disease, and senior citizens.

c. The following chart lists the acute effects produced by carbon monoxide in relation to ambient concentration in parts per million.