

General Operational Guideline

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| Subject: RESPONSE TO NATURAL GAS EMERGENCIES | Effective Date: 3/1/14 | GOG 10-37 |
| Applies to: ALL PERSONNEL | Supersedes: NEW | Pg 1 of 2 |
| Responsible Committee: Operations Committee | New Review Date: | |

PURPOSE:

The purpose of this GOG is to establish guidelines for responding to and mitigating a variety of natural gas emergency situations.

SCOPE:

Applies to all KCFD personnel

GUIDELINES:

Properties of Natural Gas- Natural Gas (NG) are colorless and odorless in its natural state however mercaptan is added to give NG a "rotten egg" odor. NG is lighter than air and will usually dissipate in outside environments. Inside of buildings and confined spaces, however, NG will tend to accumulate. The explosive range of NG is approximately 4% to 15% *by volume in air*, 4% *by volume in air* being the LEL (lower explosive limit) and 15% *by volume in air* being the UEL (upper explosive limit). Concentrations that are higher than 15% (UEL) are too rich to ignite and will not explode. NG is non-toxic and is not an asphyxiate unless it is in confined space and displaces oxygen.

KCFD 4-Gas Monitor or Combustible Gas Indicator (CGI)- KCFD CGIs measure concentrations of NG in a range at or below the LEL and are calibrated to read NG concentrations as a percentage of the LEL. For example, if the CGI is reading 100%, the atmosphere **WILL** ignite or explode if given an ignition source. If the CGI is reading 50% of the LEL, the concentration of NG is at 50% of what is necessary for the atmosphere to ignite or explode if given an ignition source. KCFD CGIs are programmed to alarm at 10% of the LEL, which indicates that the concentration of NG is at 10% of what is needed for the atmosphere to ignite or explode if given an ignition source. 10% of the LEL is the **Action Level** for KCFD, i.e. evacuation, deny entry, and mitigation.

It should be noted that while KCFD CGIs measure NG concentrations up to and including LEL, the gas utility measures NG concentrations as a *% by volume in air*, This allows the gas utility to determine NG concentration in the *explosive range* and also above the UEL as a *% volume in air*.

Comparing KCFD monitor readings
with gas utility monitor readings

| KCFD in % LEL | Gas Co in % <i>volume in air</i> |
|--------------------|----------------------------------|
| 10% of the LEL | 4% by volume in air |
| 50% of the LEL | 2% by volume in air |
| 75% of the LEL | 3% by volume in air |
| 100% of the LEL | 4% by volume in air |
| 100 % of the LEL * | above 4% by volume in air* |

*Any Gas Company reading above 4% *by volume in air* will continue to read as 100% of the LEL on a KCFD CGI

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INCIDENTS INVOLVING A GAS LEAK OUTSIDE – NO FIRE OR EXPLOSION HAS OCCURRED

- Ensure that the gas utility has been notified if you suspect gas is escaping from the ground, excavation site, or broken gas line.
- Extinguish all open flames, remove any possible ignition sources, and restrict the use of electronic devices while in the vicinity of the leak.
- The area surrounding the incident should be evacuated and an isolation perimeter established.
- Obtain a sufficient number of gas concentration readings with a combustible gas indicator (CGI) for Command to evaluate the hazard and take appropriate action.
- Secure a water source, and layout charged 1 ¾ hose line with two personnel in full PPE and SCBA.
- Surrounding buildings, basements in particular should be checked with a combustible gas indicator (CGI) for the presence of NG.
- If a gas leak is suspected to have been caused by horizontal drilling equipment and the leak is not being vented to open air, particular attention should be given to the possible migration of NG underground into sewers and basements.
- Again, basements in the area should be checked with a CGI to determine if NG is present. If NG is present, follow the guidelines for *INCIDENTS INVOLVING A GAS LEAK INSIDE OF A BUILDING*. Under no circumstances should Fire Department personnel operate underground valves in an attempt to shut off the flow of NG. It could make the situation worse. Operating underground valves should only be performed by gas company personnel. It is the responsibility of the gas utility to locate and eliminate the source of the leak. Incident Command shall have effective communication with the gas utility to stay informed of any safety issues. Fire Department personnel in coordination with the gas utility will provide for life safety until the emergency situation is mitigated.

INCIDENTS INVOLVING A GAS LEAK INSIDE OF A BUILDING

- If a gas leak is suspected inside of building, a CGI must be utilized with full PPE and SCBA. The instrument should be turned on and readings taken as you approach the structure.
- Shut the gas off at the meter if NG is detected. Remember, this may not stop the flow of NG into the building if the gas is actually migrating underground from another source.
- Evacuate occupants if the action level of 10% LEL or above of NG is detected. Ventilate the building by opening doors and windows. Eliminate all possible ignition sources.
- Do not turn on or off electrical switches or operate doorbells inside the structure. Electrical power should be shut off from outside of the building if explosive concentrations are present.
- Flashlights should be turned on before entering the building.
- Rubber soled boots should be worn when entering the building, as walking across carpet could result in a static electric charge.
- Continue to monitor with CGI until the leak is mitigated and the presence of NG has returned to safe levels.
- Never turn on a valve that was previously shut off. Only gas company personnel should turn on NG valves.

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DON'T RELY ON YOUR SENSE OF SMELL. USE A CGI (COMBUSTIBLE GAS INDICATOR)
The odorant (mercaptan) can be removed from the NG if it is migrating through soil. Also, If NG is flowing through "new" pipe, the pipe will absorb the mercaptan and remove the odor from the NG until the point when the walls of the pipe become saturated.

INCIDENTS INVOLVING LEAKING GAS AND IS BURNING

Whether it is outside or inside of a building, **don't** attempt to extinguish the flames. Extinguishing the flames turns a danger you see into a danger you cannot see. Burning gas will not explode. Spray surrounding combustibles with water to prevent ignition or control the spread of fire until the gas can be shut off. Clear the area if a pipeline is burning and don't assume that all of the gas is being consumed by the fire. Nearby basements and sewers should be checked with a CGI to ensure that NG is not migrating under ground.