



Standard Operating Guideline	
SOG Name:	Air Monitoring at Structure Fires
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Standard:	TBD
Guideline Owner:	Emergency Operations - Safety
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PURPOSE: The byproducts of combustion create an atmosphere that is an immediate danger to life and health (IDLH). Hydrogen Cyanide (HCN) and Carbon Monoxide (CO) are two gases, when exposed, pose immediate and long term health effects. Air monitoring is used to confirm the absence of toxic by-products, rendering a space atmospherically safe (no IDLH). This document provides guidance for the use of air monitors for clearance of an IDLH atmosphere.

A. SAFETY

SECTION 1

Safety of responders is our first priority; therefore, self-contained breathing apparatus (SCBA) must be worn until the atmosphere has been deemed safe by air monitors.

SECTION 2

HCN exposure may be difficult to determine. Its symptoms are similar to that of CO exposure, which may include headache, nausea, fatigue, dizzy spells at low levels, respiratory problems, unconsciousness, and cardiac arrest for high levels. If exposure is suspected, transport to a health care facility should not be delayed.

B. PERSONAL PROTECTIVE EQUIPMENT

SECTION 1

SCBA is the best preventive measure for smoke exposure, as inhalation is the primary route of entry. SCBA is required on all structure fires, vehicle fires, and large trash receptacle fires until all fire is extinguished, smoke has dissipated, or monitoring has taken place.

SECTION 2

Turnout gear helps protect personnel from absorbing smoke through the skin, including HCN and CO, which is a secondary route of exposure. Members are to wash turnout gear following structure fires that heavily soil and saturate gear with products of combustion.

C. MONITORING

SECTION 1

All structure fires are to be monitored by HCN and CO monitors. Designated monitors are on Truck 1, Truck 3, and Rehab. The monitors will undergo calibration by station 2 personnel in accordance to factory recommendations. SCBAs are not to be removed until the atmosphere can be monitored and deemed safe. Follow monitoring steps as outlined in Addendum 1 of this SOG.

SECTION 2

Other times an air monitor must be used are vehicle fires within a structure or parking garage, whenever deemed necessary by the incident commander or safety officer, and in adjacent apartments or structures where smoke is reported.

D. ACTION LEVELS**SECTION 1**

HCN – Action level is below **4.5ppm** (4.7ppm) to operate without SCBA

- Short Term Exposure Limit (STEL) is a 15-minute Time Weighted Average (TWA) exposure that should not be exceeded at any time during a workday
- IDLH is 50ppm

SECTION 2

CO – Action level is below **35ppm** to operate without SCBA

SECTION 3

Both HCN and CO action levels must be met to operate without SCBA

E. DECONTAMINATION**SECTION 1**

All members are encouraged to wash their hands prior to eating or drinking while on the scene of a fire. Disposable wet wipes are provided and available on the rehab unit.

SECTION 2

All interior crews should use PPV and soft bristle brush to gross decontaminate their turnout gear after all working fires. If a fan is unavailable, briefly rinse with a soft fog pattern to prevent saturation. All members operating inside the structure should be decontaminated.

SECTION 3

Gear should be washed as soon as possible after a working fire. This includes turnout gear, flash hood, and helmet ear flaps. An extractor washer should be used for this process. Gloves should be washed by hand in a sink or by hose.

F. REPORTING**SECTION 1**

The assigned Safety Officer is responsible for documenting any significant exposures during a structure fire. The following information will be supplied in the narrative:

1. The HCN and CO levels during the time of operation
2. Areas monitored with corresponding reading
3. How long members operated in the atmosphere
4. The member operating in the hazardous atmosphere

5. Specifics concerning the call, i.e. major materials that burned or were greatly heated

SECTION 2

Any time members are operating outside the safe range without SCBA, a notation is to be made in Firehouse under the Fire Personnel Casualty section.

G. HCN EXPOSURE**SECTION 1**

Indicators that a member has been exposed to HCN:

- Exposure to fire or smoke in an enclosed area
- Soot found around the mouth and nose
- Altered mental status

SECTION 2

Acute exposure symptoms:

- Weakness
- Headache
- Confusion
- Vertigo
- Fatigue
- Anxiety
- Dyspnea
- Nausea and Vomiting

SECTION 3

All members found to have been operating in an IDLH atmosphere or experiencing severe health effects are to be transported to emergency department. The safety officer reporting to the emergency department must ensure the receiving physician is aware the patient has been operating in an atmosphere containing HCN. Request immediate medical attention to include HCN testing.

(Signature On File)

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Fire Chief

DOTHAN FIRE DEPARTMENT

Addendum 1 ToxiRAE Pro Hydrogen Cyanide (HCN) Monitor Instructions

Following steps should be followed to ensure proper operation and quality systematic monitoring at a structure fire incident when monitoring for HCN.

- 1) Monitor must be fresh air calibrated prior to use
- 2) Turning ToxiRAE Pro on
 - a. Press and hold the Mode Key [(I)] for 3 seconds
 - b. During start up, the battery, buzzer, vibration alarm & LEDs are tested
 - c. Process takes approximately 2 minutes (includes “zeroing”)
 - d. When main measurement screen appears, ToxiRAE is ready to use
- 3) During the start up several screens will appear that include:
 - a. Self-Test; Sensor; Date, time & temp; Last calibration; Cal interval& days remaining; User mode; Battery info; Alarm mode; Alarm setting; Datalog; Warming up before getting to fresh air calibration (“Apply zero gas...”)
 - b. If battery power is low the following will be displayed:
“Battery too low! Needs charging. Powering off!”
- 4) Apply zero gas: Click the [Y/+] Key Will zero the detector in 60 seconds
- 5) Ready to monitor for HCN
- 6) To light the screen, press the [Y/+] button
- 7) HCN Monitoring steps
 - a. Structure is ventilated through positive pressure, smoke ejectors, hydraulic ventilation, natural or combination there of
 - b. Structure must be monitored for Carbon Dioxide (CO) with the Q-RAE first
 - i. High levels of CO can produce a high false alarm for HCN
 - ii. High levels of Hydrogen Sulfide (HS2) may also produce high false alarms
 - c. Fresh Air Calibrate the ToxiRAE Pro
 - i. Stay away from Engine exhaust and smoldering structures/materials
 - d. Ensure positive pressure fans are turned off prior to begin monitoring.
 - e. Begin monitoring from the entry point
 - i. The ToxiRAE Pro does NOT have a pump, monitoring of an area will take 4-5 minutes before an accurate measurement will be obtained
 - f. Monitor towards the room(s) of origin of the fire
 - g. Monitor rooms that have fire damage
 - h. Monitor other areas of the building
 - i. The monitor will alarm at **4.5 ppm (low) to 25 ppm (high)**
 - ii. In case of an alarm, notify Command the results and exit the structure and reinitiate ventilation
 - iii. Bring unit out to fresh air, you should not have to turn off the monitor
 - i. Once structure has been re-ventilated for a period of time, then begin monitor process starting with step b.
 - j. To shut off the monitor, hold the Mode Key [(I)] until the unit shuts down.

NOTE: Do NOT use the monitor to “test” for HCN in small containers (i.e. trash cans, etc). This will saturate the sensor and it will need to be replaced. It is designed for monitoring areas not testing containers.