

Guilford Fire Department
Standard Operating Guideline

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Title: Hydrogen Cyanide Monitoring

<u>Approved By:</u>	<u>Replacing:</u> All Previous	<u>Number of Pages:</u>
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Purpose:

To establish a guideline for monitoring the atmosphere for hydrogen cyanide at structure fires.

Scope:

This guideline applies to all suppression personnel.

Procedure:

Hydrogen cyanide (HCN) is a deadly gas and bi-product of combustion present at nearly every structure fire. It is produced when materials such as insulation or synthetic materials are burned or heated. HCN has been known to be a product of combustion, but just recently has its significance been acknowledged. The symptoms closely mirror those of carbon monoxide exposure; therefore personnel must be aware of its presence.

Vehicle fires also generate a high level of HCN, but because they normally occur in an open environment the products of combustion dissipate quickly into the atmosphere. However, when smoke is present the need for SCBA is vital for responder protection.

I. Safety

- A. Safety of responders is the first priority, therefore SCBA are required until a safe atmosphere can be determined.
- B. Hydrogen cyanide exposure may be difficult to determine. Its symptoms are similar to that of carbon monoxide exposure, which may include headache, nausea, fatigue and dizzy spells at low levels and respiratory problems, unconsciousness, and cardiac arrest for high levels.
- C. Hydrogen cyanide is a combustible gas and should be treated with caution.

II. Properties

- A. NIOSH describes the appearance and odor of HCN as a colorless gas or bluish-white liquid with a bitter almond odor. An air odor threshold concentration for hydrogen cyanide of 0.58 ppm has been reported.
- B. The most common environment likely to possess HCN is a structure fire. Therefore the common appearance and odors associated with hydrogen cyanide will be severely masked in the smoke.
- C. HCN is lighter than air and will rise in the heated atmosphere of a structure fire. In an enclosed environment without ventilation vapors will linger.

III. Personal Protective Equipment

A. Self-Contained Breathing Apparatus (SCBA)

1. SCBA is the best preventive measure for HCN exposure, as inhalation is the primary route of entry for exposure.
2. SCBA is required on **all** structure fires that present a smoke condition, to include kitchen and cooking fires.
3. SCBA is required on **all** vehicle fires until completely extinguished and all smoke as dissipated.

B. Structural Turnout Gear

1. Turnout gear help protect personnel from absorbing HCN through the skin, which is a secondary route of exposure.
2. Personnel are to wash turnout gear following structure fires that heavily soil and saturate gear with products of combustion.

IV. Monitoring

- A. All structure fires are to be monitored by utilizing one of the approved HCN meters. This will not replace the current monitoring for carbon monoxide levels, but is to be conducted concurrently.
- B. The HCN meter will be stored on Rescue 1
- C. SCBA is **not** to be removed until the atmosphere can be monitored, and deemed safe.

V. Action Levels

- A. Hydrogen cyanide is twenty-four times more dangerous than carbon monoxide. Because of this the action level for HCN is lower than CO.
- B. The action level in order to operate without SCBA in an environment where HCN is present will be **5ppm** (4.7ppm). This is the Short Term Exposure Limit (STEL) for HCN as recommended by NIOSH.
- C. STEL as defined by NIOSH is a 15-minute TWA (Time-Weighted Average) exposure that should not be exceeded at any time during a workday.
- D. Immediately Dangerous to Life and Health (IDLH) for HCN is 50 ppm.
- E. The action level for carbon monoxide will remain the same at 35ppm. The atmosphere must meet both the action level for HCN and CO in order for personnel to operate without SCBA.

VI. Decontamination

- A. Personnel should practice good personal hygiene by washing hands prior to drinking and eating in rehab.
- B. Once call is placed under control a random selection of personnel known to have operating in the structure should have their PPE monitored.
- C. If turnout gear has a reading higher than 5 ppm a hose line is to be used to decontaminate the gear. Briefly rinse with a soft fog pattern to prevent saturation. All personnel operating inside the structure should be decontaminated.
- D. Gear should be washed as soon as possible in an approved gear extractor. Turnout gear, flash hood, and helmet ear flaps should be washed in extractor per NFPA 1851

VII. Reporting

- A. Any reported exposures or alarm activations during overhaul will be reported to the Incident Commander.

VIII. Calibration

- A. Meters are to be calibrated every 30 days by Rescue 1 personnel only.
- B. If meters are exposed to a high concentration and register “out of range” on the LED display the meter will need calibration.