

INVESTIGATION GUIDELINE

Appendix 93

Smoke Detectors

I. Introduction

A. Background Information

In recent years, smoke detectors have played an increasingly important role in reducing the annual toll of fire deaths in the United States. As these devices have become more prevalent, however, concern has developed as to whether detector coverage has been adequately extended to all areas of need (particularly for high fire-risk residences), whether detectors are being properly positioned, installed, tested, and maintained, and whether detectors are operating effectively in real fires situations.

In general, these guidelines are intended to be used for fires in which a smoke detector was present, but did not appear to function properly (did not alarm at a stage early enough to permit escape or did not operate at all). However, these guidelines may also be used in some instances where product defects are reported (such as when a detector itself catches fire) or where a detector functioned properly and was instrumental saving lives.

B. Product Class Description

1. Definitions and General Description

Smoke detectors are devices which are designed to alert the occupants of a dwelling to the presence of an uncontrolled fire, at a stage early enough to allow escape. They are usually powered by battery or by household current (AC), occasionally both. The primary types of detectors include:

- o Ionization: These detectors contain a radiation source which ionizes molecules in the air between positive and negative electrodes, causing a small current flow when voltage is applied. When combustion products enter the detector, the ion mobility is decreased, and the resulting decrease in current actuates the alarm.
- o Photoelectric: These detectors generally contain a light source and a photosensitive cell. Combustion products entering the detector affect the beam of light, thus triggering the alarm.

C. Headquarters Contacts

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II. Instructions for Collecting Specific Information

A. Free Text Summary

Please provide a summary of the sequence of events that occurred prior to, during, and subsequent to the incident. If a sample was collected, please include the sample collection number.

For data retrieval from the computer, please make sure that the following key words are used in the Free Text Summary as appropriate: detector, malfunction, ionization, and photoelectric.

B. Description of Product

- o Indicate the types of detector(s) present (ionization or photoelectric), and for each, whether powered by battery or house current.
- o State the age of each detector. If the detector was already present in the dwelling at the time the occupant moved in, state how long this had been.
- o Determine the manufacturer and model number of each detector.
- o Indicate whether detectors were safety tested or certified (e.g., UL approved).

C. Description of Victim Contact with the Product
(Victim/Product/Environment Interface)

1. Installation

- o Specify who installed the detector(s), professional vs. homeowner, and when each was installed.
- o Indicate the location of each detector, being as specific as possible. (Specify room, location on wall or ceiling, proximity to doors, windows, and heating and/or cooling system ducts, etc.)
- o If more than one detector is present in the residence, determine whether the detectors were interconnected.

2. Maintenance and Testing

- o Determine how frequently the detector was cleaned, and what method was used. Was this method recommended by the manufacturer?

- o Indicate how frequently the detector(s) were tested, and what methods were used (e.g., pushed test button, blew smoke into detector, etc.).
- o If detector(s) were battery powered, determine how frequently batteries were replaced. Indicate why they were replaced (e.g., did not function during testing, detector emitted low battery signal, etc.).

3. Performance

- o Describe the nature of the fire, including ignition source, items ignited, whether fire was primarily smokey or flaming, etc. (follow other product-specific guidelines where appropriate).
- o Indicate where the detectors were in relation to the fire.
- o Indicate whether the detector(s) activated in response to the fire. If yes, specify whether a detector was the first indicator of the fire, and at what stage of the fire the detector activated.
- o If the detector did not activate, please specify why you think this was so; e.g., inadequate smoke, battery absent or dead, power failure in residence, etc.
- o If battery was not present, try to determine the reason why; e.g., due to nuisance alarms, vandalism, difficulty in finding appropriate replacement battery, etc.

4. Other

- o Describe whether there had been provided, at the point of sale, instructions by the manufacturer concerning installation, maintenance, testing and use. If provided, indicate whether they were adequate, and if inadequate, describe why.

D. Description of Victim

- o Report the type and extent of injury, as well as the age, sex, and long term prognosis for each of the victims.
- o Indicate whether the detector's failure to function properly was directly related to each casualty. Describe each victim's activity at the time of the injury, e.g., sleeping, escaping, fighting fire, etc.

- o Determine if any of the victims were under the influence of alcohol, medication, or other drugs at the time of the incident, or if they suffered from any physical infirmities that would tend to contribute to the cause of the incident or to the likelihood of injury.

E. Description of Environment

- o Indicate the time of day the accident occurred.
- o Describe any environment factors which may have been related to the incident, e.g., detector located in a drafty hallway, loud music masking the sound of the alarm, etc.

F. Other

- o Remember that timeliness of investigations is extremely important,