Problem

What

Fatality, carbon monoxide exposure, flue gas pipe failure

When

Date

February 22, 2014

Time

~5:30PM

Where

Facility, site

Seafood Restaurant

Unit, area, equipment

NA

Task being performed

Normal business

Impact to the Goals

Safety

1 fatality, 27 people hospitalized

Environmental

None

Customer Service

Impact to customers

Regulatory

None

Production Schedule

Restaurant closed, time?

Property/Equipment

None

Labor/Time

?

Frequency

400 deaths per year in US due to carbon monoxide poisoning; 20,000 hospital visits due to carbon monoxide poisoning annually

Analysis

Restaurant Carbon Monoxide Fatality

Why?

Effect → Cause

NOTE: Read the Cause Map from left to right with the phrase "Was Caused By" in place of each arrow.

Carbon monoxide in water heater → Flue gas → Flue gas in basement → ?

Safety Goal

1 fatality, 27 people hospitalized

Unaware of high carbon monoxide levels

Carbon monoxide is colorless and odorless

No carbon monoxide detector present

Evidence: Regulations require CO detectors in residences and where people sleep; not required in restaurants

Carbon monoxide is poisonous

Exposed to high levels of carbon monoxide gas

High levels of carbon monoxide in the building

Evidence: Normal levels are <1 ppm, 35 ppm is dangerous level

Carbon monoxide released into the basement

Water heater in the basement

Evidence: Water heater had passed last annual inspection, March 2013

Incomplete combustion in heater

Evidence: Ineffective inspection process

Evidence: Flue gas pipe directed gas outside

Ineffective inspection frequency?

Evidence: Ineffective inspection frequency?

Carbon monoxide in water heater → Flue gas → Flue gas in basement → ?

Solutions

No. | Action Item                           | Cause
---|--------------------------------------|-----------------------
1  |

Require carbon monoxide detectors in restaurants | Not required by state or town code

2  |

Increase inspection frequency | Ineffective inspection frequency?

Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.

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