J & P Equipment Cleaning, Inc.
Thunder Ridge Mine

December 7, 2008
Coal Mine Fatality
Dec 7, 2008

• Five contractor employees assigned to clean mobile equipment mounted on two different trucks at two locations within the mine
• One employee assigned to repair one of three cleaning units located on a flat bed truck
• Cleaners had gasoline engines
• Cleaning operation conducted outside
• Making repairs to engine of #1 steam cleaner while #3 was operating
• Began repair at 9:00 am – at 10:50 two other employees talked to victim – at 11:15 a third employee talked to the victim – at 11:30 an employee found the victim unresponsive
• At time of death, cleaner #1 was the only one running
#1 Working but failed Being Repaired by victim

#2 Not Working

#3 Working

Back of Cab

Victim was sitting on bucket when last observed alive by other workers, with both machines operating and exhausting in his direction.

Victim was found with face lying against this exhaust.
What was the cause of death?
Acute Carbon Monoxide Poisoning

- The National Research Council short-term exposure Emergency Exposure Guidance Levels (EEGLs) for carbon monoxide are:
  - 10 minute EEGL: 1,500 parts per million (ppm)
  - 30 minute EEGL: 800 ppm
  - 60 minute EEGL: 400 ppm
  - 24 hour EEGL: 50 ppm

- A lethal concentration is considered (Lefaux 1968) 4,000 ppm for 30 minutes.

- The coroner's report stated that the victim died of acute carbon monoxide intoxication, with a blood carboxyhemoglobinemia of 71.4%.
PROPERTIES OF CARBON MONOXIDE

• A colorless, odorless, tasteless gas that is slightly lighter than air.
• Produced by fires and heated combustibles.
• Combines more readily with hemoglobin in the blood than Oxygen.
• Once combined with blood it hinders the oxygen carrying capacity of the blood.
• It is a flammable gas and forms flammable mixtures with air in the range of 12.5 to 74 volume percent of CO.
EFFECTS OF CO

The effects of carbon monoxide concentration and activity on the time required to reach 5 percent blood saturation.
EFFECTS OF CO

Effects of carbon monoxide concentration and exposure time on humans.

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<thead>
<tr>
<th>CARBON MONOXIDE CONCENTRATION, PPM</th>
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<tr>
<td>600</td>
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<th>EXPOSURE TIME, HOUR</th>
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- Fatal
- Dangerous
- Perceptible Effects
- Headache
- No Perceptible Effects
EFFECTS OF CO

Long-term effects of carbon monoxide in combination with the hemoglobin of the blood.
MSHA Root Cause Analysis

• **Causal factor:**
  
  • The standards, policies, and procedures used by the mine operator did not ensure that safe working conditions were provided for all employees.
  
  • Repairs being performed on the Mi-T-M Corporation, hot water pressure washer, were not made from a safe location, with the gasoline engine off.
  
  • The victim was overcome by carbon monoxide, resulting in a fatal accident, caused by acute carbon monoxide intoxication.
What corrective actions could have prevented this fatality?
MSHA Corrective Actions

• Never work alone around exhaust gases.
• Conduct air quality tests prior to performing work near exhaust gases where internal combustion engines are running and at frequent intervals thereafter.
• Direct exhaust gases away from the work area.
• Avoid exposure to exhaust gases wherever possible.
• Install carbon monoxide detectors in work areas where internal combustion engines are being utilized.
• Maintain internal combustion engines in good working condition to minimize toxic exhaust gases.
Recent Fatality

- A 21 year old contract tire repair technician was killed at a surface gold operation.
- The victim was working in a shop repairing a large haul truck tire.
- He was applying adhesive inside the tire and was completely out of view.
- He was not wearing respiratory protection.
ACCIDENT SCENE

WHAT PROCEDURES SHOULD HAVE BEEN FOLLOWED TO PREVENT THIS FATAL ACCIDENT?
BEST PRACTICES

• Develop, implement and maintain a written HazCom program.
• Ensure that a Material Safety Data Sheet (MSDS) is accessible for each hazardous chemical a person may be exposed to.
• Train individuals to recognize physical and health hazards of chemicals and the proper use of respiratory protection.
• Ensure proper exhaust ventilation is provided to all work areas.
• Ensure persons are not required to perform work alone in any area where hazardous conditions exist.