

# Lessons Learned



**Title:** Carbon Monoxide - The Silent Killer

**Loss Amount:** \$22,000,000

**What Happened:** Upon entering a hotel room to perform daily cleaning, a housekeeper discovered a middle-aged couple passed out on the bed. She opened the windows and doors and called paramedics who responded quickly to the upscale resort.

Unfortunately the couple appeared to have been unconscious for many hours. The husband died shortly afterward and the wife is still severely brain damaged after four years. Investigation results indicated that large amounts of carbon monoxide had silently seeped into the room, probably while the couple was already asleep, causing carbon monoxide intoxication and poisoning.

Extensive engineering and industrial hygiene investigations revealed an unfortunate chain of events and conditions:

- An electric water heater in one of the towers was replaced with a gas water heater. Reportedly, this new heater was vented properly to the outside.
- Water heater size was insufficient for demand. A newer, larger one was installed in a utility closet vented through a sidewall with air intake and exhaust on same side. Other installation errors were discovered later.
- Laundry rooms were refurbished with vents on the opposite side of the building from the water heater intake/vent.
- Because of building reconfigurations and building additions, the laundry room intakes/vents were re-routed again and ended up on the same sidewall as the water heater and HVAC air intakes.
- Airflow patterns around the building, especially on the side of the vents and the guest room in question, changed dramatically because of all the reconfigurations.
- Lint from the dryers was not properly filtered, and because of proximity of air intake, was entrapped into heater's air intake increasing the potential for carbon monoxide generation.
- Room air handling unit entrapped and re-circulated incoming carbon monoxide into the couple's room.
- There were no carbon monoxide alarms in either the guest rooms or the laundry or boiler rooms.

Ensuing litigation and arbitration was complex and protracted. The hotel had good risk transfer mechanisms in place and was able to shift most of the liability back to the heater manufacturer, installer and building design engineers.

## **Lessons Learned:**

- Building modifications should always be reviewed by qualified engineers to make sure that all critical air quality considerations have been taken into account.
- Air intakes should be as far away as possible from exhausts, sources of combustion, or other possible sources of contaminant entrainment.

- Combustion chambers in gas-fired equipment must be inspected regularly by qualified maintenance staff to make sure the correct burn ratio is used, no soot is generated, and the unit is properly vented.
- Vents should follow appropriate local building codes and be located above rooflines and consider prevailing wind patterns to avoid re-entrapment.
- Room ventilation systems and air-tightness should be reviewed. Negative or positive pressure differentials should be maintained in reference to sources of possible contamination such as rooms facing atriums, for example.
- Utility, boiler, and other rooms or chambers where combustion sources are present should always be provided with reliable carbon monoxide detectors -- in addition to fire and smoke detectors. Early warning on a rise in carbon monoxide levels can alert to impending trouble. Hardwired, central station alarmed systems would be preferred.
- Similar systems for guest rooms should be considered. Install carbon monoxide alarms in handicapped rooms at a minimum. Again, this is in addition to smoke and fire alarms.
- Provide a sufficient number of portable carbon monoxide monitors to emergency responders on site to prevent additional injury to rescue personnel.
- Have good risk transfer mechanisms in place (Certificates of Insurance, Hold Harmless Agreements, and other contractual language).

### **For Further Assistance in Preventing this Type of Loss:**

Click on the Customer Library link to obtain the following resources:

- Lodging Facility Ventilation Systems (Loss Control Insight)
- Carbon Monoxide Danger and Prevention Issues (E&S Technical Information).
- Occupational Health Information SIC 7011: Hotels (Loss Control Insight)
- Proper Building Ventilation Systems (Loss Control Insight)
- "Do it Yourself" Rooftop HVAC Service Causes Fire (Lessons Learned)
- Clothes dryer fire safety (Loss Control Insight)
- Risk Transfer (Loss Control Insight)
- Risk Transfer Contractual Language Resources

### **Questions?**

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