

# Heating, Ventilation & Air Conditioning (HVAC)

#### **Overview**

Exponent's engineers and scientists provide services related to the prevention and investigation of accidents involving heating, ventilation, and air conditioning (HVAC) systems. HVAC systems include all of the equipment used to ventilate, heat, and cool a building, to move the air within the building, and to filter the air. These systems include air conditioning units, central heaters and furnaces, heat pumps, space heaters, fireplaces, and chimneys. Exponent has experience with electric, natural gas, propane, oil-burning, coal-fired, wood-burning, and other types of units.

# Our HVAC services include:

- Fire cause and origin investigations
- Mechanical systems design and failure investigations
- » Indoor air quality analysis
- » Carbon monoxide issues

# **Fires**

According to estimates obtained from the National Fire Protection Agency, heating equipment was involved in an estimated 62,200 residential structure fires that resulted in 670 civilian deaths and 1,550 injuries in 2005. The presence of combustion and/or high electrical currents in HVAC equipment provides an easy (and often erroneous) target for subrogation claims related to residential fires. Exponent has experience investigating causes and origins to determine the role that HVAC equipment may have played in a fire.

# **Mechanical Systems**

Exponent engineers have investigated many aspects of HVAC systems, including burners, exhaust, fuel gas systems, sensors, and controls. We identify the cause of failures and develop design strategies to correct them. Our engineers have experience with Consumer Product Safety Council (CPSC) investigations and recalls. We have investigated individual unit failures to determine if part failures, misuse, or lightning strikes, for example, were responsible.

### **Indoor Air Quality**

Indoor air quality (IAQ) has been an increasing concern, because energy conservation measures minimize outside air exchange and infiltration, which can result in a buildup of air contaminants. IAQ is related to indoor environmental quality (IEQ) and "sick building syndrome" (SBS). Good indoor air quality involves management of pollutant sources and the building's HVAC system, which determines how pollutants are distributed and removed, and can in some cases act as a source of pollutants. Exponent's engineers and scientists have experience with determining and correcting indoor air quality issues.

# **Carbon Monoxide Issues**



Exponent has investigated the cause of carbon monoxide exposures that resulted from poor combustion in furnaces, boilers, and portable space heaters. Some of the sources of exposure found by our staff have included damaged equipment, poor design, improper installation, and even animals nesting in vent pipes. Utilizing portable combustion gas analyzers and other detectors, Exponent has the capability to test and quantify carbon monoxide emissions of combustion appliances. An Exponent engineer is a principal member of the NFPA 720 (Recommended Practice for the Installation of Household Carbon Monoxide [CO] Warning Equipment) technical committee of the National Fire Protection Association.

The technical expertise and experience of the Thermal Sciences engineers, combined with the additional capabilities of Exponent's Electrical, Mechanics and Materials, and Health Sciences professionals, can provide a complete solution to any HVAC-related issue.