

CASE STUDY: HVAC FREON LEAKS - ACID GAS EXPOSURE

Project Description: IAQ Investigation for Acute Upper Respiratory Irritation at Banking Facility.

Scope of Services: AET was contracted to evaluate complaints of periodic upper respiratory tract irritation including coughing and burning eyes/throat at a bank branch facility. Complaints occurred in the summer during high outdoor temperatures and maximum air conditioner use. The facility was a single building with a two stage roof-top package HVAC unit. Based on the symptoms, periodic episodes and design of the space, a Freon leak in the system was suspected by AET's investigator.

AET's Experience: Freon is a trade name for a class of chemicals (known as chlorofluorocarbon or CFC's) used as a refrigerants in air conditioning systems. Freon is a colorless, non-flammable and relatively odorless gas containing fluorine and chlorine molecules which can form acid gases during a system leak. Acid gases even in low concentrations can cause respiratory irritation.

R22 use as a refrigerant is being phased out worldwide due to its damage to the ozone layer. Currently, R22 is only used in existing equipment and as of 2010 manufacturers are no longer producing new air conditioners or heat pumps using R22. Lower ozone damaging Freon products such as R410a is now being used (cannot be retrofitted to existing R22 systems).

FREON leaks are often difficult to detect until verified by your HVAC contractor (where the system will not hold a charge or pressure or by use of UV leak detection dye or instrument). Visual inspection of the HVAC unit may find signs of condensation on surfaces where slow/small leaks are ongoing.

AET's Investigative Approach/Sampling/Tools:

1. **Visual Observation:** AET's IAQ investigator inspected the roof top HVAC units, no signs of leakage or physical damage were observed. No other sources of IAQ sources related to respiratory irritation were found.
2. **Complaint/Symptom Confirmation:** Like the bank employees, AET's IAQ inspector experienced similar respiratory irritation symptoms which forced him to seek fresh air outdoors. As a result, bank employees were sent home for the day and the bank branch closed. The bank's HVAC contractor was immediately called to provide service.
3. **Acid gas sampling:** At the client's request, air sampling was performed to document the extent of acid gas exposure. Low levels of acid gas (below the OSHA PEL) were found.

FINAL CONCLUSION: The roof-top HVAC unit was replaced. All complaints and reported symptoms ceased. AET recommends that our clients have their HVAC units serviced annually in accordance with ASHRAE recommended maintenance prior to the start of the summer cooling season.

Note: FREON release in close proximity to an open flame may result in formation of phosgene gas. Phosgene gas is highly toxic with an odor threshold of 0.4 ppm and an OSHA PEL of 0.1 ppm (has no warning properties). It's suffocating irritant odor resembles fresh cut hay or grass. Phosgene gas levels as low as 2 ppm can be immediately dangerous to life and health.

When you need professional IAQ advice, email me at a.sutherland@aetinc.biz or call 610-891-0114. We provide nationwide services; phone consultations are free. Check out the full range of environmental contracting/consulting services on our website www.aetinc.biz.

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