



Creating Industrial Hygiene Programs

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Standard Industry Approach to Addressing Airborne Hazards

Three step process:

1. Identify potential hazards
2. Conduct a hazard assessment of workforce to identify inhalation hazards
3. Control hazards in order of priority

Step 1: Identify the potential hazards

- Identify the group of chemicals to which workers could potentially be exposed.
 - Tank headspace space vapor testing;
 - Process fugitive emissions;
 - chemical/physical properties, etc...
- Determine which of these might potentially warrant further investigation based upon:
 - Their frequency of detection in the headspace or ambient air near processes;
 - Their concentration in air compared to an applicable screening value (PELs, TLVs, etc.)

Step 2: Conduct a hazard assessment

- What are the work patterns?
 - For each work activity
 - Location
 - Duration
 - Frequency
- Where are the potential points or pathways of exposure?
 - Vents
 - Stacks
 - Fugitive emissions
 - Transfer lines
 - Sample ports
 - Filter houses

Step 2: Conduct a hazard assessment

- What is the reasonable maximum concentration workers could likely be exposed to (RME)?
 - Results of air dispersion modeling relevant to worker exposures and work patterns.
 - Measured concentrations at given points of exposure relevant to workers' breathing zones(e.g. preferably personal samples augmented by area samples if relevant).
 - Worst case scenario sampling.

Step 2: Conduct a hazard assessment

- Compare the exposure point concentrations (i.e. breathing zone results) to applicable screening values.
 - OELs and AOELs - note 10x safety factor is not necessary if an additive evaluation is conducted
- If concentrations do not exceed screening values in the worker breathing zone, then they can be removed from further analysis if they do not contribute to an additive exposure greater than the combined OEL.
 - Screening values need to be relevant to the types of exposures that could possibly occur.
 - Acute exposures - Ceiling or STEL values that may be applicable for short-term intermittent exposures that would not exceed an acutely harmful concentration or an 8-hr TWA when considered in aggregate (i.e. 3X or 5X the OEL)
 - Chronic exposures - Considerations related to carcinogenicity of compounds.

Step 3: Control hazards in order of priority

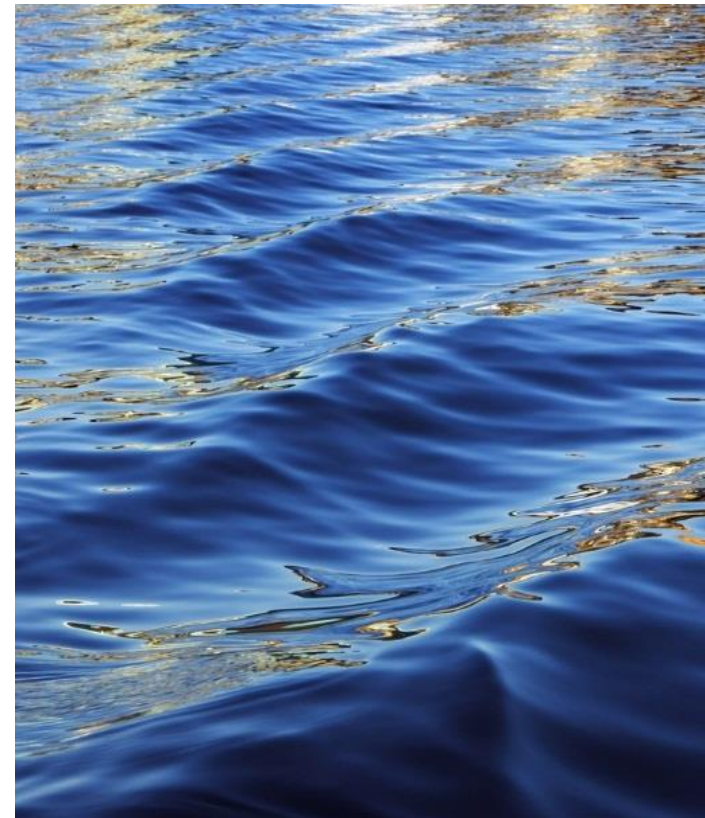
- Elimination/substitution of the hazardous agent
 - Eliminate the hazard, or replace the hazardous agent with another, non-hazardous or less hazardous, material.
- Engineering controls - common methods would include:
 - Ventilation
 - Stacks
 - Filter media/vapor scrubbing
 - Locate exhaust to areas distant from/elevated above worker breathing zones.
 - Ensuring tanks are under negative pressure and ventilated, especially when opened, to minimize vapor emissions.

Step 3: Control hazards in order of priority

- Administrative controls - common controls would include:
 - Barriers preventing individuals from entering areas where they may be exposed above the OEL.
 - Warning signs.
 - Worker education and training
 - Limiting worker shifts in particular job tasks to prevent overexposure
 - Scheduling work when there are fewer opportunities for bystander exposure

Step 3: Control hazards in order of priority

- Personal protective equipment - To be used as a last option, provided exposure could not be reduced below the OEL using the previously listed controls:
 - Identify the materials responsible for exposures above the OEL.
 - Determine the level of respiratory protection needed based on the maximum likely exposure:
 - Can use air purifying respirator (APR) if:
 - An appropriate cartridge is available that will handle the mixture of constituents in the air; and,
 - The assigned protection factor (APF) of the respirator type is not exceeded.
 - Max chemical concentration for APR = $APF \times OEL$; and,
 - The chemical concentration does not exceed the IDLH
 - If none of the criteria are met above, then must default to supplied air/SCBA
 - IDLH environments require SCBA usage.



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