Putting the “A” Back in JHA

Office of Health, Safety and Security
Office of Worker Safety and Health Assistance
DOE Voluntary Protection Program

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Safety Share

What's the worst thing that can happen?

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What is Analysis?

- **Analytical Questions – Quantitative or Qualitative answers**

- **WHO :**
  - **Is at risk?**
  - **Is performing the task?**
  - **Else might be in the vicinity?**
- **WHAT :**
  - **Is being done?**
  - **Specific chemicals, tools, or processes are being used?**
  - **Regulations apply to the task?**
  - **Company policies or procedures apply?**
- **WHEN :**
  - **Will the work start?**
  - **Will the workers be exposed to the hazard?**

What is Analysis?

- **Analytical Questions - Continued**
- **WHERE :**
  - **Is the work being done?**
  - **Where is the hazard located?**
  - **Where will the worker be in relation to the hazard?**
- **HOW :**
  - **Can the worker be exposed to the hazard (exposure pathway)?**
  - **Can the worker recognize the hazard?**
- **WHY:**
  - **Is the hazard a concern?**
  - **Are we doing the work?**

Example

- Exposure risks for operations in this laboratory are acceptable. Small quantities of chemicals are used at a time. Inhalation risks are minimized by using the chemicals in solution or in closed systems and using the fume hoods for operations that may generate airborne material. Absorption risks are managed through the use of dilute solutions or by wearing impervious gloves when working with concentrated solution. Ingestion risks are managed through standard laboratory practices and by using automatic pipettes. Flammable/combustible chemicals are stored in approved flammable-liquid storage cabinets. Release of the entire contents of an asphyxiant gas is insufficient to create an oxygen deficient atmosphere in the room.

Example

- Methylene chloride will be used as a solvent to adjust viscosity of silicone for casting. It will evaporate, normally into a local snorkel exhaust , after the silicone is cast. For the STEL calculation, however, we conservatively assume neither the snorkel exhaust nor lab general exhaust is functional, and the methylene chloride evaporates into stagnant lab air. The area of the lab is 370 ft^2 ,and its volume (9 ft ceiling) is 3300 ft^3, or 89,100 L. The quantity of silicone used at one time will never exceed 5 grams. The quantity of methylene chloride mixed into the silicone will also never exceed 5 grams. This process will be repeated no more than once per hour, or 8 per day. The maximum short term exposure can be calculated by assuming 5 grams of methylene chloride evaporates instantaneously into 89,100 L of air. 5 grams is 0.06 mole which expands to 1.4 L vapor. 1.4 L in 89,100L is 16 ppm. So assuming no ventilation and instantaneous evaporation, the peak concentration is well below the STEL (125 ppm)

- For the 8 hour average, assume 40 grams methylene chloride is evaporated into a volume of air exhausted from this lab in 8 hours. The lab has 11cfm exhaust currently, and snorkels to be added increase that flow to approximately 2000cfm. The methylene chloride vapor volume is 11 L . The air volume (1100cfm) X (8 hours) X 60 mins/Hour) X (27 L/ft^3) = 14,000,000 L. Dividing by 14,000,000 yields 0.8 ppm TWA.

- Therefore, if the exhaust ventilation failed during an experiment the vapor concentration might reach 16 ppm whereas the STEL is 125 ppm. With the exhaust functional the TWA might reach 0.8 ppm whereas the limit is 12.5 ppm.

Example

- Another general observation was the use of non-specific terms in the control section of the JHA. In many cases, the controls are identified as “proper” or “appropriate” (e.g. proper PPE, appropriate gloves, appropriate precautions”). This condition may be driven by the lack of documented or specific analysis. The use of these terms leads to the worker making the decision at the time of work regarding what is proper or appropriate, and without the supporting analysis they may not make the correct control selection. For example, the standard glove adopted for use in the laboratories is a 5.9 mil (.0059 in) thick Nitrile surgical glove. While these gloves are adequate for the majority of chemicals used in the lab, there may be chemicals for which it is not appropriate. The laboratory has a small quantity of 49 percent Hydrofluoric Acid (HF). The JHA did not analyze penetration data for the glove for HF exposure. OSHA specifically recommends not using Nitrile gloves for protection against HF. Although the gloves do provide Some protection, a small drop of HF on the glove could penetrate the glove and cause damage before a worker is aware that the acid has been spilled. Laboratory workers indicated that if they saw a spill on their gloves, they would remove the gloves immediately and replace them, but that precaution was not included in the JHA.

SKILL of CRAFT

Skill of the craftperson is a CONTROL

Controls are justified by ANALYSIS

Even SKILLED personnel can make ERRORs

Example

- **A Washington TRU Solutions LLC (WTS) employee was pinned between the light bar of a TRUPACT trailer and the front seat of an electric cart.**

- Because WTS determined that the electric cart activity was low-risk and short-term, no hazard analysis was performed, controls were not implemented, and there was a lack of oversight. The Board determined this to be a systemic root cause. A systemic root cause is a deficiency in a management system that, if corrected, would prevent the occurrence of a class of accidents, not just those associated with electric carts.

Conclusions

- **Analysis is a key element of ensuring the proper controls are selected and used.**
- **Doing it right once, and keeping it adds value to the work process.**