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MPH 632 – Assessment 9 Practice Lab

Scenario Introduction:

A southern town is host to several major chemical production facilities, each with roughly 6,500 employees. Carbamate pesticides are produced in one of them, which also stores a year's supply of methyl isocyanate. Production requires high temperatures which can be a fire risk and results in bottom stills and sludge that are disposed of. Materials are brought in and out by rail and both the facilities and rail line are within several miles of town. Multiple public health, ecological, and occupational health hazards that must be addressed. This document will not encompass all the risks and hazards associated with this scenario. The primary function is to assess which risks have the highest potential to cause harm and are the most actionable. However, many of the listed recommendations can contribute in reduction to risk and hazards not mentioned. Below the recommendations will be listed in order of importance.

Risks & Recommendations:

- **Many employees work in high-risk areas where chemical exposures and other occupational hazards are present.**

  Recommendation 1& 2: 1. *Provide training for each job within the facility that is in a language that the employee is proficient in.* 2. *High risk work areas should have sign in and out sheets where each employee is accounted for.*

- **Extremely high temperatures in conjunction with flammable gasses & explosive materials are present in the facilities.**

Recommendation 3: Engineering safety measures need backup systems and fail safes where appropriate to account for possible failures which are checked to assure proper function.

- **Transportation of hazardous materials**

  Recommendations 4 & 5: 4. Chemicals transported should be stored in containers specific to the chemical contents involved. 5. Rail cars are fitted with environmental controls and crash safety features which are to be checked prior to each transit to assure proper function.

- **Multiple towns and communities are located within close proximity to facilities and transport routes.**

  Recommendations 6 & 7: 6. Develop and support an emergency notification system for local communities. 7.Create and keep updated evacuation routes for towns within a 24km or 15mile radius of the chemical facilities and transportation hubs.

- **Methyl isocyanate is stored in large quantities on site**

  Recommendation 8: methyl isocyanate should be placed into appropriate storage containers in a well-ventilated storage with environmental controls.

- **Byproducts and waste are created in the form of bottom stills and sludge:**

  Recommendation 9: All still bottom and sludge waste products should be stored in containers appropriate to their composition, with easily readable labels that include the compound inside, date created, and a hazardous waste symbol.

- **Many hazardous chemicals are used in this facility:**

  Recommendation 10: Use alternative chemicals or materials that are less hazardous where possible

Justification & Implementation:

Recommendations 1& 2 are the top priority because they are necessary to even maintain a functioning facility and lower cost than most of those that will follow. For proper learning to occur, it must be presented in a manner that can be understood. When working with chemicals that require a large amount of engineering and processes to safely maintain, specific job training is necessary for a safe and efficient facility and to reduce the likelihood of unsafe acts occurring. Training materials should be on hand for the most common languages spoken in the region and upon hiring new employees, should a new language be needed, training materials should be translated into that language. The second recommendation piggy backs on the first in that it is employee safety. This can prevent injury and death during emergency events allowing responders to easily locate all employees and prevent searches that put responders in danger. This can be implemented as a physical sheet until a badge swipe system can be implemented.

Recommendation 3 involves the volatility of the materials used and is one of the highest areas of risk which can result in an incident in all three categories: occupational, public and ecological. Despite being expensive these are vitally important to the safety of the facility. Engineering safety measure such as environmental controls, tank fill sensors, or fire response systems with the appropriate foam/water and so on are a necessary part of maintaining facility safety and should be inspected regularly per the schedule determined by the manufacturer at minimum. Fail safe measures are necessary as an assurance should the first line of engineering measures fail in between a testing period. An incident or disaster can be averted and the facility is alerted to the need to repair or replace the necessary safety measure in the event that a failsafe is kicked on.

Recommendations 4 & 5 deal with transportation and are high on the list because movement of hazardous materials via rail system is a high-risk action that can have major public health and ecological implications via chemical release in populated areas resulting in human and animal exposure, explosion, or soil and water contamination. Storage of materials for transport need to account for the energy produced by the movement of the train, as well as the possibility of collision. Train cars themselves should have environmental controls that keep stored chemicals within their safe ranges of temperature and humidity. Each of these cars should be fitted with crash safety features such as crash buffers to reduce the amount of movement produced during a collision and during the stopping of the train. Environmental controls should be tested for function prior to each load of the car to assure good working order, and safety features should be inspected at minimum per manufacturer recommendation.

Recommendations 6&7 are necessary in the event of a failure in recommendation 4 & 5 and switched from prevention to reaction. Chemical producing facilities pose a risk to the public health of the surrounding communities. Working with local emergency alert system notifications should be set up via cell phone, television and radio. Utilizing multiple communication systems increases the likelihood of the notification being received because different demographics receive messages in different ways. Included in this messaging should be appropriate evacuation information that has been created through the collaborative efforts of the facility, the rail stations, the department of transportation and local health departments. These routes should be made available year-round for the community to access and be reviewed & updated at a minimum, annually.

Recommendation 8 develops a protocol for the large amounts of methyl isocyanate stored at the facility. This is lower on the list because the scope of this risk, focusing only on one

stationary aspect of the facility, is smaller than the previous recommendations but in no way diminishes the high level of risk it poses. Methyl isocyanate is volatile and reactive making safe storage practices a vital part of risk management not only to prevent leaks and explosions but for environmental exposure of employees. This substance is highly toxic to humans and animals making it an occupational, public health and ecological risk. Appropriate storage containers reduce leaks, environmental controls reduce the possibility of ignition due to heat and ventilation reduces inhalation risk and exposure risk to employees.

Recommendation 9 reduces the risks associated with the waste produced by the facility. Still bottoms and sludge are produced by the processes within the facility and must be disposed of. However, these present environmental exposure and ecological risks. All still bottom and sludge produced should be safely stored until they can be transported to the appropriate disposal end points. This is in keeping with EPA resource and recovery act and reduces the possibility of both an ecological event through leaks or materials improperly disposed of, as well as public health and occupational risks where people are exposed to hazardous materials. This may also be implemented in a phase in manner where all newly purchased storage containers are upgraded and all older containers can be retrofitted with the updated labeling system.

Recommendation 10 tries to reduce the risks associated with chemicals used during the processes in the facilities. Utilization of less hazardous materials and chemicals where possible reduces the occupational risk of exposure and the public health and ecological hazards related to any of the chemicals and materials they are replacing. This can be accomplished cost effectively in a phaseout of hazardous materials by replacing them with the safer alternatives when current materials are used up or reach the end of their lifespan.

References

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