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Risk Management Exercise – Petroleum Transfer Station

Risk can be defined as the measure of the severity of a particular hazard or the measure of the probability and severity of adverse effects (Fuentes-Bargues, et. al., 2017). Risk management is the identification of actions necessary to reduce the risk. The first priority is to identify the hazards to decide on specific actions to avoid incidents. For the petroleum transfer station and port, the primary hazards are spills, leaks, and fires. To manage the risks associated with these hazards, recommendations for risk management are provided in order of priority:

1. Engineering Controls that provide the ability to detect and contain a leak or fire. These controls should occur automatically without the need for an employee to initiate.
2. Administrative controls such as process safety standards to ensure proper procedures are in place, especially for transfer operations because they pose a higher risk. This also should include employee training on safe handling of petroleum and additives, and other safety functions. Inspection and maintenance procedures should also be in place for quality assurance and to maintain equipment and identify any defects.
3. Emergency plans that are adequate and thorough and include response actions to every potential incident. The emergency plans should also identify responsible parties for each action so there is no confusion on jurisdiction if a real accident occurred.

Engineering controls are the top recommendation for managing the risks at the petroleum station because these controls mitigate hazards automatically without relying on human intervention. Since the petroleum station and transfer process are in close proximity to a community, a leak could pose a danger to residents and the environment. A leak to the water

could affect the community's economy. A leak detection system and automatic shutdown process are engineering controls that should be used within the station and port. Automatic shutdown should occur only if a leak is detected to avoid unnecessary plant disruptions. There should also be backup systems and redundancy in place in case there is a failure of one of these controls. Other controls include fire prevention systems because if a leak or spill occurs then there is a large fire hazard. There should also be controls in place to prevent a release to the external environment, such as secondary containment systems to catch leaking fuel. Transfer tanks, trucks, ships, as well as storage tanks above and below the ground should have secondary containments to prevent the release of petroleum and other chemicals if a leak occurs in the primary containment.

Safety protocols and procedures for transfer operations should be created and maintained. Employees should be thoroughly trained on these procedures and qualifications should be mandatory for high-risk processes. Refresher training and re-training should also be built into the program so that employees are always aware of updated procedures and best work practices. An effective safety culture is an essential risk management tool. Management should expect all employees to take responsibility for safety and must allow any employee to stop work if there is a perceived safety issue. Other organizations, such as local law enforcement and fire departments should be involved in safety planning or drill exercises to ensure a coordinated and appropriate response. Another example of a safety protocol is to perform transfer operations when the nearby school is not open (after hours). Additionally, transfer routes that do not pass through highly populated areas should be utilized.

Inspection and maintenance procedures are important aspects of quality and safety assurance. Regular preventative maintenance should be routinely performed and documented.

Maintenance and inspection of safety equipment are required activities to mitigate risks. Having an internal oversight or audit function on-site is a convenient way of ensuring that these safety activities are achieved, and that hazard assessment is performed to measure the effectiveness of each safety function (Creager, M., 2021).

Although eliminating or reducing the risk of leaks and fires should be priority, it is important to still be prepared for a emergency to occur. Therefore, a detailed emergency response plan is a vital risk management tool to prepare for an accident involving any possible hazard associated with the petroleum station. Specific examples of hazards that should be included in these plans are:

- A leak or fire on-site of the transfer station and shipping port.
- A spill on a road or train track.
- A spill or leak into the local waters.
- A fire on a transport ship, truck, or train.
- A leak from an underground storage tank.

Emergency plans should include specific actions to these potential hazards, such as evacuating the nearby elementary school in the event of a large spill and having spill cleanup kits located in accessible areas for all responders. Emergency plans should also delineate specific actions to responsible parties so that there is no confusion in the event of an incident. Additionally, emergency plans should be practiced at least annually where an accident is simulated so that response actions can be evaluated. Emergency plans should be shared with local law enforcement, fire departments, and nearby schools for coordination and to avoid a chaotic situation in the event of an actual emergency. Plans should also take into account effects on local environment, including waterways that may be used for fishing.

It is essential that these risk management recommendations are implemented to reduce the likelihood of a disaster caused by the petroleum station. Additionally, these actions should be routinely reevaluated to ensure their effectiveness (Blando, J., 2021).

References

Blando, J. (2021). *Lecture 6: Risk characterization and management* [Powerpoint Slides]. School of Community and Environmental Health, Old Dominion University. www.blackboard.odu.edu.

Creager, M. (2021). Bulk petroleum storage facility hazards – Mitigating risks during storage and transfer. *AXA XL's Environmental Risk Bulletin*. Retrieved from https://axaxl.com/fast-fast-forward/articles/bulk-petroleum-storage-facility-hazards.

Fuentes-Bargues, J. L., González-Cruz, M. C., González-Gaya, C., & Baixauli-Pérez, M. P. (2017). Risk Analysis of a Fuel Storage Terminal Using HAZOP and FTA. *International journal of environmental research and public health*, *14*(7), 705. https://doi.org/10.3390/ijerph14070705