

Environmental Communication and Reporting

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Executive Summary

Following the recent accidental release of hydrogen sulfide from one of the organization's facilities, the purpose of this report was to provide an overview of the level of compliance of the organization. The consolidated lists of lists provide a comprehensive list of toxic chemicals that are subject to reporting under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Emergency Planning and Community Right to Know Act (EPCRA) and the section 112 r of the Clean Air Act. The organization is compliant with section 302 and 304 of EPCRA which detail the EHS Threshold Reporting Quantity (TPQ) and Reportable Quantity (TQ). The organization is also compliant with section 301-303 of the EPCRA on emergency planning, response, and preparedness. In addition, the organization is compliant with section 304 on emergency notification, section 311 on hazardous chemical inventory, section 313 regarding annual reporting and submission to emergency responders, and section 112 r of the Clean Air Act regarding accident prevention and risk management planning. However, the organization failed to comply with section 312 of the EPCRA concerning material safety data sheets.

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Introduction

Hydrogen sulfide is a flammable and colorless gas that is soluble in various liquids such as alcohol and water, and which is typically accompanied by a characteristic smell of rotten eggs (Zhao, Biggs, & Xian, 2015). The gas can either be produced naturally or through human activity under conditions of deficient oxygen coupled with the availability of organic sulphate and material (Lim, Mbowe, Lee, & Davis, 2016). The natural sources of hydrogen sulfide arise from processes that include anaerobic and non-specific bacterial breakdown of sulphates and organic compound containing Sulphur. The gas occurs naturally around saline marshes, Sulphur lakes and springs, in crude petroleum, volcanic gas, and natural gas among others. In addition to the natural occurrence of hydrogen sulfide, it can also be produced commercially through human activity including wood pulp production, waste water treatment, and in the tanning and oil refinery industries.

The purpose of this paper is to examine the compliance guidelines and reporting standards and requirements of hydrogen sulfide storage, emission, and release by oil refining organizations. Evidence has shown that the primary sources of hydrogen sulfide is as a by product in the process of purifying and refining natural gas and crude petroleum (Drummond, House, McMullen, & Stewart, 2012). Improper storage of hydrogen sulfide or the disposal and accidental release of the materials that result from the process of oil refinery can result in the release of the gas into the air in the form of emission in ambient air. Almost all chemicals are toxic and hazardous when they enter the human body or the environment beyond the threshold levels. Hydrogen sulfide poses significant safety and health concerns given the fact that it can be released both anthropologically and natural, resulting in negative health effects on humans as

well as environmental degradation. Adherence to storage and reporting guidelines helps minimize the risk of harm from hydrogen sulfide.

Background

Oil and natural gas play a significant role in the United States economy with the US energy information administration pointing out that by the year 2050, natural gas will account for about 39% of the total US energy production (Congressional Research Service, 2018). However, despite the role that oil and natural gas plays in the energy sector and the economy at large, the continued production of these elements has led to heightened concerns regarding the environmental and human effects of the processes involved. The exploration and production of oil and gas has the potential for negative impacts on both humans as well as the environment. In humans, hydrogen sulfide may result in headaches, cardiovascular irritation, and respiratory irritation while it causes bad odor to the environment and contributed to Sulphur burden (Copeland, 2014). The human and environmental impact is dependent upon the complexity and size of the projects, the nature of the surrounding environment, and the effectiveness of pollution prevention, planning, control measures, and mitigation strategies.

As a naturally occurring component of natural gas and crude oil, hydrogen sulfide is an important contaminant of the oil refinery process (Kenessary, Kenessary, Kenessariyev, Konrad, Amrin, & Erzhanova, 2017). Crude oil with Sulphur concentrations of more than 0.5% is usually referred to as sour while ones with concentrations of less than 0.5% is referred to as sweet (Andrews, 2014). The sweetening of natural gas and crude oil in processing facilities and refineries entails the removal of hydrogen sulfide. As a result, there continues to be hydrogen sulfide emissions associated with oil and gas activities. Oil and gas operations may result in the emission of hydrogen sulfide, either accidentally or routinely, during the extraction, processing,

storage, or transportation processes. Such a release of hydrogen sulfide poses significant human health and environmental risks and therefore there are recommendations, reporting requirements, and guidelines that are in place to ensure that organizations involved in oil and gas activities adhere to best practices that prevent hazardous emissions and concentrations from occurring.

Current Scenario

Presently, I work for a small oil and gas exploration and refining company that is located in the state of California. The organization is a drilling company that has approximately 45 employees including the administrative staff. The organization drills sour crude oil and gas and then the raw gas is sweetened through a processing process that entails the removal of hydrogen sulfide. Prior to shipping to offsite locations, the organization holds the captured hydrogen sulfide in an onsite tank which can, on average, hold 12000 lbs. of the gas daily. However, recently, there was an accidental release of about 700lbs of hydrogen sulfide. Management is highly concerned as a result and the manager wants to know whether the company is compliant with regulations, particularly regarding the storage and release of hydrogen sulfide. Given my knowledge, skills, and education on environmental communication and reporting, the manager considers me an expert albeit just starting the job recently. The following section will examine the various annual reporting requirements from the context of my organization.

Recordkeeping, Reporting, and Notification Standards

The list of lists, which will be used as a guide in the report, is a consolidated list of chemicals which are subject to the Emergency Planning and Community Right-to-Know Act (EPCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Section 112(r) of the Clean Air Act (United States Environmental Protection Agency, 2015). This comprehensive list identifies the broad categories of the hazardous

materials and chemicals which are subject to reporting standards and material safety data sheets which must be developed and communicated. The consolidated list is a proper guide as it was prepared to assist firms that handle chemicals determine whether or not they need to submit reports, whether or not they are subject to any accident-prevention programs, and whether or not chemical releases should be reported.

EPCRA/CERCLA/SARA

EPCRA section 302 examines the Extremely Hazardous Chemicals (EHC) and prescribes the quantities of EHS at or above the threshold which require particular emergency planning activities to be carried out. In case a chemical exceeds the EHS Threshold Planning Quantity (TPQ), the organization or facility should report to the State Emergency Response Commission (SERC) and to the Local Emergency Planning Committee (LEPC) (United States Environmental Protection Agency, 2015). The EPCR section 302 also examines the Reportable Quantities of chemicals which are subject to local and state reporting under CERLA hazardous substances. When the CERLA hazardous substances are released in amounts that are equal to or greater than their Reporting Quantities (RQ), then such incidents should be reported to the National Response Center under CERLA.

SARA encompasses EPCRA and so the similar requirements are applied. The reportable quantities, threshold quantities, and the Threshold Planning Quantities for hydrogen sulfide (CAS number 7783-06-4) are as shown below:

- I. Section 302 EHS Threshold Planning Quantity (TPQ) – 500 pounds
- II. Section 304 EHS Reportable Quantity (RQ) – 100 pounds
- III. CAA 112 Threshold Quantity – 10, 000 pounds

Emergency Planning, Response and Preparedness – Section 301-303

Under EPCRA section 302, a comprehensive emergency response plan should be developed and the SERC and LEPC notified in case a chemical is present at the facility or above the TPQ for Extremely Hazardous Substances. The threshold planning quantity for hydrogen sulfide as stipulated under the United States Environmental protection Agency (2015) is 500 pounds. Given that the organization handles about 12000lbs of hydrogen sulfide per day and there was an accidental release of 700lbs recently, the TPQ for extremely hazardous substances has been exceeded. Therefore, to remain compliant, the Local emergency response committee, as well as the state emergency response commission, should be notified. In addition, the organization is required under section EHS to utilize the emergency preparedness and response plan developed by the local emergency planning committee.

As an organization in California, the applicable emergency response plan is the Regional Hazardous Material Emergency Plan (HMEP) prepared by the California Local emergency response Committee. The purpose of the plan is to ensure that federal requirements detailed in SARA Title III, section 303 have been fully met and provide a reference point for organizations involved in hazardous material emergencies (Bueler, et al, 2012). The organization is compliant with the LEPC response plan which details procedures and steps that should be adhered to ensure that the organization is well prepared for emergencies involving hazardous materials and that an adequate and proper response can be launched in case of such an emergency. The organization has a comprehensive hazard analysis function that clearly and concisely identifies potential risks and hazards associated with the accidental release of extremely hazardous substances.

The risk-analysis function is an ongoing process that continuously carries out hazard identification, vulnerability analysis, and proper risk analysis. The organization is also compliant

as it has adhered to the exercise and training guidelines as per the emergency response plan.

Individuals who are involved in handling extremely hazardous materials are engaged in ongoing training programs based on established state and federal training requirements. The training is well documented, and the periodic drills and exercises are conducted to evaluate the skills of the response personnel as well as the adequacy of the response plan. The release of hazardous materials has been reported as per the required standards and all relevant information provided, communicated to relevant stakeholders, and containment efforts are now in place.

Emergency Notification – Section 304

Under section 304 of EPCRA, any release of the reportable quantities of extremely hazardous substances should be reported to relevant state and local authorities (United States Environmental Protection Agency, 2015). Given that the reportable quantities for hydrogen sulfide is 100 pounds, the accidental release of 700 pounds of H₂S is subject to local and state reporting. According to California LEPC response plan, an actual or a threatened release of an extremely hazardous substance should be immediately reported to 911 or the local emergency response agency and to the California State warning center (Bueler, et al, 2012). The information that should be reported includes;

- a. The affected organization and facilities
- b. The responsible parties
- c. The exact location of the release
- d. The substance involved
- e. The potential hazards presented and how the release occurred
- f. Clean-up and containment actions being taken
- g. Agencies notified, and water bodies affected.

All these have been reported by the organization except the responsible parties and how the release happened as these are still under investigation.

Hazardous Chemical Inventory/Community Right to Know – Section 311-312

Section 311-312 of the Emergency Planning and Community Right to Know Act (EPCRA) is concerned with the inventory reporting requirements for hazardous chemicals. Section 311 is to the effect that for all the hazardous chemicals that are stored or used within the workplace, organizations are required to maintain a material safety data sheet, or a list of hazardous materials kept or used and submit such information to the local fire department, the local emergency planning committee, and the state emergency response commission (United States Environmental protection Agency, 2015). These sections cover facilities that have chemicals in quantities that are equal to or far much greater than 500 pounds or the Threshold planning quantity, whichever is lower.

The amount of hydrogen sulfide that is stored by the company and the amount that was accidentally released are both greater than the TPQ and so the organization should adhere to section 311 and 312. Section 312 requires all organization that are required to submit the material safety data sheets to also submit annual inventory reports for the list of chemicals held or used. The inventory reports should be submitted to the LEPC, the SERC, and the local fire department before or on the 1st of March each year. The state of California requires the submission of Tier II documents as opposed to Tier I documents

The Tier II submissions should contain;

- a. Emergency and non-emergency contact information
- b. The chemical names
- c. The estimated average amount

- d. The exact location of facility
- e. The manner in which the chemical is stored, and
- f. Whether the company wished to withhold the location of the facility from the public or not.

An evaluation of my organization has revealed that section 311 has been complied with but section 312 has not been complied with. As a result, I will ensure immediate efforts have been put in place to ensure that the necessary inventory information have been properly filed and submitted to the fire department, the SERC, and the LEPC.

Submission to Emergency Responders and the Annual Report - 313

The toxic release inventory was established under section 313 of the EPCRA and it facilitates the tracking and management of toxic chemicals which poses a threat to both the environment as well as to human health (United States Environmental protection Agency, 2015). Emergency responders are highly trained individuals who are called in to help manage and contain emergency situations in case they occur. It is vital for organizations to ensure that in addition to proper training exercise by emergency responders, they should also be armed with sufficient and relevant knowledge that will enable them to effectively and efficiently address the various emergency situations. Therefore, it is important that comprehensive information is submitted to the emergency responders.

The submission to the emergency responders should include information regarding Emergency and non-emergency contact information, the chemical names, the estimated average amount, the exact location of facility, the manner in which the chemical is stored, and whether the company wished to withhold the location of the facility from the public or not. Annual reports, on the other hand, cover environmental releases and other management practices for

toxic chemicals and materials during the year. These forms should be submitted to the environmental protection agency and to other appropriate local and state bodies.

Usually, the information that is submitted to the TRI is compiled and then availed to the public through the TRI website to help support decision-making by the public as well as by governmental and non-governmental organizations. Organizations that wish some of the information submitted to not be availed to the public should state so during submission. The Toxic release inventory data is vital as it can be used to promote and encourage pollution preventive practices, identify the sources of toxic chemical releases, and provide a platform for the analysis of the impact of toxic chemical hazards on the environment and on human health (Gaona, 2017). The information that should be submitted as part of the annual TRI reporting include;

- a. The on-site release and disposal of toxic chemicals to land, water, and air
- b. The practices and activities aimed at preventing pollution within the organization's facilities
- c. The on-site treatment, recycling, and recovery of toxic release inventory chemicals
- d. The off-site transfer of toxic chemicals from TRI facilities to other locations
- e. Incidences that resulted in the release of TRI toxic chemicals and other substances
- f. The locations of the various facilities that deal with TRI toxic chemicals

As the organization is still not compliant with the annual reporting standards, I will take immediate measures to ensure that the required annual reports have been submitted. Non-compliance can cause the organization significant problems and result in substantial financial penalties. I will complete the TRI reporting for the organization by filling and submitting form R rather than form A since the release to the environment was more than 500 pounds.

Accident Prevention Requirements of Risk Management – Section 112 r

Section 112r of the Clean Air Act requires organizations and facilities to file Risk Management Plans (RMP) with the environmental protection agency. This section obligates any facility produces, utilizes, or stores toxic substances at or above their regulated threshold quantities develop a comprehensive documented risk management plan (Schwartz, Dell’Aglia, Nickle, & Hornsby-Myers, 2014). It is aimed at ensuring that facilities which deal with hazardous materials in their regular operations utilize effective and sound work practices that guard against the accidental release of hazardous materials, and that they have brilliant and efficient plans in collaboration with emergency response personnel to ensure that all releases that occur are quickly and appropriately responded to. Typically, the Risk Management Plans are not public documents but are read within a federal room due to security concerns.

The worst-case scenarios detailed within the Risk management Plans might offer terrorists with a blueprint and roadmap for carrying out chemical attacks. Therefore, one can only access such information through the Emergency Management Agency (EMA) director or through the Local Emergency Planning Committee (LEPC) after verifying who they are and what they intend to do with the information. An assessment of the organization has indicated that the organization is compliant with this requirement as the RMP has already been filed with the EPA. The information that was included in the filing included contact information, an overall description of the RMP, consequences for accidental release including a worst-case scenario, an emergency response plan, and accident prevention plan, and an incident history for the facility going back five years.

References

- Andrews, A. (2014). Crude Oil Properties Relevant to Rail Transport Safety: In Brief. *Congressional Research Service*. Retrieved from <https://www.hsdl.org/?view&did=751042>
- Bueler, J et al. (2012). *Hazardous Materials Local Emergency Plan*. Region IV Local emergency Planning Committee. Retrieved from <https://www.caloes.ca.gov/RegionalOperationsSite/Documents/LEPC%20IV%20Regional%20Plan%202011.pdf>
- Congressional Research Service. (2018). *Methane and Other Air Pollution Issues in Natural Gas Systems*. Retrieved from <https://crsreports.congress.gov/product/pdf/R/R42986/25>
- Copeland, C. (2014). Air Quality Issues and Animal Agriculture: A Primer. *Congressional Research Service*. Retrieved from <https://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32948.pdf>
- Drummond, I., House, F., McMullen, G. W., & Stewart, A. j. (2012). Hydrocarbon Gases and Hydrogen Sulfide: A Code of Practice. *Applied Occupational and Environmental Hygiene*, 11(5). 493-500. <https://doi.org/10.1080/1047322X.1996.10389361>
- Gaona, D. S. (2017). The Utility of the Toxic Release Inventory (TRI) in Tracking Implementation and Environmental Impact of Industrial Green Chemistry Practices in the United States. *Open Access Peer-Reviewed Chapter*. DOI: 10.5772/intechopen.70716
- Kenessary, D., Kenessary, A., Kenessariyev, U. I., Konrad, J., Amrin, M. K., Erzhanova, A. E. (2017). Human health cost of hydrogen sulfide air pollution from an oil and gas Field. *Annals of Agricultural and Environmental Medicine*, 24(2), 213-216. <https://doi.org/10.26444/aaem/74562>

- Lim, E., Mbowe, O., Lee, A. S., & Davis, J. (2016). Effect of environmental exposure to hydrogen sulfide on central nervous system and respiratory function: a systematic review of human studies. *International journal of occupational and environmental health*, 22(1), 80-90
- Schwartz, D. M., Dell'Aglio, D. M., Nickle, R., & Hornsby-Myers, J. (2014). Federal Environmental and Occupational Toxicology Regulations and Reporting Requirements: a Practical Approach to What the Medical Toxicologist Needs to Know. *Journal of Medical Toxicology*, 10(4). 415-427. Doi:10.1007/s13181-014-0411-6
- Unites States Environmental Protection Agency. (2015). *LIST OF LISTS: Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Section 112(r) of the Clean Air Act*. Retrieved from https://www.epa.gov/sites/production/files/2015-03/documents/list_of_lists.pdf
- Zhao, Y., Biggs, T. D., & Xian, M. (2014). Hydrogen sulfide (H₂S) releasing agents: chemistry and biological applications. *Chemical communications (Cambridge, England)*, 50(80), 11788-805.