Saudi aramco report sample

Experience, Failure

Background Information

Saudi Arabian Oil Company (ARAMCO) is a state-owned oil organization of the Kingdom of Saudi Arabia (Figure 1) . Saudi Aramco was founded in the early 1930s with headquarters at Dhahran, Saudi Arabia. The President and Chief Operating Officer is Khalid A. Al-Falih since 2009. A total of 3. 4 billion barrels of oil were produced in 2013 or 9. 4 million barrels per day (bpd) . Forbes ranked Saudi Aramco as number one in the list of the world’s biggest oil companies .

Aramco Operations

There are different stages in oil operations. The current section expounds on oil exploration, production, refining and marketing, and finally, petrochemical manufacturing. Petroleum exploration is defined as “ the process of exploring for oil and gas resources in the earth’s sedimentary basins” . Figure 2 illustrates the process in simple visual flow:

- Exploration: The exploration process entails searching for oil and gas resources, specifically from “ complex onshore and offshore reservoirs and frontier areas in the Red Sea” .
- Production: The process of drilling and boring a hole in the earth’s surface to produce oil for various consumers.
- Refining and Marketing: The process of “ separating the many compounds present in crude petroleum” . After the oil has been refined to finished product, the distribution and marketing process entails designing strategies pertinent to product, price, place and promotions to entice consumers to purchase the end-product.

- Petrochemical Manufacturing: The process of converting raw materials and feedstock into primary petrochemicals, petrochemical intermediaries and finally, to end product.

Aramco Safety:

The organization has openly signified commitment to the safety of the employees and other stakeholders . A culture of safety is inculcated through adherence to safety standards, as well as managing risks. The company signified institution of the following major safety initiatives:

- “ Assessing and controlling risks;
- Improving safety standards, inspections and audits;
- Conducting safety training and education;
- Recognizing safety achievements; and
- Adherence of contractors to safety standards” .

ARAMO Safety Structure:

Aramco has developed a Safety Handbook, which contains safety responsibilities, basic safety rules, operational safety processes; permit procedure and safety topics .

- Management Structure:

The commitment of management to safety is incorporated in the Safety Handbook through Manager/Supervisor Responsibilities section . A proof of management’s commitment to safety is the lost time injury (LTI) rate which dropped by “ 18. 2 percent from 2012 — and 25 percent from 2011 — to 0. 09 per 200, 000 work hours” . Likewise, environmental safety efforts are continuously being promoted in the organization.

Aramco Hazard Analysis Methods:

Hazards analysis and job safety analysis is conducted at Aramco on a regular basis through the office safety checklist. Any deviations from safety standards, based on the checklist and from reported injuries or illnesses incidences, are addressed accordingly.

In one's opinion, the safety structure of Aramco is one of the best in the industry. The declining LTI rate attests to the efficiency of the safety standards, as well as the strategies for mitigating and controlling risks. The use of engineering and administrative controls enforces risk management in the organization. However, there is always room for improvement in enforcing safety policies and in monitoring them through continuous improvements.

Refining Process Description:

The petroleum refining process, (Figure 3), in Aramco is categorized into five (5) major areas: fractionation, conversion, treatment, formulating and bending, as well as other refining operations (" light-ends recovery, sour-water stripping, solid waste and wastewater treatment, process-water treatment and cooling, storage and handling, product movement, hydrogen production, acid and tail-gas treatment, and sulfur recovery" (OSHA: Refining Operations, n. d., p. 1).

- The refining process is described as follows:

- Fractionation is described as the process of separating crude oil into hydrocarbon compounds.

- Conversion entails the transformation of the size of the hydrocarbon compounds through decomposition, unification, and alteration.

- Treatment processes prepares the compounds into additional processes and finished products.
- Formulating and blending processes combine “ hydrocarbon fractions, additives, and other components to produce finished products with specific performance properties” (OSHA: Section IV Chapter 2, n. d., p. 1).
- The end products resulting from these processes are as follows:
- Fractionation: gas, gas oil, gasoline, petrochemical feedstock, lube stock, hydrogen, cracked naphtha, among others;
- Conversion: iso-octane, lubricating grease, high-octane naphtha, petrochemical stocks;
- Treatment: high quality diesel and lube oil, high-octane gasoline, desalted crude oil, among others .

Hazards in the Refining Process:

The refining process includes hazards in the work setting that expose workers to injuries, illnesses, or even fatalities. The hazards identified in the work setting are ranked according to the severity with number as posing extreme hazard to number 12 as the least hazardous, and illustrated in the following table:

A summary of “ FMEA” Analysis:

•The “ FMEA” analysis (Failure Modes and Effects Analysis)

The failure modes and effects analysis (FMEA) is an analytical tool which is qualitative and systematic in nature, which is designed to comprehensively identify the potential causes of failure with the aim of designing appropriate measures to prepare in instances where failure could not be prevented. As the term implies, the type of evaluative analysis enables organizations to shift thrust and focus on events that could possibly go wrong . From a designed structure, a FEMA would address questions such as: (1) what could possible go wrong? (2) What are the potential causes of failure or why would failure happen? And (3) what are the impacts or effects of these failures? .

•Why do we need it?

FMEA is needed to be conducted by various practitioners in different fields of discipline

•Pros and Cons?

The obvious advantage of the FMEA is the ability of the analytical tool to identify how failure could emerge or be encountered in the work setting. Through an analysis of the organization’s products, services, processes, or operations, the policymakers and decision makers are provided with crucial information which would prepare them to minimize harm or the negative impacts of failures. From a positive viewpoint, simulating a worst scenario through an evaluation of failures would help accurately identify methods for preventing these failures to happen; or if the failure could not be prevented from increased probability or likelihood analysis, ways of mitigating the damaging effects could be designed. In addition, the following benefits are attributed to FMEA: “ improved reliability of products and services, prevention of costly late design changes, and increased customer satisfaction” .

On the contrary, despite the beneficial effects of the FMEA, reviews and discourses written on the subject matter has emphasized that there are limitations to the process. One disadvantage is the excessive time, efforts, and resources needed to undertake FMEA. In addition, the focus on examining single points, there are tendencies to overlook the overall system. Finally, assigning failure probabilities could be relative and subjective in nature. As such, the accuracy and reliability of the results would be influenced accordingly.

•Best uses? For what processes? Is it good for chemical, mechanical processes?

The FMEA is best to be applied in evaluating single point failures within the following specifically identified industries: process industries, aerospace, consumer products, NASA, as well as in the Department of Defense . As such, this type of analysis could be applied in the oil industry, specifically in evaluating relevant processes in an oil refining organization. According to American Society for Quality (ASQ), the FMEA could be used in any of the following situations: (1) when a new product, service, or process is currently in the process of being either designed or redesigned; (2) when there is an existing process that needs to be applied in an innovative manner; (3) when there have been an evaluation made on the currently existing product, service, or process with specifically identified goals for improvement; (4) when failures are being explicitly analyzed in a product, service, or process; and finally, (5) on a regular annual basis during the product (or service) life process .

•Situations are not good for? Is it bad for short processes? Long processes? Or what?

How “ FMEA” Analysis Works:

•How it works?

The FMEA starts with an identification of the product, service, or process to be evaluated. From the starting point, the person evaluating should form a multidisciplinary team composed of all people who are instrumental in the design and development of the product, service or process. Solicit inputs from the multidisciplinary team regarding potential failure modes, causes, and effects of the areas that are to be subjected to FMEA. A FMEA template could be used to fill in relevant information pertinent to the area being evaluated. The team should agree on establishing a unified coding system which would be instrumental in identifying system elements. Finally, the FMEA elements need to be comprehensively evaluated.

As emphasized, there are three (3) specific questions to be appropriately answered: (1) identify whether the area being evaluated would result to an undesirable or intolerable loss: if the answer is yes, then, the evaluator would have to proceed on dividing the system into sub-systems, and further into assemblies . (2) From the analyzed elements, the evaluator determines what the failure modes are? And finally, (3) from the identified failure modes, what are the failure effects? .

When the FMEA is applied to ARAMCO, the items evaluated within the refining process (specifically within the fractionation, conversion, and treatment) are as follows: the pressure check valves (machines used in fractionation), the cracking unit (conversion), thermostat (hydrocracking phase), alkylation unit (conversion), and pipelines used in hydrotreating (treatment phase). Under the pressure valve and gas valve, the failure modes ranged from these items being left open, jammed closed, or exhibit propensities for leaks. For the thermostat, the failure modes include failures to react either to increases or drops in temperature. An examination of the failure effects range from seeping of hazardous materials or vapors in the atmosphere (for pressure valve and gas valve) and tendencies for overheating (thermostat failure) or excessive drops in temperature which compromises the standards of the oil by-products. The targets for all items identified under the FMEA are personnel, property, productivity, or the environment. Under severity of the failure occurrence, the items identified generated either a critical level of severity (III) or an average severity level (II). The risk codes that were exhibited and recorded where 6 and 8, signifying that the likelihood of occurrence for the risk failure are medium and very high, respectively. Finally, the action required would be intensified and regular monitoring of the items identified to prevent failure and mitigate potential injuries or fatalities that could happen due to the failure. Overall, the FMEA would assist decision makers in identifying potential failure of crucial items during the refining process which could jeopardize productivity at ARAMCO.

Appropriateness of the “ FMEA” Analysis as Applied in ARAMCO:

The FMEA analysis is appropriate for ARAMCO and the analytical tool could be applied to the task of refining which includes the following sub-processes; fractionation, conversion, treatment, formulating and blending. As linked from the reviews of various literatures on FMEA, it could be clearly established that the type of analysis is appropriate for the refining process to determine potential failures in each of the sub-processes through the items or equipment used in the process. Aside from determining the potential failure mode, the causes of the failure are accurately ascertained with the objective of detailing the effects in cases of failure, the repercussions of exposure to risks, and more importantly, the proposed action to prevent the failure from occurring. Overall, the decision makers at ARAMCO are aptly provided with the crucial information which would assist in improving safety policies and procedures to ultimately prevent accident and failures in the work setting.

References

Airbus Defence and Space. (2014). Oil & Gas, Mines & Energy. Retrieved October 12, 2014, from Airbus Defence and Space: http://www. geo-airbusds. com/oil-and-gas/

American Society for Quality. (n. d.). Failure Mode Effects Analysis (FMEA). Retrieved November 15, 2014, from asq. org: http://asq. org/learn-about-quality/process-analysis-tools/overview/fmea. html

Ansari, M. (2013, September 30). Safety Handbook: Saudi Aramco. Retrieved October 12, 2014, from slideshare. net: http://www. slideshare. net/fahadansari131/safety-handbook-saudi-aramco-by-muhammad-fahad-ansari-12ieem14

Forrest, G. (2014). Quick Guide to Failure Mode and Effects Analysis. Retrieved November 15, 2014, from isixsigma. com: http://www. isixsigma. com/tools-templates/fmea/quick-guide-failure-mode-and-effects-analysis/

Google Images. (n. d.). FMEA Oil Refining Process. Retrieved November 15, 2014, from google. com: http://3. bp. blogspot. com/-v-O_eVr-1Eo/UGJbz_GMNTI/AAAAAAAABE4/z_KUwxIT-wE/s1600/New+Picture+(12). png

Kable. (2013, November). The world's biggest oil and gas companies. Retrieved October 13, 2014, from hydrocarbons-technology. com: http://www. hydrocarbons-technology. com/features/feature-the-10-biggest-oil-and-gas-companies-in-the-world/

MacKenzie, W. (2014). The World's Biggest Oil Companies. Retrieved October 12, 2014, from Forbes: http://www. forbes. com/pictures/mef45effmk/the-worlds-biggest-oil-companies-25/

Mohr, R. (2002). Failure Modes and Effects Analysis.

Distillation Oil Refining. (n. d.). Retrieved October 12, 2014, from elmhurst. edu: http://www. elmhurst. edu/~chm/vchembook/513refining. html

Overview. (n. d.). Retrieved October 12, 2014, from Petroleum Online: http://www. petroleumonline. com/content/overview. asp? mod= 3

Ophardt, C. (2003). Oil to Petrochemicals. Retrieved October 12, 2014, from Elmhurst College: http://www. elmhurst. edu/~chm/vchembook/325petrochem. html

OSHA. (n. d.). Petroleum Refining Processes. Retrieved October 22, 2014, from osha. gov: https://www. osha. gov/dts/osta/otm/otm_iv/otm_iv_2. html

Saudi Arabian Co. Oil. (2014). Upstream. Retrieved October 12, 2014, from Saudi Aramco: http://www. jobsataramco. eu/our-business/upstream

Saudi Arabian Oil Co. (2014). Commitment to Safety. Retrieved October 12, 2014, from saudiaramco. com: http://www. saudiaramco. com/en/home/our-business/commitment-to-safety. html

Saudi Arabian Oil Co. (2014). Who we are. Retrieved October 12, 2014, from saudiaramco. com: http://www. saudiaramco. com/en/home/about/who-we-are. html