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Marine Terminal Safety Assessments

By Bob Blundell

Marine terminals that facilitate product imports and exports are a crucial and necessary part of the oil industry, and yet you rarely hear much in the media about the inherent risk that terminals may pose. Every day in the US alone, there are thousands of product transfers involving millions of barrels of hydrocarbons and chemicals being moved via refinery and chemical plant docks as well as distribution terminals. Each one of those transfers represents a risk of a safety or environmental event if minimum standards of care are not followed.

Though most companies have developed robust auditing systems to ensure that refineries, chemical plants, and distribution terminals are complying with applicable regulations and effectively managing risk, there may be less emphasis on this other critical part of the industry.

Marine terminals, like other parts of the oil and petrochemical industry, require the same basic Process Safety elements that are used on mainstream refinery and chemical plant process units, such as Hazard Analysis, Management of Change, and Operating Procedures. However, the unique interfaces between a terminal and a third party vessel, when transferring millions of barrels of hazardous liquids, afford other SHE risks that are not common to "oil boiling units." To the best of our knowledge, there is no generally available standardized assessment protocol in the marine terminal industry to validate a facility's conformance with key industry standards as seen in the Oil Company International Marine Forum (OCIMF) or the International Safety Guide for Oil Tankers and Terminals (ISGOTT). Therefore, Carmagen has developed a structured, "quantitative" protocol for conducting Safety, Health, and Environmental (SHE) assessments for marine facilities. This methodology can be used to validate a facility's conformance with industry practices and recommend areas for improvement.

This protocol is focused on preventing or responding to an SHE-event. It covers not only Process Safety elements common to both marine terminals as well as the refining/chemical industry, but also incorporates other key areas specific to ship/shore loading. Some of these additional areas include:

- Ship/shore interfaces
- Effective vessel mooring while at the terminal
- Emergency response requirements specific to loading and unloading vessels
- Vessel screening (i.e., Vetting) to ensure that vessels conform with minimum standards
- Adequate procedures to mitigate other hazards specific to marine loading

Work Highlights

Process Development

- *Supported a major licensor on fixed bed reactor design engineering and scale-up research and reactive chemistry.*

Process Plant Optimization

- *Completed process planning support for domestic refinery and miscellaneous related consultation.*

Project Management

- *Provided technical bid conditioning team to assist the owner in selecting the prime contractor for a grass roots chemicals plant located in China. The team consisted of mechanical, materials, machinery, electrical, civil, and instrumentation/process control engineers.*

Safety

- *Concluded support integrated within client's safety and noise NPQC team that has covered several years. The overall mega-project involves a major "clean fuels" revamp of a Middle East refinery.*

This protocol incorporates key industry requirements defined in ISGOTT and the OCIMF, and also “better practices” that have been seen in the industry to manage SHE risk. It includes a structured scoring process for the questions in the protocol so that terminals can be assessed “consistently” against industry norms.

The questions within the protocol and categories include:

- Operating Procedures
- Emergency Response
- Vessel Screening
- Equipment Testing and Inspection Systems
- Ship/Shore Interface
- Training
- Continuous Improvement

This assessment protocol includes requirements for validation that Management Systems exist for critical elements, as well as confirmation of effective execution of elements in practice via field observations, personnel interviews, and documentation review. It can be used for traditional “finger pier” docks as well as offshore facilities (e.g., SPMs and MBMs).

Carmagen believes that this assessment tool can be utilized not only for external SHE assessments conducted for marine facilities utilizing experienced Specialists, but also as an effective means for conducting internal assessments of a company’s facilities. For companies with multiple terminals, the application of this structured assessment process may be beneficial not only to benchmark performance between terminals, but also to identify best practices between facilities.

The assessment “scope” can be customized for specific client needs to address areas of concern or focus areas. In addition, an eighth section of the protocol is being finalized that covers operating practices for storage tanks (complete 4Q2016). This section can also be added contingent on client needs.

If you’d like to learn more about this assessment tool, please contact Vince Carucci (vcarucci@carmagen.com).

About the Author

Bob Blundell is an experienced mid-level manager with more than 40 years experience in refinery and marine terminal operations while working for ExxonMobil. He has strong analytical and leadership skills with a depth of experience in leading or participating in a team environment. Bob is a subject matter expert in refinery "offsites" operations (marine, tank farm, blending, and shipping operations). He has significant background in work management systems (routine maintenance work) in a refinery/manufacturing environment with specific emphasis on Risk Based Work Selection (RBWS).