ioMosaic Statement Of Qualification

Auditing Process Safety Management Systems

Overview

Audits are the ongoing quality assurance process for your process safety management (PSM) systems. They are typically designed to ensure that these systems are in compliance with regulations and in conformance with industry and company standards and guidelines. But they also need to address the quality of the PSM systems to ensure that they are being implemented effectively. A company can have a PSM program that meets regulatory requirements, but is ineffective in preventing accidents. Identifying quality issues in PSM systems is difficult, because it requires auditors with considerable experience in the elements of PSM and requires a more in depth review of the program in place for each element.

Experienced Professionals

ioMosaic Corporation PSM auditors are process safety professionals that conduct audits. They wrote "Guidelines for Auditing Process Safety Management Systems" which is the industry standard text on PSM auditing for the Center for Process Safety (CCPS) of the American Institute of Chemical Engineers (AIChE). They have extensive experience in the development and implementation of individual PSM program elements, such as leading process hazard analyses (PHA). They have helped numerous companies implement PSM programs and have first hand experience with best industry practices for PSM. Through this experience, they understand the changing performance-based expectations of PSM compliance programs and can recommend cost-effective solutions to address program deficiencies. In addition, they can dig down below the surface of your PSM programs and identify quality issues that may be limiting your company in realizing the full benefits of an effective PSM program.

Leading An Audit Team

Our PSM professionals can assist with your PSM auditing requirements by providing both team leaders and experts in individual PSM program elements. Our staff will work with your audit team to provide them with the hands-on experience necessary to be an effective team leader or audit team member.

An audit is not usually a pleasant experience for the facility being audited. Our professionals understand how to gather audit data without pointing fingers and assigning blame, while at the same time maintaining a high level of credibility that is essential in communicating audit findings. We provide continuous communication with the facility staff and management to ensure they understand the audit process and their role. In addition, we provide the proper leadership and interaction with the facility staff in order to make them appreciate the value of the audit.

Audit Tools

In the course of conducting hundreds of audits, our professionals have developed numerous tools for improving the efficiency and effectiveness of audits. The heart of an audit is the protocol that guides each team member through each step of the audit process. Our protocols go beyond the compliance requirements and address the equally important quality issues of each PSM element.

Other useful tools include pre-audit questionnaires, opening and closeout meeting outlines and final report templates.

PSM Quality Audits

PSM quality audits can be done simultaneously with a compliance audit or after a compliance audit, using a separate audit protocol. There is an advantage to doing the audits simultaneously as

much of the information that would be reviewed is the same. In a quality audit the findings are based on good industry practice rather than regulatory requirements. In addition to the traditional interviews and review of documents, the quality audit will include observation of PSM activities, such as a PHA team meeting. We believe that in order for PSM programs to be effective in preventing accidents, each element must have a high level of quality that reflects good industry practice.

Training

The best approach for teaching your staff to become auditors is to provide classroom training followed by participation in an audit. Our instructors are the same professionals that lead audits and can share the benefits of years of auditing experience. In the classroom, your staff can learn and practice the many techniques necessary for becoming a successful team leader or auditor including: planning, interviewing, gathering data, maintaining working papers, sampling data, writing and communicating findings and preparing the report.

We have trained over 1000 individuals in PSM systems auditing open-enrollment and in-house training courses for the following companies. In addition, we conducted a PSM systems audit training course for the members of the Texas Chemical Council.

Selected Study Experience

- We were selected by the owners of the Trans Alaska Pipeline System - British Petroleum, ARCO, Exxon, Mobil, Amerada Hess, Phillips, and UNOCAL - to assist them in conducting a highly visible, comprehensive, independent audit of the operations, management systems, and regulatory compliance of the pipeline system including the Valdez Marine Terminal. The management systems assessment was based on a process safety management system which is similar to the OSHA PSM regulation under 29 CFR 1910.119. The pipeline was under the close scrutiny of a congressional subcommittee, and it was anticipated that audit findings and recommendations were going to be made available to the subcommittee and all external parties who have legitimate interest and oversight.

- At the request of the Minister of Labor for the State of Victoria, ioMosaic Corporation personnel performed a safety audit of the bulk liquid terminals on Coode Island for the Coode Island Review Panel.

Process Safety Management Audit Training Companies

3M
ALCOA
Allied Signal
Alyeska
Amerada Hess Corporation
American Home Products
Amoco Chemical Company
Amoco Production Company
Amoco Oil Company
Anheuser Busch Companies
Arcadian Corporation
Arco Chemical
Arco Alaska
Aristech Chemical Corporation
Avery Dennison Company
BP Alaska
BP America
Cabot Corporation
Clairol, Inc.
Cosmar Company
DOW Chemical Company
Eastman Chemical Company
Eastman Kodak
Exxon Company U.S.A.
Exxon Exploration Company
Exxon Production Research Company
Exxon Company International
Farmland Industries, Inc.
Freeport McMoran
GE Aircraft Engines
GE Plastics
Georgia Gulf Corporation
Georgia - Pacific Corporation
Gillette Company
Himont Incorporated
Hoechst Celanese
Hunt Oil
IBM
INCO Limited
INTEL
International Specialty Products
International Paper
Kerr-McGee
Marathon Oil Company
Millennium Inorganic Chemicals
Monsanto Company
Occidental Oil and Gas
Occidental Chemical Company
Pennzoil Company
The Pillsbury Company
Praxair
Reilly Industries, Inc.
SADAF
Shell Oil Company
Solvay Polymers
Union Carbide Company
UNOCAL
Vulcan Chemicals
Westlake Group of Companies
Woodside Offshore Petroleum
WR Grace and Company
Yukong Limited

SELECTED STUDY EXPERIENCE *CONTINUED*

Our engineers performed the safety audit with respect to safety, technology and best management practices. Risks were identified relating to equipment, management systems, non-compliance and best international practices. Recommendations were made to reduce the risks of operation. A thorough examination of the management systems of relevant operators covered corporate safety policy; management structures and approach; documentation of work systems and procedures; maintenance inspections and procedures; record keeping for plant, equipment and work training; and emergency systems and preparedness. A review of compliance with relevant Victorian and Commonwealth legislation and regulations, and best international practice, as well as a report on the state of the maintenance, serviceability and fitness for purpose of tanks, pipework and protective systems, was also carried out. Recommendations on measures to maximize safety in relation to storage and handling of chemicals on Coode Island and associated transport routes were identified.

- For Woodside Offshore Petroleum, we conducted an audit of their Total Hazard Control Plan for the onshore and marine LNG facilities on the Burrup Peninsula, Western Australia. This study, which was required by the Western Australia Department of Mines, included an assessment of how well the Total Hazard Control Plan met the requirements of API RP 750.

- For an international chemical company, we developed audit protocols to assess implementation of PSM programs according to their corporate process safety management standard. This standard was broader in scope and coverage that even the OSHA PSM Standard. Our professionals led company audit teams that conducted baseline audits at most of their facilities worldwide, and are continuing to lead audit teams during subsequent rounds of audits.

- For a major petrochemical manufacturer, we provide experts in selected PSM elements to conduct both compliance and quality PSM audits of their facilities in the US.

- We developed a protocol to conduct baseline audits relative to OSHA 1910.119 and the CMA Process Safety Code for an international polypropylene manufacture. A number of the client's staff attended our open enrollment course "Auditing Process Safety Management Systems" and were team leaders for the pilot audit. We assisted the audit teams in conducting the baseline audits and in developing implementation plans for three separate facilities. We also developed a Global Safety Standard that defines the requirements for management systems that address process safety at all company locations worldwide.

- For an international paper company, we conducted a three-day PSM audit training course for representatives of all their U.S. facilities covered under OSHA 1910.119. We then coached their audit team on the first compliance audit conducted at one of their facilities. Subsequently, we conducted a baseline audit and a HAZOP study of their chlorine dioxide process at another of their facilities. We helped a third facility develop and implement their PSM Program. A key component of that involvement was an extensive PSM training program for their staff. Our most recently assignments included a second PSM audit training course and development of a corporate process hazard analysis (PHA) standard. After the PHA Standard was finalized, we conducted a four-day training class for representatives of their manufacturing facilities.

- For a large international oil company, we developed the assessment program for their Operations Integrity Management System (OIMS) assessment intended to verify that management systems are in place and functioning. We prepared the overall program framework, defined the scope of the assessments, coverage, organization, resources and approach. For the approach, we developed an assessment guide, report format, document retention guidelines and action plan responsibilities.

  A separate assignment for the same client involved developing a guidance document for compliance with OIMS within the Exploration Company. The document defines the management systems necessary to comply with OIMS expectations and includes specific OSHA PSM requirements for U.S. facilities covered under 29 CFR 1910.119. Each system contains generic examples of programs and/or procedures.

- For a major petrochemical company, we conducted an OSHA PSM compliance audit of their Houston facility. Soon after OSHA conducted a PSM inspection of the facility and did not issue any serious citations. Also, we conducted a facil-

Selected Study Experience *continued*

ity siting analysis of the same facility. Based on risk tolerability criteria developed for this purpose, some mitigating measures were recommended to reduce risk to individuals in occupied buildings. We later conducted the second PSM compliance audit for the facility.

- For a major oil company we conducted a two-day audit skills and techniques training course and then provided the team leader and a coach for the internal audit team during their first audit at one of their refineries. Our staff coordinated the pre-audit activities, assisted in the audit and preparation of the written audit report.

- We developed an implementation plan for compliance with the final OSHA PSM regulation for a refinery in Louisiana which processes 220,000 bbl/d of crude oil. The baseline audit used to develop the implementation plan built on a prior major hazard review conducted at the same location. At that time a draft of API RP 750 was used as the basis for the process safety management assessment. A key consideration in developing the implementation plan for this refinery was to minimize facility involvement to those activities necessary for proper review and implementation of their Process Safety Management program. Non-essential work will be contracted.

- We developed a safety management systems audit program for an international mining company based in Canada. Our involvement included assistance in defining program objectives, organization, resources, approach, coverage and scope. We then prepared and presented a one-day Safety Management Awareness seminar to management and union personnel at two divisions within the company. This one-day seminar was followed by a tailored version of our three-day open enrollment course "Auditing Process Safety Management Programs" to two groups of thirty auditors. We also participated as advisors for the first six pilot audits to assist the company teams in auditing their twelve safety management elements.

- For a multinational corporation, we have developed a scoring system and protocols for assessment of their worldwide operations (40 facilities) relative to the CCPS Guidelines. For the two US facilities (plastics resin and silicones manufacturing) completed to date, we incorporated the requirements of the proposed OSHA regulation under 29 CFR 1910.119 into our assessment protocol. The findings were prioritized to allow resources to be allocated to those areas most in need of improvement in order to comply with the proposed OSHA regulation. We also identified a number of areas where Division Management needs to develop PSM standards for their facilities.

- For a specialty chemical producer, we conducted a series of audits to assess the conformance of process safety management systems to the framework described in the CCPS Guidelines, and to assess the degree of implementation of these programs within each of six facilities. This work involved development of a tailored audit protocol, followed by management interviews and a series of facility audits. Where improvement opportunities were identified, we made recommendations

About Us

ioMosaic Corporation is a leading provider of safety and risk technology consulting services and software solutions.

ioMosaic's Consulting Services:

- *Auditing*
- *Calorimetry, Reactivity, and Large-Scale Testing*
- *Due Diligence Support*
- *Effluent Handling Design*
- *Facility Siting*
- *Fire and Explosion Dynamics*
- *Incident Investigation and Litigation Support*
- *Pipeline Safety*
- *Pressure Relief Design*
- *Process Engineering Design and Support*
- *Process Hazards Analysis*
- *Risk Management Program Development*
- *Quantitative Risk Assessments*
- *Software*
- *Structural Dynamics*
- *Training*

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