Integrated Management Systems for PSM/CALARP Facilities

Chad San Juan
Dan Starkey
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Mark Rodriguez
INTRODUCTIONS

• Chad San Jan
• Dan Starkey
• Mark Rodriguez
• Brody Saleen
PRESENTATION OVERVIEW:
What is Integrated Management Systems

- Definition:
  - An integrated management system (IMS) combines all related components of a business into one system for easier management and operations.

- Discussion on:
  - An approach to integration management systems with the PSM/RMP Programs
PRESENTATION OVERVIEW: Why Consider Integration

• ISSUES
  • Center of Chemical Process Safety (CCPS) guidelines to Risk Based Process Safety discussed performance stagnation issues of PSM/RMP Programs:
    • “In the U.S. process safety management has become synonymous with OSHAS PSM regulation, 29 CFR 1910.119, resulting in a minimum cost, compliance based approach to managing process safety...”“If it isn’t a regulatory requirement, I'm not going to do it!””
    • “Process safety management was implemented as a separate, stand-alone system that was not integrated into the organization’s overall management system”
    • “Process safety management was implemented as a one-time project instead of an ongoing process”
    • “When different SHEQ&S management systems are not well coordinated, the sometimes conflicting goals and demands on a operating facility may prompt program changes that inadvertently contribute to an increase process safety related operating risk.”
PRESENTATION OVERVIEW: Why Consider Integration

• BENEFITS
  • CCPS Guidelines for Integrating Management Systems and Metrics to Improve Process Safety Performance:
    • “Whether a facility is regulated or not, if it must handle hazardous materials and energies, a company success will be impacted by how well it applies fundamental elements of a process safety and risk management system and integrate metrics which affect process safety performance with its other risk reduction programs.”
    • “Organizational Efficiency: Improve efficiency by taking advantage of and by combining existing management systems, encourage teamwork by brining together diverse staff from multiple management teams.”
    • “Successful integration include reduced operating costs and more effective use of staff managing the programs, reducing duplication of effort across an organization.”
    • “If you think process safety is expensive, wait until you have an accident.” –Trevor Kletz (Introduced the idea of inherent safety and major promoter of Hazop)
PRESENTATION OVERVIEW
• Brody Saleen-Overview of CalARP Program to provide a foundation for integration
  • PSM/RMP History
    • Bhopal India Incident
  • PSM/RMP Elements and CalARP Specific Requirements

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PRESENTATION OVERVIEW

• Chad San Juan-Integration of Management Systems
  • Deming’s Diseases of Management and Systems in relationship to the PSM/RMP Program
  • Discussion of Deming’s Plan-Do-Check-Act Model
  • Discussion on Common Metrics between Management Systems and the PSM/CalARP Program
    • ISO 9001
    • ISO 14001
    • OSHAS 18001
  • Center of Chemical Process Safety Guidelines to a PDCA Model of the PSM/RMP Program
PRESENTATION OVERVIEW

• Dan Starkey-New Regulations within PSM/CalARP reflecting PDCA model concepts
  • Promulgation of Program 4 requirements
  • Program 4 Specific Elements:
    • Section 2762.13: Hierarchy of Hazard Control Analysis
    • Section 2762.2.1: Safeguard Protection Analysis
    • Section 2762.14: Process Safety Culture Assessment
    • Section 2762.6(i): Management of Organizational Change
    • Section 2762.15: Human Factors Program
    • Section 2762.16: Accidental Release Prevention Program Management
• Mark Rodriguez-Foundation of Integration is Management Commitment and Employee Participation towards the Organization Processes:
  • You can have all the programs written and in place but until you have management commitment and employee involvement, you will not achieve the desired result.
  • Management Commitment
  • Employee Involvement
PSM/RMP HISTORY:
Bhopal India Incident

UNION CARBIDE DISASTER
BHOPAL, INDIA
PSM/RMP HISTORY: Bhopal India Incident

- PSM/RMP Triggered due to 1980’s numerous incidents
- Bhopal India considered one of the major catastrophic releases in history
  - 1984 Bhopal India Chemical release killing estimated 10,000+ people
  - 30,000-50,000 injuries (Dutta, 2002)
  - Caused by unintended large quantities of water entering a chemical process that reacted violently with water and released 40 tons of Methyl Isocyanate
  - Symptoms include vomiting, difficulties breathing, burning sensation.
  - Community unable to diagnose issues
PSM/RMP HISTORY: Bhopal India Incident

- Investigators discovered the following issues:
  - Safety training concerning the process and chemical was inadequate;
  - Process procedures were bypassed;
  - Process equipment were not maintained;
  - Corrective actions on past incidents were not completed and;
  - Emergency action plans concerning a chemical release was inadequate.
PSM/RMP HISTORY:
Bhopal India Incident
CalARP Program Specific Requirements

- Program 1, 2, 3, and 4
- Worst-Case Scenarios
- Alternative Release
- Off-site Consequences
- 5-year accident review
PSM/RMP PROGRAM ELEMENTS: Employee Participation

Employer is required to consult with employees associated with the process for PSM/RMP development activities such as:

- Process Hazard Analysis
- Emergency Action Plans
- Standard Operating Procedures
- And other elements of the PSM/RMP program
PSM/RMP PROGRAM ELEMENTS: Process Safety Information

• Technology such as block flow diagrams of the process, process chemistry, maximum chemical inventories, and the evaluation of consequences of deviation;

• Chemical properties such as lower and upper explosive limits, ph, vapor pressures, hazardous effects of incompatibilities, physical/corrosivity/ reactivity data, thermal/chemical stability, and permissible exposure limits;

• Equipment such as piping diagrams, ventilation design, electrical design, operating limits, materials of construction, pressure relief systems, safety systems, and design codes and standards employed.
PSM/RMP PROGRAM ELEMENTS: Process Hazard Analysis

• PHA Methodologies include:
  • What-if
  • Checklist
  • What-if/checklist
  • Hazard and Operability Study (HAZOP)
  • Failure Mode Effects Analysis
  • Fault Tree Analysis
PSM/RMP PROGRAM ELEMENTS: Pre-Startup Safety Review

- PSSR conducted for new modified processes to ensure the following:
  - Process meets standards and specifications
  - Process has installed safety systems
  - Procedures are updated to current modified systems
  - Training and been completed
  - Emergency response procedures are in place
PSM/RMP PROGRAM ELEMENTS: Mechanical Integrity

- Mechanical Integrity should include the following:
  - Pressure vessels and storage tanks;
  - Piping systems;
  - Relief and vent systems and devices;
  - Emergency shutdown systems;
  - Controls such as alarms and sensors and;
  - Pumps.
PSM/RMP PROGRAM ELEMENTS: Contractor

- Contractor qualifications should be reviewed
- Employers should ensure that contractors meet training requirements of the facility to ensure safe handling of the process
PSM/RMP PROGRAM ELEMENTS: Hot-Work Permit
PSM/RMP PROGRAM ELEMENTS: Emergency Response

- Training plans
- Internal/external resources for response
- Designated Evacuation areas
- Emergency Contacts
PSM/RMP PROGRAM ELEMENTS: Operating Procedures

• SOP should include a compilation of instructions of the process and include health and safety considerations
PSM/RMP PROGRAM ELEMENTS: Operating Procedures

• SOP should include the following:
  • Initial start-up;
  • Normal start up;
  • Temporary operations;
  • Emergency shutdown;
  • Emergency operations;
  • Normal shut down and;
  • Startup after an emergency shutdown.
PSM/RMP PROGRAM ELEMENTS: Management of Change

- Management of Change:
  - Before a process is modified, management needs to review the changes to ensure any addition of equipment, chemicals, or technology does not add an additional hazard and ensures compliance with regulation.
PSM/RMP PROGRAM ELEMENTS: Compliance Audit

- Verifies if the PSM/RMP program is in compliance
- Deficiencies shall be corrected.
- Compliance audits can be conducted through:
  - on-site review
  - Documentation
  - Employee interviews
PSM/RMP PROGRAM ELEMENTS: Training

Training should include all employees associated with the process.

• Initial Training
• Refresher Training
• Documentation of Training
PSM/RMP PROGRAM ELEMENTS: Incident Investigation

- Root cause analysis concerning an incident with the process is required
- Corrective actions should be implemented and include:
  - Administrative controls
  - Engineering controls
  - Elimination of the hazard
PSM/RMP PROGRAM ELEMENTS: Trade Secrets

Employer is required to provide information to employees who are responsible for the PSM/RMP activities such as:

• Employees involved in preparing operating procedures;
• Employees involved in compliance audits;
• Employees involved in the PHA;
• Employees involved in conducting incident investigations;
• Employees involved in preparing emergency plans
• And other related elements.

Employee can be held to keep information confidential.
INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

- Quote from Deming’s work concerning issues found in all processes:
  - Out of the Crisis
  - The New Economics for Industry, Government, and Education
INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

• “A system is a network of interdependent components that work together to try to accomplish the aim of the system.”

• “A system must be managed. It will not manage itself. Left to themselves, components become selfish, competitive, independent, profit centres, and thus destroy the system.”

Related to entire PSM/RMP program and any process
INTEGRATION OF MANAGEMENT SYSTEMS:
Deming’s Perspective on Management and Systems

THE SILO EFFECT
INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

- “A manager of people needs to understand that all people are different. This is not ranking people. He needs to understand that the performance of anyone is governed largely by the system that he works in, the responsibility of management.”

- “Variation there will always be, between people, in output, in service, in product. What is the variation trying to tell us about a process and about the people that work in it.”

“COMMON SENSE AIN’T SO COMMON”
Related to SOP & Training
INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

PIG EXERCISE DISCUSSION

<table>
<thead>
<tr>
<th>GROUP 1</th>
<th>GROUP 2</th>
<th>GROUP 3</th>
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<tbody>
<tr>
<td>Instructed to draw a pig</td>
<td>Given step by step instructions on drawing a pig</td>
<td>Given step by step instructions with pictured results for each step on drawing a pig</td>
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INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

• “Understand and improve the processes that produced the fault, defect, etc. Understand the distinction between common causes of variation and special causes, thus to understand the kind of action to take.”

Related to PHA and understanding routine and non-routine tasks concerning the management of the program.
INTEGRATION OF MANAGEMENT SYSTEMS:
Deming’s Perspective on Management and Systems

• “Rework raises costs. No one likes to do repair work. A pile of items set aside for rework grows and grow, and too often in desperation downstream for parts, are not repaired at all, but are commandeered and used just as they are.”

Related to Mechanical integrity and the need to update SOPs
INTEGRATION OF MANAGEMENT SYSTEMS: Deming’s Perspective on Management and Systems

• “Theory is a window into the world. Theory leads to prediction. Without prediction, experience and examples teach nothing. To copy an example of success, without understanding it with the aid of theory, may lead to a disaster.”

• “Transformation can only be accomplished by man, not by hardware (computers, gadgets, automation, new machines.) A company cannot buy its way into quality.”

Related to the Process Safety Information and understanding an organization as a whole through management commitment and culture.
INTEGRATION OF MANAGEMENT SYSTEMS: Plan-Do-Check-Act Model

Figure 1: Generalized PDCA Model
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

- Clause 4-Context of the Organization (PLAN PHASE);
- Clause 5-Leadership (PLAN PHASE);
- Clause 6- Planning (PLAN PHASE);
- Clause 7- Support (DO PHASE);
- Clause 8-Operation (DO PHASE);
- Clause 9-Performance Evaluation (CHECK PHASE) and;
- Clause 10-Continuous Improvement (ACT PHASE) (ISO 9001, 2015)
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

- Clause 4: Context of the Organization
  - Determine factors affecting products/services;
  - Determine interested parties;
  - Determine the goals/objectives of the organizations QMS;
  - Defining the organizations processes
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

- Clause 5- Leadership
  - Demonstrating customer focus;
  - Defining and implementing the organizations quality policy and;
  - Defining responsibilities within the organization.
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

• Clause 6- Planning
  • Management of risks/opportunities;
  • Meeting quality objectives and;
  • Management of change.
INTEGRATION OF MANAGEMENT SYSTEMS:
Breakdown of ISO Standards through ISO 9001

• Clause 7- Support
  • Essential personnel and equipment;
  • Infrastructure and Environment;
  • Measurement and monitoring and;
  • Maintaining knowledge, training, and competence.
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

- Clause 8- Operation
  - Process control to meet specifications of products/services;
  - Management of internal and external processes;
  - Management of inputs and outputs concerning the process and;
  - Control of non-conformance.
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

- Clause 9- Performance evaluation
- Determination of monitoring requirements to meet product/service specification;
- Establishment of auditing process for conformance and;
- Management review of quality management system inputs/outputs.
INTEGRATION OF MANAGEMENT SYSTEMS: Breakdown of ISO Standards through ISO 9001

• Clause 10- Continuous Improvement
  • Corrective actions concerning non-conformance and preventive measures and;
  • Continual improvement of the quality management system.
INTEGRATION OF MANAGEMENT SYSTEMS: Common Metrics ISO 14001

- ISO 14001 is structured similar to ISO 9001
- Benefits:
  - Improved relationships with customer and regulatory agencies
  - Increased efficiency through eliminating unnecessary waste
  - Efficient process
- Focuses on the following:
  - Improve Environmental Performance;
  - Meet environmental compliance and customer requirements and;
  - Achieve environmental objectives.
INTEGRATION OF MANAGEMENT SYSTEMS: Common Metrics ISO 14001

- COMMON METRICS
  - Tracking of inputs/outputs of the process chemical;
  - Tracking of environmental incidents/accidents concerning the process chemical;
  - Tracking of energy usage from the process;
  - Tracking of waste produced involving the process chemical;
  - Tracking of individuals trained concerning the process chemical and;
  - Tracking investments towards environmental protection concerning the process chemical (ISO 14001, 2015).
INTEGRATION OF MANAGEMENT SYSTEMS: Common Metrics OSHAS 18001

• OHAS 18001 is similar in structure to ISO9001
• Focuses on the following:
  • Control of Occupational Health and Safety Risks;
  • Improved Occupational Health and Safety management performance and;
  • Demonstrate compliance to the organizations Occupational Health and Safety Management System, OSHA, and other customer requirements.
INTEGRATION OF MANAGEMENT SYSTEMS: Common Metrics OSHAS 18001

• Metrics to consider:
  • Human factors concerning the PSM/RMP program;
  • Routine/nonroutine job duties;
  • Design of processes/equipment/SOP;
  • Identifying internal/external hazards concerning the PSM/RMP process and;
  • Management of changes within the organization or process (OSHAS 18001, 2008).
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

• The American Petroleum Institute (API) developed a Recommended Practice (RP) for process safety indicators. The following are the guiding principles for implementing process safety indicators:
  • Drive improvement of process safety and learning;
  • Easy to be understood by all stakeholders;
  • Appropriate for the industry and;
  • Be statistically valid (API, 2016).

• Leading versus Lagging indicators

• Process Indicators have been implemented in Program 4 requirements
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

- Process safety indicators include the following:
  - Tier 1 Indicators (Lagging): Loss of Primary Containment (LOPC) events of greater consequences
  - Tier 2 (Lagging): LOPC of lesser consequence
  - Tier 3 (Lagging): Challenges to the Safety Systems
  - Tier 4 (Leading): Operating Discipline and Management System Performance Indicators
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

- Process safety indicators include the following:
  - Tier 1 Indicators (Lagging): Loss of Primary Containment (LOPC) events of greater consequences
    - Fire explosion >$100,000
    - Employee/contractor “days away from work” or fatality
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

- Process safety indicators include the following:
  - Tier 2: LOPC of lesser consequence
    - Fire/explosion >$2,500
    - Employee/contractor recordable injury
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

- Process safety indicators include the following:
  - Tier 3: Challenges to the Safety Systems
    - Excursions of safe operating limits of a vessels tank level
    - Exceeding acceptable limits of wall thickness of vessel
INTEGRATION OF MANAGEMENT SYSTEMS: Leading/Lagging Indicators recommended by API

- Process safety indicators include the following:
  - Tier 4: Operating Discipline and Management System Performance Indicators
    - Training completed
    - PHA performed
INTEGRATION OF MANAGEMENT SYSTEMS: CCPS Guidelines to a PDCA Model PSM/RMP Program

• CCPSs FOUR PILLARS (CCPS, 2007)
  • Commitment to Process Safety
  • Understand Hazards and Risks
  • Manage Risk
  • Learn from Experience
INTEGRATION OF MANAGEMENT SYSTEMS:
CCPS Guidelines to a PDCA Model PSM/RMP Program

- Commitment to Process Safety (PLAN PHASE)
  - Process Safety Culture
  - Compliance with Standards
  - Process Safety Competency
  - Workforce Involvement
  - Stakeholder Outreach
INTEGRATION OF MANAGEMENT SYSTEMS:
CCPS Guidelines to a PDCA Model PSM/RMP Program

• Understand Hazards and Risk (PLAN PHASE)
  • Process Knowledge Management
  • Hazard Identification and Risk Analysis
INTEGRATION OF MANAGEMENT SYSTEMS:
CCPS Guidelines to a PDCA Model PSM/RMP Program

• Managing Risk (DO PHASE)
  • Operating Procedures
  • Safe Work Practices
  • Asset Integrity and Reliability
  • Contractor Management
  • Training and Performance Assurance
  • Management of Change
  • Operational Readiness
  • Conduct of Operations
  • Emergency Management
INTEGRATION OF MANAGEMENT SYSTEMS: CCPS Guidelines to a PDCA Model PSM/RMP Program

- Learn from Experience (CHECK/ACT PHASE)
  - Incident Investigation
  - Measurement and Metrics
  - Auditing
  - Management Review and Continuous Improvement
  - Implementation (CCPS, 2007).
NEW CALARP REGULATIONS:
Promulgation of PSM/CalARP Program 4

REFINERY INCIDENTS IN CALIFORNIA:

- ExxonMobil Refinery Explosion (Torrance, 2015, ongoing investigation)
- Tesoro Martinez Sulfuric Acid Spill (Martinez, 2014, ongoing investigation)
- Chevron Refinery Fire (Richmond, 2012)
- Tosco Avon Refinery Naphtha Fire (Martinez, 2001)
NEW CALARP REGULATIONS:
Promulgation of PSM/CalARP Program 4

Chevron Richmond Photo
NEW CALARP REGULATIONS: 
Promulgation of PSM/CalARP Program 4

Presentation adapted from "California's Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas

Governor’s Report on Refinery Safety Recommendations

Strengthen PSM and Cal ARP Programs:

1. Implement inherently safer systems to the greatest extent feasible;
2. Perform periodic safety culture assessments;
3. Adequately incorporate damage mechanism hazard reviews into Process Hazard Analyses;
4. Complete root cause analysis after significant accidents or releases;
5. Explicitly account for human factors and organizational changes; and
6. Use structured methods such as Layer of Protection Analysis to ensure adequate safeguards.

Additional areas: Reporting of leading and lagging indicators, increasing worker and community involvement and exploring the safety case approach
NEW CALARP REGULATIONS:
Section 2762.5(e): Damage Mechanism Review (DMR)

Presentation adapted from “California’s Proposed Process Safety Management (PSM) Regulation Section 5189.1” and Presented by Clyde J. Trombettas

- Scope: “each process for which a damage mechanism exists”;
- Initial DMR within 5 years (50% within 3 yrs);
- Revalidated every 5 years or prior to a major change;
- Reviewed as part of an incident investigation;
- Team must include experts and employees;
- Feeds into the Process Hazard Analysis.
NEW CALARP REGULATIONS:
Section 2762.13: Hierarchy of Hazard Control Analysis

- Hierarchy of Hazard Control; A system used to minimize or eliminate exposure to a hazard or to reduce the risk presented by a hazard. Control measures listed from most effective control measure to least effective control measure are: (1) eliminating the hazards altogether (first order inherent safety), (2) reducing severity of hazard or likelihood of release (second order inherent safety), or (3) applying layers of protection, including passive, active, or procedural safeguards (layers of protection).
NEW CALARP REGULATIONS:
Section 2762.13: Hierarchy of Hazard Control Analysis

Presentation adapted from "California’s Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas

• Initial HCA for all processes, & revalidation every five years. Refineries also must conduct an HCA when: (1) recommendations from a Process Hazard Analysis (PHA) show a potential for a major incident, (2) a major change is proposed, or (3) a major incident occurs.

• Also during the design of any new process, process unit, or facility. An HCA done for this purpose must be made available to the public, with appropriate protections for trade secret information.

• HCAs are conducted by a team with expertise in inherent safety and safeguards, with employee representation.

• Refineries must select the highest order safety measure unless it is not feasible. Any finding of infeasibility must be documented.
NEW CALARP REGULATIONS:
Section 2762.13: Hierarchy of Hazard Control Analysis

Presentation adapted from "California's Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas

1st Order Inherent Safety (Safer chemicals)

2nd Order Inherent Safety (Lower Volume of Chemicals)

Passive Layers of Protection (Corrosion Resistant Piping)

Active Layers of protection (auto shut-downs)

Procedure Protections
NEW CALARP REGULATIONS:
Section 2762.2.1: Safeguard Protection Analysis

Presentation adapted from “California's Proposed Process Safety Management (PSM) Regulation Section 5189.1” and Presented by Clyde J. Trombettas

- “Safeguard” means a device, system, or action that interrupts the chain of events following an initiating cause, or that mitigates the impacts of an incident. [Passive/Active/Procedural Safeguards]

- Conduct and update within 6 months of finalizing a Process Hazard Analysis (PHA), to ensure the effectiveness of the individual and combined safeguards for each failure scenario identified in the PHA, and to assure that the safeguards are independent of each other.

- Team with expertise in engineering and process operations, the methodology, and the safeguards being evaluated; at least one employee representative.
NEW CALARP REGULATIONS:
Section 2762.2.1: Safeguard Protection Analysis

Presentation adapted from "California's Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas
NEW CALARP REGULATIONS:
Section 2762.14: Process Safety Culture Assessment

Presentation adapted from "California’s Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas

• Assessment of the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals in order to ensure protection of people and the environment.

• Shall be done every 5 years, with a mid-term check on progress to:
  – Ensure that reporting of safety concerns is encouraged;
  – Ensure that reward or incentive programs do not deter reporting of concerns or incidents;
  – Ensure that safety is not compromised by production pressures;
  – Promote effective process safety leadership at all levels of the organization.

• Employees and their representatives shall participate in all phases of the safety culture assessment.

• The refinery manager, or his or her designee, must sign off on all process safety culture assessment reports and corrective action plans.
NEW CALARP REGULATIONS:
Section 2762.15: Human Factors Program

Presentation adapted from “California’s Proposed Process Safety Management (PSM) Regulation Section 5189.1” and Presented by Clyde J. Trombettas

• A discipline concerned with designing machines, operations, and work environments so that they match human capabilities, limitations, and needs. Human factors can be further referred to as environmental, organizational, and job factors, and human and individual characteristics, such as fatigue, that influence behavior at work in a way that can affect health and safety.

• Human factors program shall take into account staffing levels, complexity of tasks, time needed to complete tasks, level of training and expertise, human-machine interface, fatigue, communication systems, and other factors.

• Human factors must be assessed and included in all PHAs, incident investigations, written operating and maintenance procedures, and in management of change processes for major changes and organizational changes.

• Written program must include:
  • Training, operating, and maintenance procedures.
  • Staffing, shiftwork, overtime, and fatigue.
NEW CALARP REGULATIONS:
Section 2762.6(i): Management of Organization Change (MOOC)

Presentation adapted from “Californi’s Proposed Process Safety Management (PSM) Regulation Section 5189.1” and Presented by Clyde J. Trombettas

• An analysis of impacts of any staffing changes or reorganization of operations, including reducing staffing levels, changing experience levels of employees, changing shift duration, or making changes in employee responsibilities.

• Analysis of change by a team; documentation of analysis, decision, and basis.

• Certification by the refinery manager that the proposed change(s) will not increase the likelihood of a major incident.

• Workers and their representatives must be involved in these processes.
NEW CALARP REGULATIONS:
Section 2762.16: Accidental Release Prevention Program Management

Presentation adapted from "California’s Proposed Process Safety Management (PSM) Regulation Section 5189.1" and Presented by Clyde J. Trombettas

• Written management system to ensure that all program elements are developed, implemented, modified when needed, communicated, and roles and responsibilities are assigned.

• Compliance audit every 3 years.

• Review all recommendations from team reports against defined rejection criteria; generate corrective actions; and implement corrective actions according to a specified timeline. Communicate reasons for all delays in the corrective action work process to employees. Document close-out of all recommendations and corrective actions.
New CalARP Program Regulations: Leading/Lagging Indicators in Program 4

- Must be submitted to Cal OES and is posted in June 30th every year of a period of January 1-December 30
- Process safety indicators include the following:
  - Inspections of pressure vessels per RAGAGEP;
  - Inspection of piping per RAGAGEP;
  - Past due PHA;
  - Past due compliance audits;
  - Major Incidents;
  - Past due investigations;
  - Past due submittal requirements of the RMP and;
  - The number of times temporary piping or equipment is utilized.
NEW CALARP REGULATIONS: Overview

- SPA, DM, MOOC AND HCA provide additional assessments on in-depth risk analysis of the organization and equipment
- PSCA assesses overall work forces involvement and understanding of the process. It is the developed mentality of how the “organization behaves when no one is watching.”
- Management commitment reinforces the established culture and reduces gap knowledge between the employees and management
Management Commitment and Employee Participation
Management Commitment and Employee Participation

• Management Commitment
  • Formalize a safety and health policy
  • Provide training
  • Setting clear goals and objectives
  • Hazard prevention and control
  • Promoting safe work practices
  • Holding company and individuals accountable for safety performance
  • Providing Recognition
  • Conduct work site analysis
Management Commitment and Employee Participation
Management Commitment and Employee Participation

• Employee Involvement
  • Actively attending all company safety meetings
  • Reporting any incidents or near misses
  • Reporting unsafe acts or conditions
  • Actively participating in process studies/policies
    • PHA, MOC, SOPS etc..
QUESTIONS?
REFERENCES


REFERENCES


• California Accidental Release Prevention Program (CalARP), Title 19 C.C.R. (2017)


REFERENCES


• Center for Chemical Process Safety (CCPS) of the American Institute of Chemical Engineers (1996) Guidelines for Integrating Process Safety Management, Environment, Safety, Health, and Quality. American Institute of Chemical Engineers


• Center for Chemical Process Safety (CCPS) of the American Institute of Chemical Engineers (2007) Guidelines for Risk Based Process Safety.
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