
SECTION A: SAFETY PROGRAM MANAGEMENT

Section 450-8.016(a) of County Ordinance Code Chapter 450-8, as amended by County Ordinance 2006-22¹, requires Stationary Sources that are subject to the requirements of Chapter 450-8 to apply the federal program 3 prevention program elements to all covered processes² within their facility. Federal program 3 prevention program elements include the following programs:

1. Process Safety Information
2. Operating Procedures
3. Employee Participation
4. Training
5. Mechanical Integrity
6. Management of Change
7. Pre Start-up Reviews
8. Compliance Audits
9. Incident Investigation
10. Hot Work
11. Contractors
12. Emergency Response Program
13. Safety Program Management

Programs 1-11 should be developed and implemented in conformance with Chapters 7 and 9 of the *Contra Costa County CalARP Program Guidance Document (CalARP Guidance Document)*. Program 12, Emergency Response Program, should be developed and implemented in conformance with Chapter 8 of the *CalARP Guidance Document*. In addition to hot work, three additional programs address safe work practices related to maintenance. They are as follows:

14. Line and Equipment Opening
15. Lockout/Tagout
16. Confined Space Entry

The regulatory requirements for these safe work practices are outlined by the CalOSHA regulations CCR Title 8 §5189; however, the amended County ISO requires that human factors be considered when developing and implementing the safe work practices.

Program 13, Safety Program Management, should be developed and implemented in conformance with Chapter 5 of *CalARP Guidance Document*. Additionally, Stationary Sources should include the following considerations in Safety Program Management.

A.1 MANAGEMENT SYSTEMS

Section 5.1 of the *Contra Costa County CalARP Program Guidance Document* states the management system developed by the Stationary Source must oversee the implementation of the CalARP program elements. Section 5.1.1 states that the management commitment to

process safety is a critical element of the Stationary Source's CalARP program and from Safety Culture Assessment, it is crucial to the success of prevention program elements.

There are many documented approaches to management systems. In many cases management systems are typically categorized by the following elements:

- Defining or setting expectations (commitment and responsibilities)
- Communicating the expectations
- Enforcing the expectations
- Measuring and following up on the expectations

Whatever management system the Stationary Source chooses to use, the system must ensure ongoing implementation of the Safety Program prevention programs. This section lists factors to consider in developing or implementing management systems.

- Ensure continuous management commitment
- Ensure the management system for the Safety Program elements is consistent with the human factors guidance developed by Contra Costa Hazardous Materials Programs (CCHMP), Contra Costa Health Services CalARP Guidance Document Chapters 5, 7, and 8, the CalARP Program, Process Safety Management, and Industry Codes, Standards, and Guidelines as defined in 450-8.014(f) of the County Ordinance Code.
- Ensure two-way communication between line personnel and senior management for the Safety Program elements, including what the elements consist of, implementing the Safety program elements, modifying the prevention elements, and the effectiveness of the Safety Program elements
- Define the roles and responsibilities for the required Safety Program elements
- Develop Job function descriptions or competency models for positions with responsibilities for health and safety, emergency response, operations and maintenance
- Evaluate the effectiveness of the Safety Program elements
- Develop a process to make changes when necessary to any of the Safety Program elements
- Establish Goals and Objectives
- Worker Feedback System
- Ensure External Communication

These elements are described in detail below

A.1.1 MANAGEMENT COMMITMENT

“Management should lead its facility by taking a visible and active role in safety management, championing safety performance, set objectives and targets, and establish accountabilities at all levels.”³ “Like the effort put in productivity, maintenance and quality, every participant in the organization should contribute to safety. By consequence, like productivity, maintenance and quality, safety should also be managed, and it should be managed from the top of the organization”⁴ “No error management initiative will be successful unless commitment to change is engendered at all levels in the organization. This can only be achieved if the commitment of senior management is demonstrated explicitly in terms of the resources (time, money, and exposure) that they are prepared to devote to the initiative.”⁵

- The management systems should describe how senior Stationary Source staff is assigned overall responsibility to oversee compliance for the Safety Program. This may be documented in senior Stationary Source staff job function descriptions or competency models, the goals and responsibilities documented during regular performance reviews, etc.
- Safety Program elements should be discussed in management meetings on a regular basis. This should be documented using meeting outlines or agendas, in meeting minutes or other types of documents.
- The management systems should state how senior Stationary Source staff has established detailed Safety Program goals for management with specific objective and goals, and tracks management involvement in workplace safety meetings, audits, and related activities. This may be documented in meeting minutes with record of attendees, or senior Stationary Source staff normal performance reviews, etc.
- The management systems should address how senior Stationary Source staff is held accountable for their Health and Safety Program record, and how do the rewards and penalties compare to those for production performance. This may be documented in the senior Stationary Source staff normal performance reviews, or Stationary Source’s “score card” or “performance indicators”, etc.
- Senior Stationary Source staff should address how the Stationary Source promotes “safety first” approach. This should be apparent in the safety program policies and documents.
- Senior Stationary Source staff should periodically review the Safety Program management system for continued appropriateness, adequacy, and effectiveness. Documentation of these reviews may be in meeting minutes, study reports, etc.
- Senior Stationary Source staff should receive information on incident and incident investigations and inspection/audit reports. This may be documented by emails, meeting minutes, documentation of communication of performance metrics – see Section A.1.2.3, etc.
- Senior Stationary Source staff should participate in specific Safety Program

initiatives/programs. Documentation of this may include announcements which indicate senior Stationary Source staff participation, meeting minutes, endorsements, etc.

- Senior Stationary Source staff should assist in the development of or issue specific types of Safety Program information and guidance.
- Senior Stationary Source staff should ensure that there is expertise available in each of the different Safety Program elements, including Human Factors. This includes proper training and background experience.
- Senior Stationary Source staff should allocate time and resources for the different Safety Program elements. Documentation of allocated resources may include budget line items, sufficient personnel assigned to develop and implement the Safety Program elements, etc.
- Senior Stationary Source management should promote the understanding of the different Safety Program elements, including Human Factors to encourage the efficient incorporation of these ideas into the work flow in process design, operation, maintenance, and incident investigations.

A.1.2 ENSURE THERE IS A MANAGEMENT SYSTEM FOR SAFETY PROGRAM ELEMENTS

The Stationary Source must have a management system in place to ensure that all of the Safety Program elements are developed, implemented, modified when needed, communicated, and roles and responsibilities are assigned. The management systems should be audited to determine the effectiveness of the program in place. The management system program should have written policies and procedures that should be reviewed and revised annually. The management system should include the following subsections.

A.1.2.1 COMMUNICATION

The management system should address the communication that exists between the line personnel, staff personnel, supervisors, and upper management. Effective two-way communication is essential to having a program that works effectively. Therefore, the program should address two-way communication, reporting lines, information exchange, and employee involvement.

The management system must ensure how communications are addressed in the Safety Program elements. The program must state how the findings, recommendations, and results of the process hazard analyses, incident investigations, and management of change are communicated to the employees. The program should address the communications between appropriate personnel in the organization (such as between shifts). The program must address how employee participation is incorporated in the prevention elements, including how this program will be communicated and

how input will be solicited from the employees (see Section B Chapter 9 Employee Participation).

A.1.2.2 ROLES AND RESPONSIBILITIES

The management system for the Stationary Source's Safety Program elements should include the Stationary Source's personnel's specific responsibilities for managing Safety Program elements development and implementation. The job descriptions and annual performance goals for safety of each employee should be clearly defined; documented and reviewed with the employee to be sure these are understood. Job descriptions must be collectively reviewed to be sure that there are no gaps in coverage.

A.1.2.3 EVALUATION

The Stationary Source should have a management system in place to ensure the Stationary Source evaluates the effectiveness of the different Safety Program elements. To evaluate and measure the effectiveness of the Safety Program elements, the Stationary Source should establish performance metrics with an initial baseline as described in Section A.1.2.8.

A.1.2.4 MODIFICATION TO THE PROGRAM

As part of the management system, the Stationary Source should have a process to make and track changes to the Safety Program elements policies and procedures. The changes should be based on the evaluation process, the auditing of the program, and input from the employees. The changes made to the Safety Program elements policies and procedures should be a part of the overall management of change program that the Stationary Source has implemented.

A.1.2.5 GOALS AND OBJECTIVES

Site goals and objectives should be established for the Safety Program elements at all levels of the organization. The goals and objectives should define what is to be accomplished for each Safety Program element.

A.1.2.6 WORKER FEEDBACK SYSTEM

Feedback from workers on job improvement will only happen in an environment of trust. Without this environment, employees are less likely to fully contribute to PHAs, incident investigation, including near miss reporting, and other Safety Program elements. The management systems should have procedures/policies in place to create an environment where workers can and will communicate problems with the processes, organization, and equipment. The management systems should describe how

these procedures/policies are incorporated throughout the organization.

A.1.2.7 EXTERNAL COMMUNICATIONS

The Stationary Source should work with CCHMP in preparing for public meetings associated with the Industrial Safety Ordinance and participate with CCHMP in these meetings as requested.

A.1.2.8 LEADING AND LAGGING INDICATORS

An essential element of any management improvement program is the measure of existing performance. A system for measuring or monitoring performance may afford the ability to improve quality, efficiency, reliability, performance, safety, and a variety of other items of interest. Stationary Sources need to strive to continuously improve their process safety performance; and to accomplish this, Stationary Sources should implement effective leading and lagging process safety metrics in order to assess the status of these various programs and establish a baseline for future improvement.

Stationary Sources need to develop useful and credible metrics. CCPS has identified that a good metric should: ⁵

- Allow accurate and detailed comparisons
- Lead to correct conclusions and avoid erroneous conclusions
- Be well understood
- Have a quantifiable basis

CCHMP recognizes two types of metrics that should be considered and evaluated: ^{6,7}

- **“Lagging” Metrics** – are outcome oriented and retrospective; they describe events that have already occurred and may indicate potential recurring problems and include fires, releases, and explosions. An example of personal safety lagging metrics is OSHA recordable injuries. An example of process safety lagging metrics is a process safety incident. While lagging metrics are after the fact measuring, they should be established at a level below which a significant event occurs; so that they may be used in prevention.

For Stationary Sources that intend to follow the CCPS’ Guidelines for Process Safety Metrics book⁶ for lagging metrics, additional lagging metrics should be considered and evaluated which include “Near Miss” and other internal Lagging Metrics. These could be “almost” incidents or small process safety events that resulted in

negligible impacts (i.e., below the threshold for inclusion in the lagging metric described above), unsafe conditions which activated one or more layers of protection (e.g., pressure relief device discharges), exceeding operating limits without completing an MOC, observed unsafe practices or behaviors, loss of primary containment, or unplanned fires/flames.

- **“Leading” Metrics** – are forward-looking and indicate the performance of the key work processes, operating discipline, or layers of protection that prevent incidents. They are designed to give an early indication of problems or deterioration in key safety systems early enough that corrective actions may be taken to avoid a process safety incident. Examples of leading metrics include: leadership involvement with line safety meetings; manual interventions to stop work/process for safety concerns; assigned action items not completed on time (e.g., from PHAs, compliance audits, incident investigations, etc.); overdue operating procedure reviews; equipment failure upon testing/inspection; overdue temporary MOCs; overdue training; spurious trips of independent protection functions (IPFs); etc.

These two types of metrics may be considered as measurements at different levels of the organization safety program measurement system. Stationary Sources are encouraged to review suggested metrics contained within CCPS’ Guidelines for Process Safety Metrics book⁶ with the understanding that metrics developed should not be limited to catastrophic process safety incidents only. For Stationary Sources that is tracking incident reporting based on the API Process Safety Performance Standard, the Tiered system clearly defines external and internal metrics for lagging and leading indicators. Stationary Sources should develop metrics that promote broad awareness of process safety concerns, some of which may not be related to an actual or potential catastrophic incident.

A.1.2.9 PUBLICLY REPORTED PROCESS SAFETY PERFORMANCE INDICATORS:

As part of the annual reporting to the County’s Board of Supervisor and the Richmond City Council, Process Safety Performance Indicators that are common to all ISO facilities will be included. The data will be collected monthly and reported to CCHS through their annual updates by June 30 of each year. The Process Safety Performance Indicators are measurements of the health of the process safety programs. The indicators can also be used to track how the process safety programs are progressing over time. Four common indicators have been developed that include past due inspections for piping and pressure vessels; past due PHA recommendations; past due incident investigations recommendations; and API/ACC Tier I and II

incidents.

A.1.2.9.1 PAST DUE INSPECTIONS FOR PIPING AND PRESSURE VESSELS

Overdue inspection for piping and pressure vessels will be reported. This information will not include relief devices, instrumentation, instrument air receivers, boilers, furnaces, atmospheric tanks, or rotating equipment.

Pressure vessels include but are not limited to: heat exchangers, columns, spheres, bullets as defined by CA Safety Order and U-stamped (or treated as such). The scope of the inspections for this reporting include external visual, corrosion monitoring location (CML) and non destructive examination (NDE), and internal visual. Title 8, Division 1, Chapter 4, Subchapter 1 Unfired Pressure vessel safety orders defines pressure vessels as follows:

Pressure Vessel: An unfired container, including cylinders, used for the storage or accumulation of any gas or liquid under pressure. This definition is not intended to include pressure chambers that are integral parts of such devices as pumps, motors, engines, clothes presses, flatwork ironers, tire molds, etc., where the pressure containing part is subjected to severe mechanical stresses. Example listed in the safety order include: LPG and Ammonia storage for operation at 15 psig or greater.

A.1.2.9.2 For Process Piping and piping components excluding utility piping, the scope of the inspections for reporting include external visual, CML/NDE and internal visual as appropriate.

Past due is defined as overdue by the requirements listed in CA Code of Regulations Title 8, Section 6857, API 510 and API 570. Deferral/extension may be allowed provided that it follows the requirements contained within the above code and recommended practices. Overdue should exclude new data that is uncovered from a new improved inspection program or uncovered from inspection data. This new data shall be handled per the stationary source's policy in compliance with applicable codes.

Inspections will be defined by circuits rather than points. A circuit may be defined by isometrics, by process stream and piping class, or piece of equipment, such as a pressure vessel. When reporting past due inspections in the annual report, the stationary source shall include the total number of circuits at the stationary source and the

total number of annual planned circuit inspection for that year to provide context regarding the number of circuits/equipment defined by the inspection program at the facility.

A.1.2.9.2 PAST DUE PHA Recommended Actions

Past due PHA recommended actions and seismic recommended actions will be reported. If a stationary source receives an extension approved by CCHS, the new approved due date will apply. The latent condition recommendations that are generated as part of the PHA process will be included but a latent condition recommendations generated outside of the PHA will not be included.

A.1.2.9.3 PAST DUE Investigation Recommended Actions for API/ACC Tier 1 and Tier 2 Incidents

Past due Investigation recommended actions will be reported for API/ACC Tier1 and Tier 2 incidents. Incidents that occurred after the API/ACC Tier 1 and 2 definitions were approved and that have

recommended actions that are past due after the 2014 ordinance revision are subject to this requirement.

A.1.2.9.4 Accounting for Past Due Items

Past due item is an item that is not completed by the end of the month during the month that is due. Each month an item that is past due will be counted overdue. If the item is continued from the prior month then it is also counted as a repeat item. The repeat row is a subset of the overdue items. If there are anomalies to the data that is collected, the facility should describe the amomalie. The table below will be used for each of the indicators listed above.

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Overdue													
Repeat													

A.1.2.9.5 API/ACC Tier 1 and Tier 2 Incidents

The number of Tier 1 events that have occurred beginning 2011 will be reported by year for the 2015 annual report. In additions the number, the rate accorded by ACC/API will also be reported. The petroleum refineries will also report the number of Tier 2 events that have occurred beginning 2011 and the rate accorded by API. The petroleum refineries will report the API Tier 1 and tier 2 rate along with the publically available refinery mean. The chemical plants will report the ACC Tier 1 along with the publically available ACC mean.

The definition below is from API RP 754 dated April 2010. The guidance will be updated as changes are made to API 754. ACC is planning to adopt API RP 754 but at this time uses CCPS “Process Safety Leading and Lagging Metrics” document dated January 2011.

Loss of Primary Containment – All unplanned or uncontrolled releases of any material from primary containment, including non-toxic, and non-flammable materials (e.g. steam, hot condensate, nitrogen, compressed CO₂ or compressed air).

API/CCPS Tier 1 Reportable Process Safety Event

A Tier 1 Process Safety Event is a loss of primary containment (LOPC) that results in one or more of the consequences listed below:

NOTE- Non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO₂ or compressed air) have no threshold quantities and are only included in this definition as a result of their potential to result in one of the other consequences.

- an employee, contractor or subcontractor “days away from work” injury and/or fatality;
- a hospital admission and/or fatality of a third-party;
- an officially declared community evacuation or community shelter-in-place;
- a fire or explosion resulting in greater than or equal to \$25,000 of direct cost to the Company;
- a pressure relief device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences:
 - liquid carryover;
 - discharge to a potentially unsafe location;
 - an on-site shelter-in-place;
 - public protective measures (e.g. road closure);
- and a PRD discharge quantity greater than the threshold quantities; or
- a release of material greater than the threshold quantities in any **one-hour** period.

Material Hazard Classification ^{a,c,d}	Threshold Quantity (outdoor release)	Threshold Quantity (indoor ^b release)
TIH Zone A Materials 5 kg (11 lb) 2.5 kg (5.5 lb)	11 lb	5.5 lb
TIH Zone B Materials 25 kg (55 lb) 12.5 kg (27.5 lb)	55 lb	27.5 lb
TIH Zone C Materials 100 kg (220 lb) 50 kg (110 lb)	220 lb	110 lb
TIH Zone D Materials 200 kg (440 lb) 100 kg (220 lb)	440 lb	220 lb
Flammable Gases or Liquids with Initial Boiling Point ≤•35 °C (95 °F) and Flash Point <•23 °C (73 °F) or Other Packing Group I Materials excluding strong acids/bases	1100 lb	550 lb
Liquids with Initial Boiling Point >•35 °C (95 °F) and Flash Point <•23 °C (73°F) or Other Packing Group II Materials excluding moderate acids/bases	2200 lb Or 7 bbl	1100 lb Or 3.5 bbl
Liquids with Flash Point ≥•23 °C (73 °F) and ≤•60 °C (140 °F) or Liquids with Flash Point >•60 °C (140 °F) released at a temperature at or above Flash Point or strong acids/bases or Other Packing Group III Materials	4400 lb Or 14 bbl	2200 lb Or 7 bbl

- a. Many materials exhibit more than one hazard. Correct placement in Hazard Zone or Packing Group shall follow the rules of DOT 49 CFR 173.2a [14] or UN Recommendations on the Transportation of Dangerous Goods, Section 2 [10]. See Annex B.
- b. A structure composed of four complete (floor to ceiling) walls, floor, and roof.
- c. For solutions not listed on the UNDG, the anhydrous component shall determine the TIH zone or Packing Group classification. The threshold quantity of the solution shall be back calculated based on the threshold quantity of the dry component weight.
- d. For mixtures where the UNDG classification is unknown, the fraction of threshold quantity release for each component may be calculated. If the sum of the fractions is equal to or greater than 100 %, the mixture exceeds the threshold quantity. Where there are clear and independent toxic and flammable consequences associated with the mixture, the toxic and flammable hazards are calculated independently. See Annex A, Examples 28, 29, and 30.

Loss of Primary Containment – All unplanned or uncontrolled releases of any material from primary containment, including non-toxic, and non-flammable materials (e.g. steam, hot condensate, nitrogen, compressed CO₂ or compressed air).

API/CCPS Tier 2 Reportable Process Safety Event

A Tier 2 Process Safety Event is a loss of primary containment (LOPC) that results in one or more of the consequences listed below:

NOTE- Non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO₂ or compressed air) have no threshold quantities and are only included in this definition as a result of their potential to result in one of the other consequences.

- an employee, contractor or subcontractor recordable injury;
- a fire or explosion resulting in greater than or equal to \$2,500 of direct cost to the Company;
- a pressure relief device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences:
 - liquid carryover;
 - discharge to a potentially unsafe location;
 - an on-site shelter-in-place;
 - public protective measures (e.g. road closure);
- and a PRD discharge quantity greater than the threshold quantities; or
- a release of material greater than the threshold quantities in any **one-hour** period.

Material Hazard Classification ^{a,c,d}	Threshold Quantity (outdoor release)	Threshold Quantity (indoor ^b release)
TIH Zone A Materials 5 kg (11 lb) 2.5 kg (5.5 lb)	1.1 lb	.55 lb
TIH Zone B Materials 25 kg (55 lb) 12.5 kg (27.5 lb)	5.5 lb	2.8 lb
TIH Zone C Materials 100 kg (220 lb) 50 kg (110 lb)	22 lb	11 lb
TIH Zone D Materials 200 kg (440 lb) 100 kg (220 lb)	44 lb	22 lb
Flammable Gases or Liquids with Initial Boiling Point ≤ +35 °C (95 °F) and Flash Point < +23 °C (73 °F) or Other Packing Group I Materials excluding strong acids/bases	110 lb	55 lb
Liquids with Initial Boiling Point > +35 °C (95 °F) and Flash Point < +23 °C (73 °F) Or Other Packing Group II Materials excluding moderate acids/bases	220 lb Or 1 bbl	110 lb Or .5 bbl
Liquids with Flash Point > 60 °C (140 °F) released at a temperature below Flash Point or Moderate acids/bases or	2200 lb Or 10 bbl	1100 lb Or 5 bbl

- a. Many materials exhibit more than one hazard. Correct placement in Hazard Zone or Packing Group shall follow the rules of DOT 49 CFR 173.2a [14] or UN Recommendations on the Transportation of Dangerous Goods, Section 2 [10]. See Annex B.
- b. A structure composed of four complete (floor to ceiling) walls, floor, and roof.
- c. For solutions not listed on the UNDG, the anhydrous component shall determine the TIH zone or Packing Group classification. The threshold quantity of the solution shall be back calculated based on the threshold quantity of the dry component weight.
- d. For mixtures where the UNDG classification is unknown, the fraction of threshold quantity release for each component may be calculated. If the sum of the fractions is equal to or greater than 100 %, the mixture exceeds the threshold quantity. Where there are clear and independent toxic and flammable consequences associated with the mixture, the toxic and flammable hazards are calculated independently. See Annex A, Examples 28, 29, and 30.

¹ Modifications were made to the Contra Costa County’s Industrial Safety Ordinance (ISO) in 2006. Major changes made to the human factors program requirements included: requiring changes to maintenance and emergency

response staffing to undergo a Management of Organizational Change evaluation; and requiring human factors evaluations of maintenance safe work practice procedures and maintenance procedures for specialized equipment, piping, and instruments. Since the corresponding City of Richmond's Industrial Safety Ordinance has not been amended, Stationary Sources subject to the City of Richmond's ISO are encouraged to comply with the County ISO amendments.

² "Covered Process" is defined as any process at the Stationary Source.

³ Arthur D. Little, Inc. (1996) – Facility Level Safety Management Audit Protocol

⁴ Moraal, J. (1992) Human Factors in Loss Prevention, International Conference on Hazard Identification and Risk Analysis, Human Factors and Human Reliability in Process Safety

⁵ Embrey, D. E. (1992) "Managing Human Error in the Chemical Process Industry", International Conference on Hazard Identification and Risk Analysis, Human Factors and Human Reliability in Process Safety

⁶ CCPS (2008), Process Safety Leading and Lagging Metrics

⁷ CCPS (2010), Guidelines for Process Safety Metrics