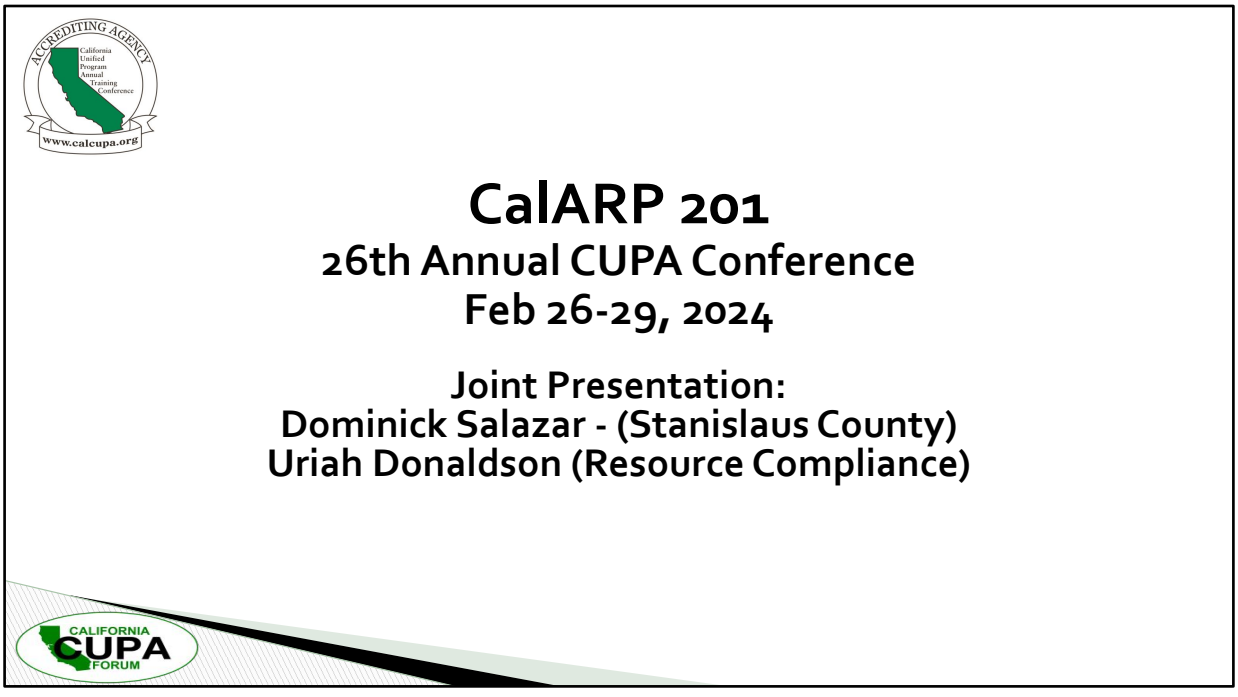


CalARP 201

26th Annual CUPA Conference
Feb 26-29, 2024

Joint Presentation:
Dominick Salazar - (Stanislaus County)
Uriah Donaldson (Resource Compliance)

Welcome to CalARP 201 class. This presentation will be a joint effort by Dominick from Stanislaus County and myself. Now our assumption is that if you are here, you have at least some experience with CalARP in the field. As such we hope to be a practical help in answering any questions you may have throughout the presentation. During the presentation feel free to ask any question at the link provided at the top of the screen. We may answer them on the fly or at the end of the presentation.

For those of you who are newer to CalARP, we hope this presentation will be helpful and informative.

Section 1: Uriah

- Introduction
- Applicability
- Definitions
- Program Levels

CalARP Applicability

EPA Federal	OSHA Federal	OSHA State	CUPA State
Risk Management Program	Process Safety Manager	Process Safety Management	California Accidental Release Prevention Program

Now just to start off, I want to paint the larger picture. You are here because you are either part of the regulatory community (which means you are dealing with CalARP) or you are here from industry, (which means you may have to deal with multiple regulations).

Historically, The Federal regulations of RMP and PSM came first, and the California versions came later. These regulations are more similar than they are different, but there are nuances which are important. With that being said, there have been modifications made to the Federal RMP regulation of which CalARP is derivative. Those modifications will be going into effect soon. It's possible, therefore, that CalARP will be getting an overhaul in near future as well. But I can't speak to that definitively.

With all of that as preface, if you are from industry and have questions about the Federal RMP regulation or OSHA's PSM regulations, I'd be happy to chat with you after the presentation, because this class is about CalARP.

CalARP Applicability

- An owner or operator of a **stationary source** that has more than a threshold quantity of a regulated substance in a **process**, as determined under this RMP and/or CalARP, must comply with the requirements of RMP and/or CalARP

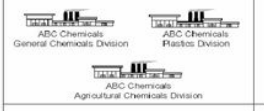
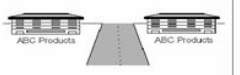
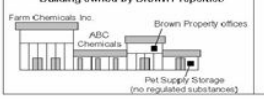
Who is subject to CalARP?

Stationary Source and Process are important terms to know. So let's define them.

CalARP §2735.4. Applicability.

Definition
Stationary Source

A **Stationary Source** is a "facility" with more than a threshold quantity of a regulated substance as found in the CalARP regulation.

Schematic Representation	Description	Interpretation
	***same*** owner ***same*** industrial group	1 stationary source 1 RMP
	two owners	2 stationary sources 2 RMPs 1 ABC 1 XYZ
	two owners three industrial groups	3 Stationary sources 3 RMPs 1 ABC Chemicals 1 ABC Refinery 1 XYZ Gases
	two owners	2 stationary sources 2 RMPs
	***same*** owner ***same*** industrial group contiguous property	1 stationary source 1 RMP
Building owned by Brown Properties 	two owners	2 stationary sources 2 RMPs 1 ABC Chemicals 1 Farm Chemicals

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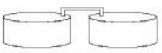
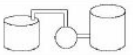
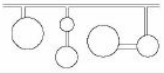
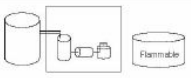
CalARP §2735.3. Definitions (xx) "Stationary source"

"Stationary source means any buildings, structures, equipment, installations, or substance emitting stationary activities which belong to the same industrial group, which are located on one or more contiguous properties, which are under the control of the same person (or persons under common control), and from which an accidental release may occur…."

Definition - Process

Process means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances, or combination of these activities. For the purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process

Schematic Representation	Description	Interpretation
	1 vessel 1 regulated substance above TQ	1 process
	2 or more connected vessels *same* regulated substance above TQ	1 process
	2 or more connected vessels *different* regulated substances each above TQ	1 process
	pipeline feeding multiple vessels total above TQ	1 process
	2 or more vessels co-located *same* substance total above TQ	1 process
	2 or more vessels co-located *different* substances each above TQ	1 process
	2 vessels, located so they won't be involved in a single release *same* or *different* substances each above TQ	2 processes
	2 locations with regulated substances each above TQ	1 or 2 processes depending on distance
	1 series of interconnected vessels *same* or *different* substances above TQs *plus* a co-located storage vessel containing flammables	1 process

CalARP §2735.3. Definition (mm) Process

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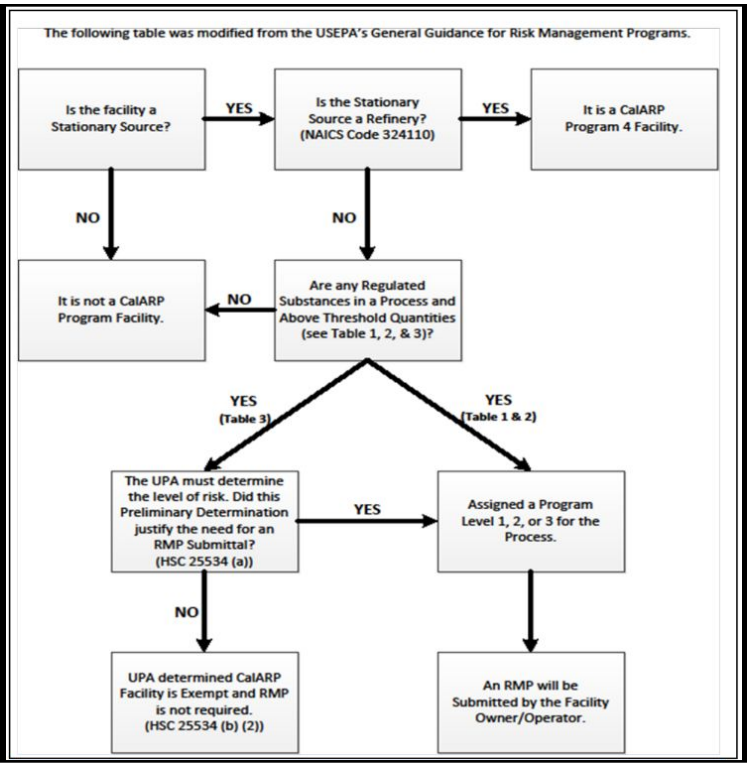
Stationary Source



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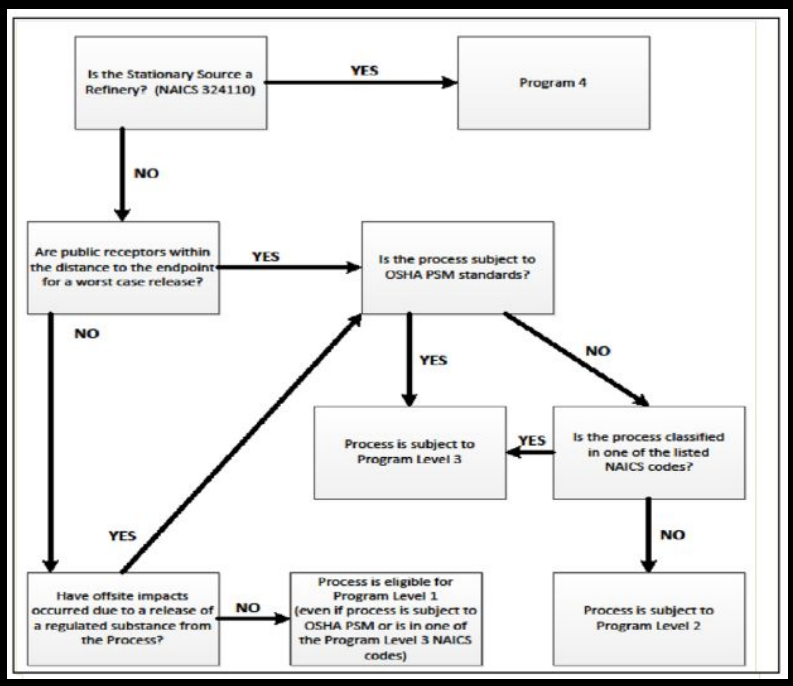
Stationary Source Program Level



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CalARP Applicability – Thresholds

Chemical Name	Fed RMP Threshold	Fed-OSHA PSM Threshold	CalARP Threshold	Cal-OSHA PSM Threshold
Ammonia	10,000 lbs.	10,000 lbs.	500 lbs.	10,000 lbs.
Sulfur Dioxide	5,000 lbs	1,000 lbs	500 lbs.	1,000 lbs
Chlorine	2,500 lbs.	1,500 lbs	100 lbs.	1,500 lbs

- Scenario #1 - Ammonia refrigeration facility with 25,000 lbs.
- Scenario #2 - Sulfur Dioxide storage cage with 900 lbs.
- Scenario #3 - Two one-ton containers of Chlorine

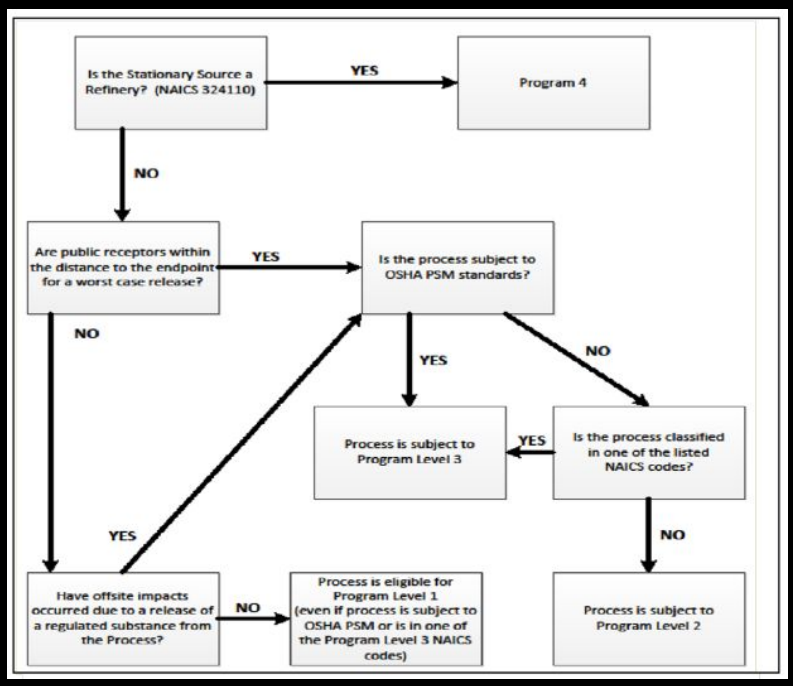
CalARP §2770.5. List of Substances Table 3

Scenario #1 – Ammonia 25,000 lb. System

Chemical Name	Fed RMP Threshold	Fed-OSHA PSM Threshold	CalARP Threshold	Cal-OSHA PSM Threshold
Ammonia	10,000 lbs.	10,000 lbs.	500 lbs.	10,000 lbs.

CalARP program 3

Stationary Source Program Level



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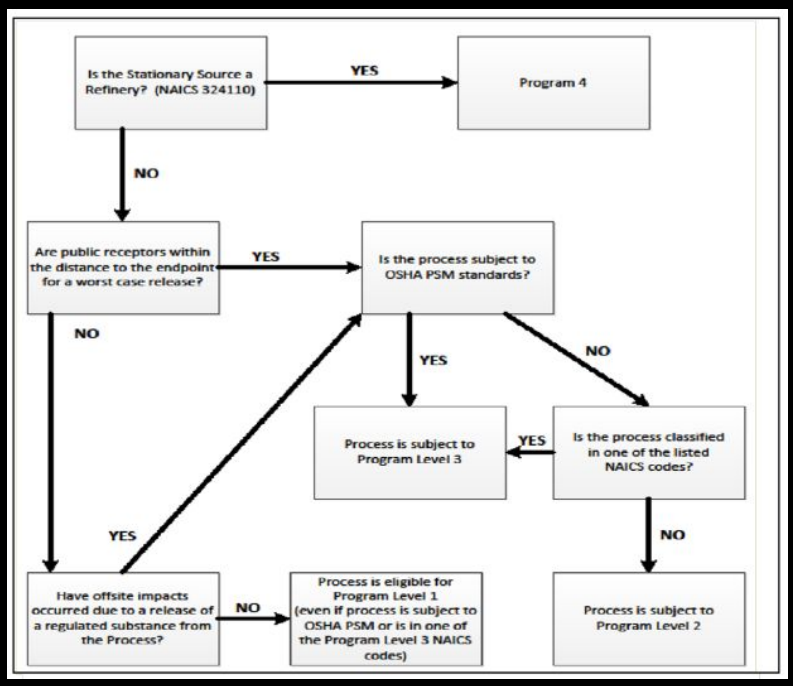
Scenario #2 – Sulfur Dioxide 900 lbs.

Chemical Name	Fed RMP Threshold	Fed-OSHA PSM Threshold	CalARP Threshold	Cal-OSHA PSM Threshold
Sulfur Dioxide	5,000 lbs	1,000 lbs	500 lbs.	1,000 lbs

CalARP Program 2

Stationary Source Program Level



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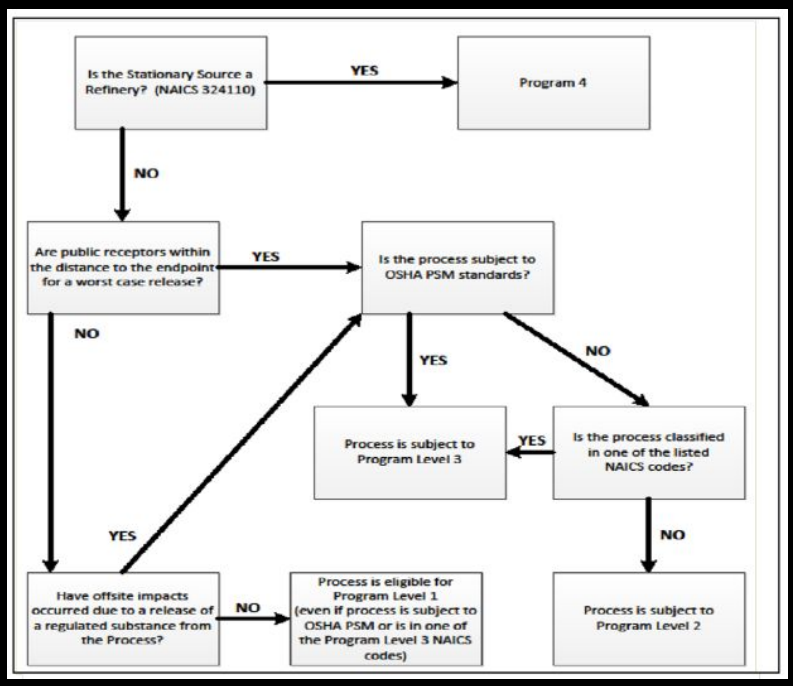
Scenario #3 - Chlorine Process – Two one-ton containers

Chemical Name	Fed RMP Threshold	Fed-OSHA PSM Threshold	CalARP Threshold	Cal-OSHA PSM Threshold
Chlorine	2,500 lbs.	1,500 lbs	100 lbs.	1,500 lbs

CalARP Program 3

Stationary Source Program Level



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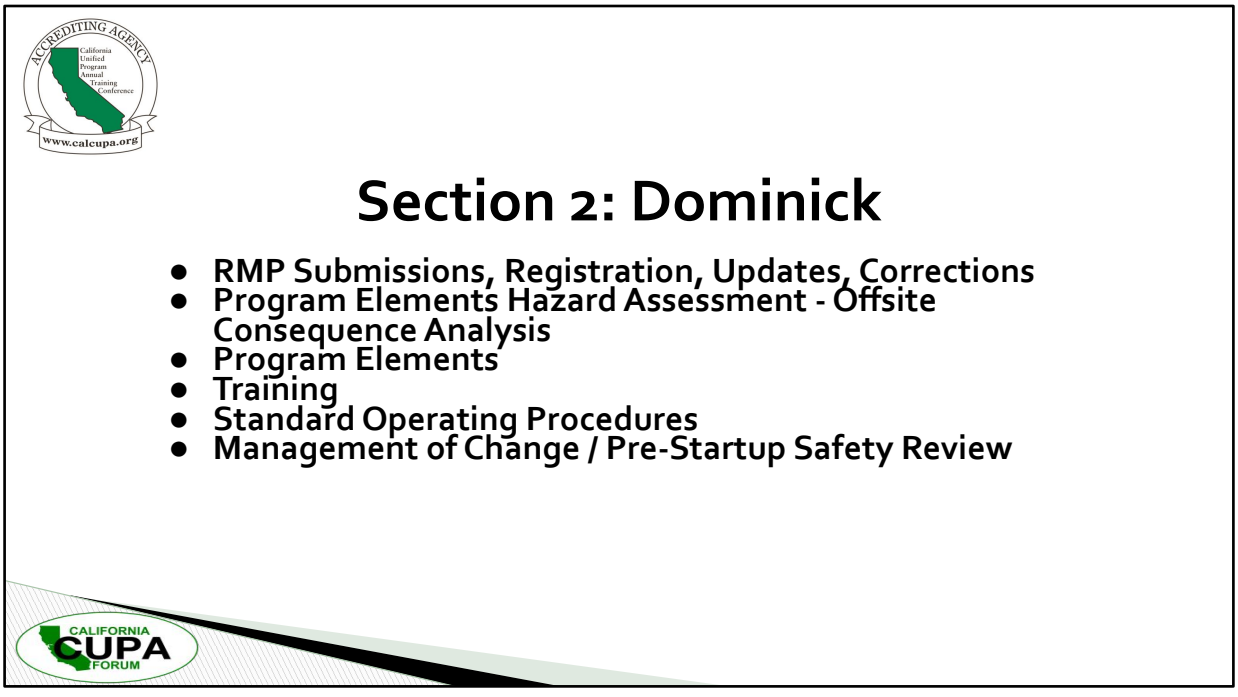


Thank you Uriah for doing a great job of going over applicability and program level. Now to the foundation has been laid for how a facility is subject to calarp, let's dive into some of the requirements for Calarp. The main requirement is that a risk management plan (RMP) needs to be submitted to the CUPA and/or EPA.

RMP Registration, Submission, Correction, Updates

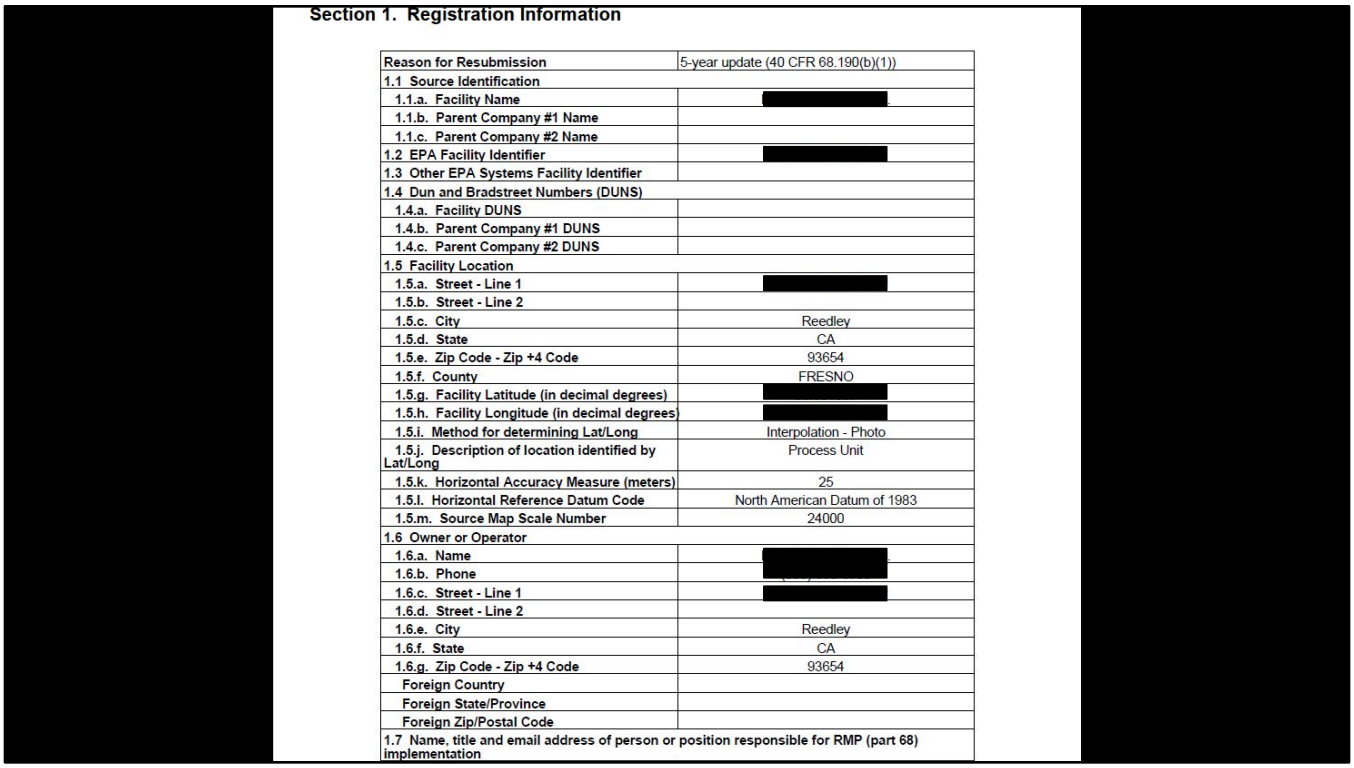
Registration [§ 2740.1]

- Includes basic registration type information such as:
  - Name and Address, Emergency Contact Info, Name of Regulated Substance, Number of Full Time Employees etc.

Submission [§ 2745.1]

- RMP information required by the USEPA shall be submitted to both the USEPA and CUPA no later than the date on which a regulated substance is first present in a process above a threshold quantity

EPA RMP's need to be submitted to the CUPA, we do not have access to the CDX website to obtain submissions. This could be a deficiency if RMP is submitted to EPA, but not the CUPA.

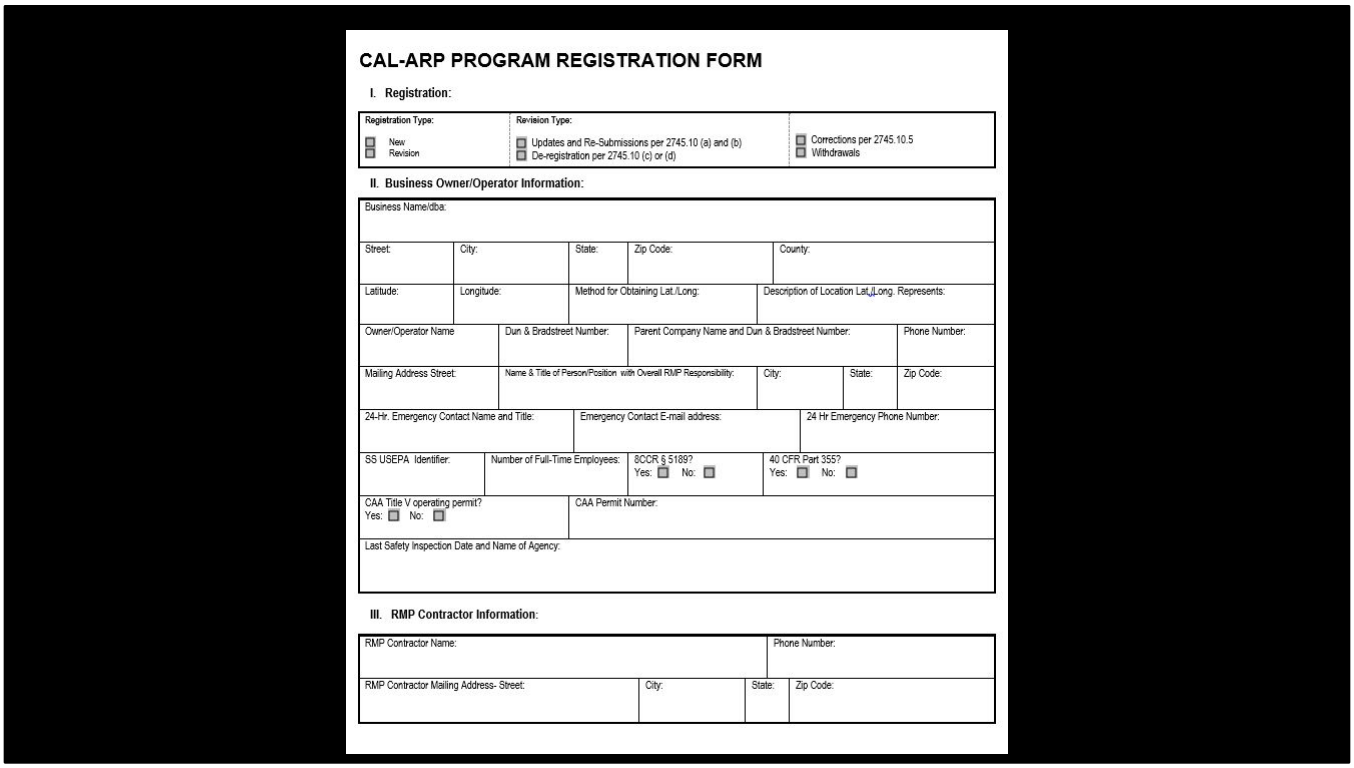


Section 1. Registration Information

Reason for Resubmission	5-year update (40 CFR 68.190(b)(1))
1.1 Source Identification	
1.1.a. Facility Name	[redacted]
1.1.b. Parent Company #1 Name	
1.1.c. Parent Company #2 Name	
1.2 EPA Facility Identifier	[redacted]
1.3 Other EPA Systems Facility Identifier	
1.4 Dun and Bradstreet Numbers (DUNS)	
1.4.a. Facility DUNS	
1.4.b. Parent Company #1 DUNS	
1.4.c. Parent Company #2 DUNS	
1.5 Facility Location	
1.5.a. Street - Line 1	[redacted]
1.5.b. Street - Line 2	
1.5.c. City	Reedley
1.5.d. State	CA
1.5.e. Zip Code - Zip +4 Code	93654
1.5.f. County	FRESNO
1.5.g. Facility Latitude (in decimal degrees)	[redacted]
1.5.h. Facility Longitude (in decimal degrees)	[redacted]
1.5.i. Method for determining Lat/Long	Interpolation - Photo
1.5.j. Description of location identified by Lat/Long	Process Unit
1.5.k. Horizontal Accuracy Measure (meters)	25
1.5.l. Horizontal Reference Datum Code	North American Datum of 1983
1.5.m. Source Map Scale Number	24000
1.6 Owner or Operator	
1.6.a. Name	[redacted]
1.6.b. Phone	[redacted]
1.6.c. Street - Line 1	[redacted]
1.6.d. Street - Line 2	
1.6.e. City	Reedley
1.6.f. State	CA
1.6.g. Zip Code - Zip +4 Code	93654
Foreign Country	
Foreign State/Province	
Foreign Zip/Postal Code	
1.7 Name, title and email address of person or position responsible for RMP (part 68) implementation	

This is an example of a printout from the Federal EPA's Central Data Exchange (cdx.gov)

Most CUPAs will accept this RMP submit printout from the CDX. There are several CUPA's who have their own local requirements for RMP Submissions.



CAL-ARP PROGRAM REGISTRATION FORM

I. Registration:

Registration Type:	Revision Type:	
☐ New ☐ Revision	☐ Updates and Re-Submissions per 2745.10 (a) and (b) ☐ De-registration per 2745.10 (c) or (d)	☐ Corrections per 2745.10.5 ☐ Withdrawals

II. Business Owner/Operator Information:

Business Name/dba:					
Street:	City:	State:	Zip Code:	County:	
Latitude:	Longitude:	Method for Obtaining Lat./Long:		Description of Location Lat./Long. Represents:	
Owner/Operator Name	Dun & Bradstreet Number:	Parent Company Name and Dun & Bradstreet Number:			Phone Number:
Mailing Address Street:	Name & Title of Person/Position with Overall RMP Responsibility:		City:	State:	Zip Code:
24-Hr. Emergency Contact Name and Title:	Emergency Contact E-mail address:			24 Hr Emergency Phone Number:	
SS USEPA Identifier:	Number of Full-Time Employees:	8CCR § 5189? Yes: ☐ No: ☐		40 CFR Part 355? Yes: ☐ No: ☐	
CAA Title V operating permit? Yes: ☐ No: ☐	CAA Permit Number:				
Last Safety Inspection Date and Name of Agency:					

III. RMP Contractor Information:

RMP Contractor Name:			Phone Number:
RMP Contractor Mailing Address- Street:	City:	State:	Zip Code:

This is an example of the registration that we give out in Stanislaus County for a facility that is not subject to EPA RMP. We will accept different forms of registration as long as it has all the required information from § 2740.1.

RMP Registration, Submission, Correction, Updates

RMP Updates [§ 2745.10]

- At least once every five (5) years
- New regulated substance (No later than date first present above threshold)
- Change that requires a revised offsite consequence analysis (6 Months)
- Change that alters the Program level (6 Months)

RMP Corrections [§ 2745.10.5]

- New Accident History Information (6 Months)
- New Emergency Contact (30 Days)

Please keep your local regulator updated with these changes, especially changes in emergency contact, increases in inventory or new regulated substance.

Hazard Assessment & Offsite Consequence Analysis

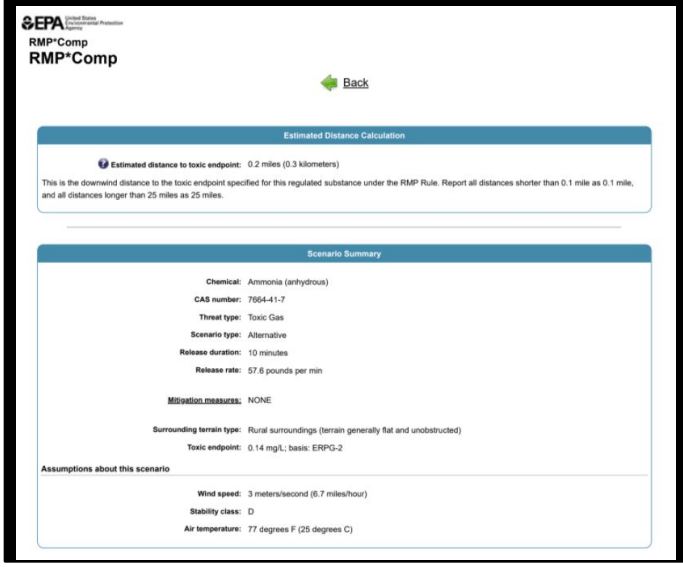
CalARP §2745.4 (OCA), Article 4 (Hazard Assessment)

First being lets look at HA and OCA because it's one of the main elements in a RMP

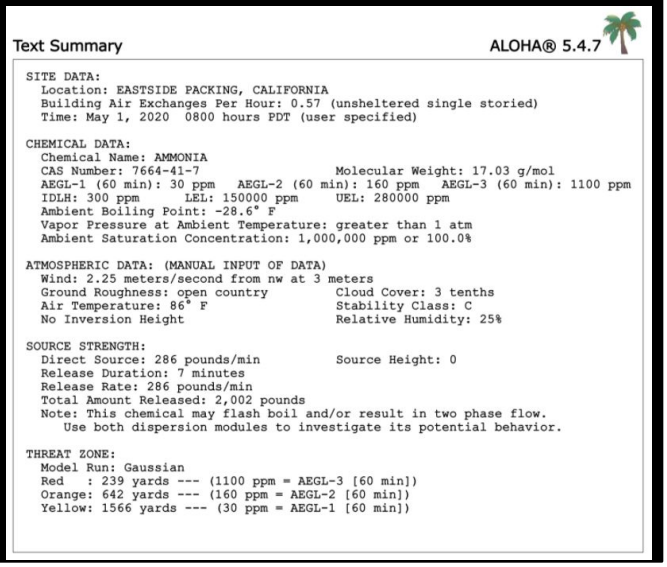
This is what I call the Circle of Death.

The big idea behind the Hazard Assessment is to model various release scenarios to analyze the potential impact of the surrounding environmental and people.

RMP Comp



ALOHA



RMP Comp

Generally used for the Worst-Case Scenarios

Areal Locations of Hazardous Atmospheres (ALOHA)

More programmable scenarios

Hazard Assessment & Offsite Consequence Analysis

Applicability

- Program 1 processes must perform a worst-case release scenario and five-year accident history (§2750.3 and §2750.9)
- Program 2-4 processes must comply with all Hazard Assessment requirements (§2750.1-§2750.9)

Section 2745.4 RMP Offsite Consequence Analysis Component.
(a) The owner or operator shall submit the following information in the RMP:
(1) Program 1 processes: One worst-case release scenario for each Program 1 process; and,
(2) Program 2 and 3 processes and Program 4 stationary sources: One worst-case release scenario to represent all regulated toxic substances held above the threshold quantity and one worst-case release scenario to represent all regulated flammable substances held above the threshold quantity. Alternate case scenario also required for each regulated toxic substance held above the threshold quantity and one ACS to rep all regulated flammable substances held above the threshold quantity

Regardless of the program level, all covered processes must perform a Hazard Assessment.

With that in mind, Hazard Assessments and Offsite Consequences Analyses are extremely detailed and we could easily spend an hour just on this section. Now as riveting as that content would be, we are not going to do that mainly because, while OCA's may be detailed, much of that detail is predetermined. Meaning, the parameters and calculations are given, and you simply plug in the numbers.

Hazard Assessment & Offsite Consequence Analysis

Worst-Case Release Scenario

- A hypothetical analysis of a worst-case accidental release and its effects on life, property, and the environment.
- Used to determine the appropriate program level of a process based on the impact to public receptors.
- Defined as the largest quantity of a regulated substance release from a vessel or pipe that results in the greatest distance to an ***endpoint***.

CalARP §2735.3(bbbb)

A WCS is a hypothetical analysis of a worst-case accidental release and its effects on life, property, and the environment.

One reason the OCA is important is that it is used to determine the appropriate program level of a process based on the impact to public receptors. Namely, a facility cannot qualify as a program 1 if the WCRS impacts public receptors.

To simplify the analysis and ensure a common basis for comparisons, the EPA has defined the worst-case release scenario as the release of the largest quantity of a regulated substance from a single vessel or process line failure that results in the greatest distance to an **endpoint**.

Now the term endpoint is important, and in broad terms, it is the distance that a toxic vapor cloud will travel (in any direction) before dissipating to the point where serious injury from short-term exposures will no longer occur.

For Ammonia, the endpoint is 200 ppm (0.14 mg/L)

Coming back to my Circle of Death, the red circle represents the endpoint of 200 ppm for this Worst-case scenario for an ammonia refrigeration process.

Hazard Assessment & Offsite Consequence Analysis

Offsite Consequence Analysis Parameters [§2750.2]

- Endpoints [§2750.2(a)]
- Wind Speed [§2750.2(b)]
- Ambient Temperature / Humidity [§2750.2(c)]
- Height of Release [§2750.2(d)]
- Surface Roughness [§2750.2(e)]

WC Release Scenario – Toxic Gases [§2750.3(c)]

- Toxic substances that are normally gases
  - Assume the entire quantity is released over 10 minutes
  - The release rate is the quantity (lbs) divided by 10 minutes unless passive mitigation systems are in place

Let's talk about the OCA parameters

There are a number of factors which go into performing and documenting an OCA. It is important to note that many of the parameters used are pre-determined and therefore do not change regardless of the process being analyzed. As such, my goal in this section is to give you a broad overview and emphasize the big ideas along the way.

Endpoints

Toxic chemicals listed in Table 1 or Table 3 are in Appendix A

- Table 1: Federal RMP list of chemicals
- Table 3: CalARP list of chemicals

Flammable chemicals listed in Table 2 vary according to the scenario studied.

- Explosion
- Radiant heat/exposure time
- LFL

Basically, when doing an OCA for a particular regulated chemical, you simply look up the endpoint value in the table and plug it in to the equation.

Wind Speed

- Wind Speed = 1.5 m/s
- Atmospheric Stability Class = F
- May use other values if local meteorological data is available

Temperature

- Highest daily maximum
- RMP OCA Guidance allows using 25ºC (77ºF) and 50% RH
- May use other values if local meteorological data is available

Height

- Ground Level (0 feet)

Surface Roughness

- Rural: no buildings in the immediate area; terrain is generally flat and unobstructed
- Urban: many obstacles in the immediate area; obstacles include buildings or trees

WC Release Scenario – Toxic Gases

- Assumes the entire quantity is released over 10 min.

There are other predetermined factors for toxic liquids along with flammables which you can look up for yourself.

Hazard Assessment & Offsite Consequence Analysis

Alternative Release Scenario Analysis [§2750.4]

- Must identify and analyze at least one alternative release scenario for each substance in a covered process
- Scenarios shall:
  - (1) Be more likely than WC (2) Reach an endpoint offsite unless no such scenario exists (3) Reach a public receptor, unless no such scenario exists
- Scenarios to consider:
  - Transfer hose, Piping release, Vessel or pump release, Vessel overfilling and spill, Shipping container mishandling

Now that we have looked at the WCR and ACR requirements, How many WCR and ACR scenarios for ammonia in 1 process held at 5k pounds? 1 WCR 1 ACR

Hazard Assessment & Offsite Consequence Analysis

Population Impacts [§2750.5]

- Estimate the population within a circle with its center at the point of the release and a radius determined by the distance to the endpoint
- Population must include:
  - (1) Residential population (2) Institutions (schools, hospitals, long term health care facilities, child day care facilities, prisons) (3) Parks (4) Recreational areas (5) Major commercial, office, and industrial buildings
- Use most recent census data
- Estimate population to two significant digits

Population impacts are important because the let the facility know who is around their facility. We have our regulated facilities make is list of nearby public and environmental receptors that can be called in the event of an emergency.

Plotting the distance to toxic endpoint on marplot can give the estimated population

Can be used to determine risk of a facility for potentially upgrading a facilities program level. CalARP §2735.4(e)(3)

Hazard Assessment & Offsite Consequence Analysis

OCA Review and Update [§2750.7]

- Document the review of the OCA at least once every five (5) years
- If a change occurs that increases or decreases the distance to the endpoint by a factor of two or more, a revised analysis must be performed and a corrected RMP submitted within six (6) months

Program Elements

Program Requirement Comparison		
Program 1	***Program 2***	***Program 3***
Executive Summary	Executive Summary	Executive Summary
Worst-Case Release Scenario	Worst-Case Release Scenario	Worst-Case Release Scenario
N/A	Alternative Release Scenario	Alternative Release Scenario
5 Year Accident History	5 Year Accident History	5 Year Accident History
Prevention Program Elements		
N/A	7 Elements	12 Elements
Emergency Response Program		
Coordination	Develop a Program and Coordination	Develop a Program and Coordination

Now we get into the real meat of a CalARP program. Now that you have determined what program level you are, registered with the CUPA and/or EPA and performed you OCA, we can get into the prevention program elements for each program level.

Looking at this really handy visual, we can easily see the RMP components for each program level, you can see that as program level goes up, that there are increasing requirements.

If you look at P1 vs P2/P3, what is the main missing requirement? A- Missing prevention program elements.
How are you placed in program level 1? A- The WCR distance to toxic endpoint has no public receptor and no 5-year accident that led to offsite consequence of Death, Injury, and response for exposure.

What is the main difference between P2 and P3? A- More prevention program elements.

Prevention Program Elements

Program 2	Program 3
Safety Information	Process Safety Information
Hazard Review	Process Hazard Analysis
Operating Procedures	Operating Procedures
Training	Training
Maintenance	Mechanical Integrity
Incident Investigation	Incident Investigation
Compliance Audit	Compliance Audit
	Management of Change
	Pre-Startup Safety Review
	Contractors
	Employee Participation
	Hot Work Permits

This next visual lays out the prevention program elements side by side. You can see that the first 7 are fairly similar with P3 having 5 more unique programs. If you compare Article 5 (P2 elements) and Article 6 (P3 elements) you will see that even through some elements like Safety Information P2 and Process Safety Information P3, that they are actually very similar.

What I will show next is that the 5 “unique” elements are actually addressed within P2, but in a different way.

Section 2760.6 Management of Change.

(a) The owner or operator shall establish and implement written procedures to manage changes (except for “replacements in kind”) to process chemicals, technology, equipment, and procedures; and, changes to stationary sources that affect a covered process.

(b) The procedures shall assure that the following considerations are addressed prior to any change:

(1) The technical basis for the proposed change;

(2) Impact of change on safety and health;

(3) Modifications to and/or development of new operating and maintenance procedures;

(4) Necessary time period for the change; and,

(5) Authorization requirements for the proposed change.

(c) Employees involved in operating a process and maintenance and contract employees whose job tasks will be affected by a change in the process shall be informed of, and trained in, the change prior to start-up of the process or affected part of the process.

(d) If a change covered by this section results in a change in the process safety information required by Section 2760.1, such information shall be updated accordingly.

(e) If a change covered by this section results in a change in the operating procedures or practices required by Section 2760.3, and/or results in a change in the written procedures to maintain the ongoing integrity of process equipment required by Section 2760.5, such procedures or practices shall be updated prior to start-up of the process.

Program Level 2 & 3 Differences

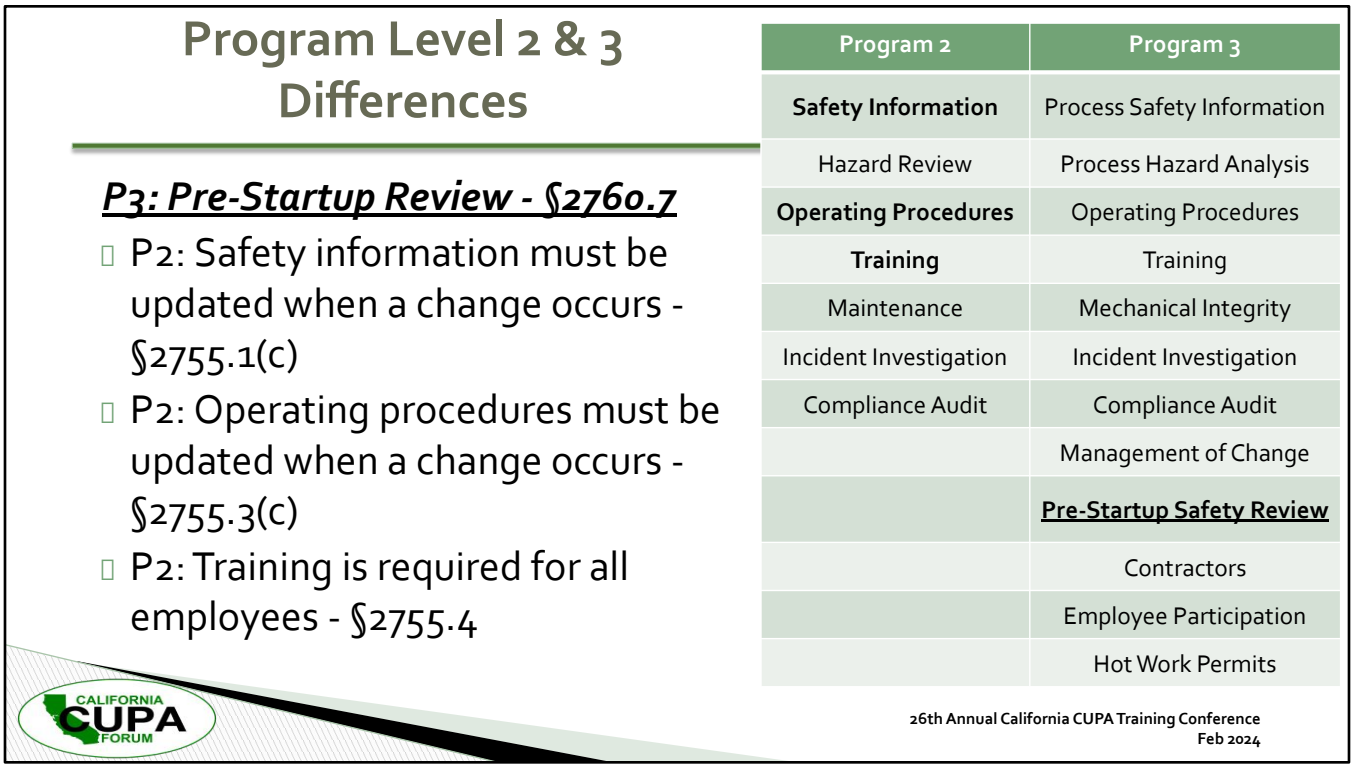
P3: Management of Change - §2760.6

- P2: Safety information must be updated when a change occurs - §2755.1(c)
- P2: Operating procedures must be updated when a change occurs - §2755.3(c)
- P2: Training is required for all employees - §2755.4

Program 2	Program 3
Safety Information	Process Safety Information
Hazard Review	Process Hazard Analysis
Operating Procedures	Operating Procedures
Training	Training
Maintenance	Mechanical Integrity
Incident Investigation	Incident Investigation
Compliance Audit	Compliance Audit
	Management of Change
	Pre-Startup Safety Review
	Contractors
	Employee Participation
	Hot Work Permits

Think of many of the prevention program elements as being interconnected together. Let's take this management of change example, suppose you are going to change out a compressor not like for like. You will use the MOC as a tool to makes sure all the necessary program elements are updated, revised, trained on etc. It is just a checklist.

However, some of these requirements are in program 2, but listed throughout different elements. You can see that on the slide here. MOC's are so useful that many of my program 2 facilities choose to have an internal MOC program to make sure that changes are tracked.



Here is another example but for a different program 3 element, PSSR. This is basically another tool to keep track of changes made to a process, this will probably be accompanied by an MOC.

Section 2760.7 Pre-Startup Safety Review.

(a) The owner or operator shall perform a pre-startup safety review for new stationary sources and for modified stationary sources when the modification is significant enough to require a change in the process safety information.

(b) The pre-startup safety review shall confirm, as a verification check, independent of the management of change process, that prior to the introduction of regulated substances to a process:

(1) Construction and equipment is in accordance with design specifications;

(2) Safety, operating, maintenance, and emergency procedures are in place and are adequate;

(3) For new stationary sources, a PHA has been performed and recommendations have been resolved or implemented before startup, and modified stationary sources meet the requirements contained in management of change, Section 2760.6; and,

(4) Training of each employee involved in operating a process has been completed.

Program Level 2 & 3 Differences

P3: Contractors - §2760.12

- P2: Owner must ensure that every contractor is trained to perform maintenance procedures - §2755.5(c)

Program 2	Program 3
Safety Information	Process Safety Information
Hazard Review	Process Hazard Analysis
Operating Procedures	Operating Procedures
Training	Training
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Incident Investigation	Incident Investigation
Compliance Audit	Compliance Audit
	Management of Change
	Pre-Startup Safety Review
	Contractors
	Employee Participation
	Hot Work Permits

Section 2760.12 Contractors.

(a) Application. This section applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do not influence process safety, such as janitorial work, food and drink services, laundry, delivery or other supply services.

(b) Owner or operator responsibilities.

(1) The owner or operator, when selecting a contractor, shall obtain and evaluate information regarding the contract owner or operator's safety performance and programs.

(2) The owner or operator shall inform the contract owner or operator of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process.

(3) The owner or operator shall explain to the contract owner or operator the applicable provisions of Article 7.

(4) The owner or operator shall develop and implement safe work practices consistent with Section 2760.3(d), to control the entrance, presence, and exit of the contract owner or operator and contract employees in covered process areas.

(5) The owner or operator shall periodically evaluate and document the evaluation of the performance of the contract owner or operator in fulfilling their obligations as specified in section (c).

(c) Contract owner or operator responsibilities.

(1) The contract owner or operator shall assure that each contract employee is trained in the work practices necessary to safely perform his or her job.

(2) The contract owner or operator shall assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his or her job and the process, and the applicable provisions of the emergency action plan.

(3) The contract owner or operator shall document that each contract employee has received and understood the training required by this section. The contract owner or operator shall prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.

(4) The contract owner or operator shall assure that each contract employee follows the safety rules of the stationary source including the safe work practices required by Section 2760.3(d).

(5) The contract owner or operator shall advise the owner or operator of any unique hazards presented by the contract owner or operator's work, or of any hazards found by the contract owner or operator's work.

Program Level 2 & 3 Differences

- No explicit requirement in CalARP Program 2.
- Still required under general OSHA regulations.

Program 2	Program 3
Safety Information	Process Safety Information
Hazard Review	Process Hazard Analysis
Operating Procedures	Operating Procedures
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	Management of Change
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	Contractors
	Employee Participation
	Hot Work Permits

Here we can see that how work permit doesn't have a comparable requirement in P2, but that doesn't mean that a facility shouldn't do it.

I don't have a slide on employee participation, but what P2 elements do you think address it? A- Hazard review, operating procedures, compliance audit, incident investigation.

Section 2760.10 Employee Participation.

(a) The owner or operator shall develop a written plan of action regarding the implementation of the employee participation required by this section.

(b) The owner or operator shall consult with employees and their representatives on the conduct and development of PHA and on the development of the other elements of process safety management in this chapter.

(c) The owner or operator shall provide employees and their representatives with access to PHAs and to all other information required to be developed under this chapter.

Training – Every 3 Years in 3 Categories

Process	Procedures	Response

RETA
• CARO (Book 1)
• CIRO (Book 2)
• Electrical Books
Equivalent to RETA
• Basic Refrigeration Theory
• Recognition of Components and their Function
• Operating Limits & Consequences of Deviation
	• Operating Procedures
	• Maintenance Procedures
	• Safe Work Practices
		• Evacuation Drills
		• Roles and Responsibilities
		• Hazwoper
		  • FRA
		  • FRO
		  • Tech

"Every 3 years, in 3 Categories: Process, Procedures, and Response"

Standard Operating Procedures

Operating Phases

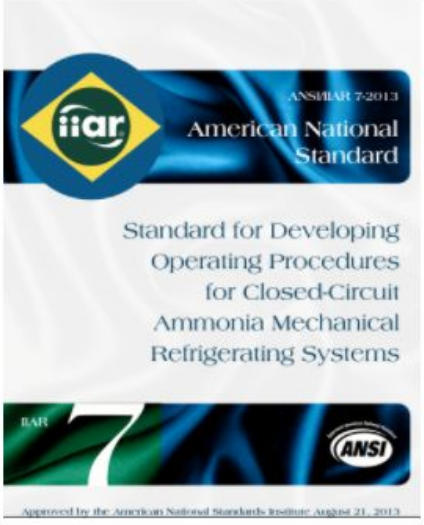
- Initial Startup
- Normal Operations
- Temporary Operations
- Emergency Shutdown
- Emergency Operations
- Normal Shutdown
- Startup Following a Turnaround

SOP Categories

- Operating Limits
- Safety and Health
- Safety Systems

Safe Work Practices

- Confined Spaces
- Lockout Tagout
- Line Break
- Contractor Entrance



Management of Change / Pre-Startup Safety Review

- "The owner or operator shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and **procedures**; and, changes to **stationary sources** that affect a covered process." (§ 2760.6)
- When is MOC/PSSR required?

Management of Change / Pre-Startup Safety Review

- The basic idea of MOC / PSSR is to monitor and document the change to ensure that any and all modifications are in accordance with current codes and standards and any affected program documentation (such as drawing, procedures, training) is updated.

The basic idea of Management of Change and Pre-Startup Safety Review is that in the event a facility decides to modify an existing chemical process, that change needs to monitored and documented to ensure that any and all modifications are in accordance with current codes and standards and any affected program documentation (such as drawing, procedures, training) is updated.

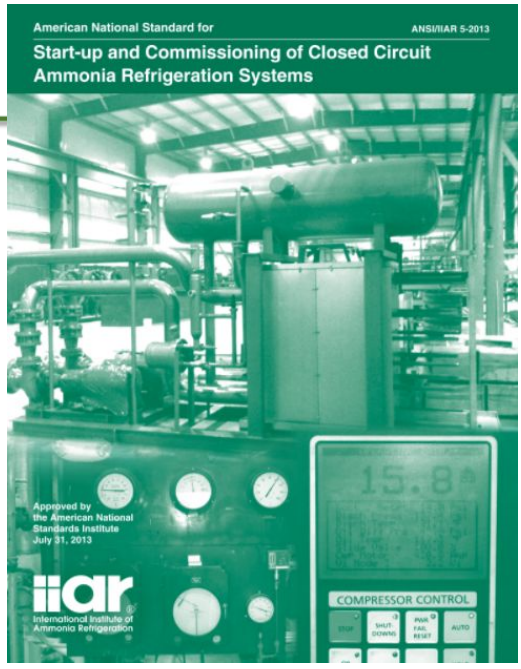
The most basic test to determine if an MOC/PSSR is required is to ask the question, “Will the PSI need to be updated?”

Examples:

1. New equipment
2. Decommissioning equipment

Management of Change
Pre-Startup Safety Review

- ANSI/IIAR 5-2019 | Start-Up of Closed-Circuit Ammonia Refrigeration Systems

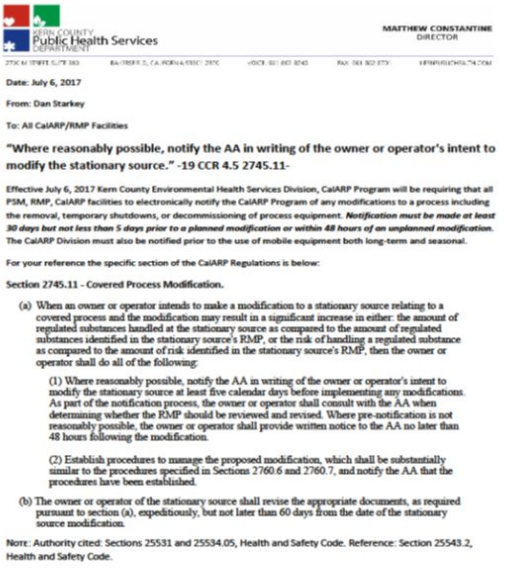


For ammonia, IIAR has published standard 5 which should be used as the baseline for PSSRs.

Not to be confused with starting up at the beginning of season.

Management of Change

- Coordination with the CUPA
  - What does coordination look like for your region?



Public Health Services

MATTHEW CONSTANTINE
DIRECTOR

Date: July 6, 2017

From: Dan Starkey

To: All CalARP/RMP Facilities

"Where reasonably possible, notify the AA in writing of the owner or operator's intent to modify the stationary source." -19 CCR 4.5 2745.11-

Effective July 6, 2017 Kern County Environmental Health Services Division, CalARP Program will be requiring that all PSM, RMP, CalARP facilities to electronically notify the CalARP Program of any modifications to a process including the removal, temporary shutdowns, or decommissioning of process equipment. ***Notification must be made at least 30 days but not less than 5 days prior to a planned modification or within 48 hours of an unplanned modification.*** The CalARP Division must also be notified prior to the use of mobile equipment both long-term and seasonal.

For your reference the specific section of the CalARP Regulations is below:

Section 2745.11 - Covered Process Modification.

(a) When an owner or operator intends to make a modification to a stationary source relating to a covered process and the modification may result in a significant increase in either: the amount of regulated substances handled at the stationary source as compared to the amount of regulated substances identified in the stationary source's RMP, or the risk of handling a regulated substance as compared to the amount of risk identified in the stationary source's RMP, then the owner or operator shall do all of the following:

(1) Where reasonably possible, notify the AA in writing of the owner or operator's intent to modify the stationary source at least five calendar days before implementing any modifications. As part of the notification process, the owner or operator shall consult with the AA when determining whether the RMP should be reviewed and revised. Where pre-notification is not reasonably possible, the owner or operator shall provide written notice to the AA no later than 48 hours following the modification.

(2) Establish procedures to manage the proposed modification, which shall be substantially similar to the procedures specified in Sections 2760.6 and 2760.7, and notify the AA that the procedures have been established.

(b) The owner or operator of the stationary source shall revise the appropriate documents, as required pursuant to section (a), expeditiously, but not later than 60 days from the date of the stationary source modification.

Note: Authority cited: Sections 25531 and 25534.05, Health and Safety Code. Reference: Section 25543.2, Health and Safety Code.

CALIFORNIA CUPA FORUM

§ 2745.11. Covered Process Modification.

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Management of Change

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  - or the risk of handling a regulated substance as compared to the amount of risk identified in the stationary source's RMP

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Section 3: Uriah

- Process Hazard Analysis
- Mechanical Integrity
- Process Safety Information

Process Hazard Analysis

Methodologies

- What-If Checklists
- HAZOP

What-If Checklist Example

PHA Checklist

1: High Pressure Receiver

What If	Scenarios	Consequences	Severity	Likelihood	Risk Rankings	Safeguards
1: What if the equipment or associated components is damaged by nearby activity? (ANSI/IIAR 2-2014 §5.17.1)	The purge valve on the bottom of the bull's-eye column is broken off when someone steps on it.	1. Death 2. High pressure liquid ammonia release 3. Injury 4. Reactive maintenance	4	1	C	1. Each of the valves on the high pressure receivers is adequately protected from inadvertent impact. 2. Gibson Wine Company personnel (including forklift drivers) have been trained to take extra care when working around the refrigeration equipment and other utilities equipment (e.g. electrical transformers).

HAZOP Example

PHA Checklist

1: High Pressure Receiver

Parameter & Guide Word	Scenarios	Consequences	Severity	Likelihood	Risk Rankings	Safeguards
Corrosion - More	An inadequate maintenance program allows the vessel to become excessively corroded.	1. High pressure liquid ammonia release 2. Equipment damage	4	1	C	1. All carbon steel pipes and vessels will be painted to help prevent corrosion from occurring. 2. Grapery has developed and will implement a mechanical integrity program as required by RMP, PSM, and CalARP.

Process Hazard Analysis – Team

Engineering	Methodology
• Professional Engineer (P.E.) • Engineering Degree from a recognized institution • Has received on the job training in relevant areas of engineering concepts and functioning in a role which demonstrates his/her engineering expertise.	Whoever is leading the PHA must be competent in the methodology being used. For example, just because an individual has led a PHA using the What-If methodology, does not mean that individual is competent in the HAZOP methodology.
Operations	**Process Specific Knowledge**
Someone who understand the operations of the process being evaluated. This includes things such as procedures, hours of operations, authorized personnel etc.	There must be at least one person present who understands how the process works. This requirement may be fulfilled by a contractor, engineer on staff, or other personnel. Example: If a refrigeration system is being evaluated, there must be someone present who understands the principles of refrigeration and how the various components function and interconnect.

For a PHA study to be compliant, the personnel who participate must meet certain criteria.

3.1 Process Hazard Analysis Team

The *PHA* team was composed of the following team members:

First Name	Last Name	Title	Company	Expertise
Peter	Thomas	PHA Team Leader, Licensed Mechanical Engineer	Resource Compliance, Inc.	Engineering, PHA Leadership, Process Safety Management
Albert	Herrera	Service Technician	California Controlled Atmosphere	Refrigeration Service
Gustavo	Gomez	Environmental Health Specialist	Fresno County Environmental Health	CalARP, Environmental Health
[redacted]	[redacted]	Supervisor	[redacted]	Process Operations
[redacted]	[redacted]	General Manager	[redacted]	Process Operations, Management
[redacted]	[redacted]	Compliance	[redacted]	Process Operations, Compliance

The *PHA* leader was Peter Thomas, P.E., the President and Senior Engineer at Resource Compliance. Peter has extensive knowledge of chemical safety regulation with particular emphasis on ammonia refrigeration and process safety management. He has a degree in mechanical engineering from California Polytechnic State University San Luis Obispo and is a licensed professional engineer.

Here is an example of how to document compliance with the team requirements.

Process Hazard Analysis

Content

- Hazards of Process
- Controls - Engineering and Administrative
- Consequences of Failure of controls including safe operating limits
- Stationary source Siting
- Human Factors
- Qualitative evaluation of health and safety effects of failure of controls
- External Events (Seismic)

PHAs should also consider past incident from ammonia facilities

Process Hazard Analysis

Report & Findings

- Recommendations and status communicated with Management System
- Verify a written schedule to address findings and recommendations
- 2.5 Years to complete or as per agreed by the local agency

Mechanical Integrity

Inspection

- Daily, Monthly, Annual

Testing

- Detection Systems
- Compressor Safeties
- Vibration Analysis

Maintenance

- Changing / Draining Oil
- Painting

Mechanic Integrity is a fancy word for maintenance. In short, a facility must have a maintenance program in place to ensure all equipment associated with the chemical process is adequately maintained to avoid an accidental release. This is one of the elements which regulators often pay closest attention to.

RAGAGEP Documents like IIAR 6

Process Safety Information

PSI Elements	
1) Safety Data Sheets	8) Electrical Classifications
2) Block Flow Diagram	9) Relief System Design
3) Process Chemistry	10) Ventilation System Design
4) Max Intended Inventory	11) Design Codes and Standards
5) Operating Limits and Consequences of Deviation	12) Material & Energy Balances
6) Materials of Construction	13) Safety Systems
7) Piping and Instrumentation Diagrams (P&IDs)	

Process Safety Information

Maximum Intended Inventory

- How is this calculated?
- Delivery Receipts
- Full Pump Down
- Engineering based calculation

Room: **High Pressure Receiver**

System Parameters:

System Capacity =	200	TR
System Charge =	27000	lbs
Condensing Temp.=	90	°F
Liquid Temp.=	90	°F
Max. Op. Pressure =	250	psig

Note: When the system is completely pumped down during the off-season the level in the receiver is approximately 59" or 80% full. The inventory analysis has been performed based on that assumption.

Min. Liquid Height (h) =	4	in.
Number of Receivers =	1	
O.D. (chosen) =	78	in
O.A.L. (chosen) =	30	ft

True liquid Level Inside=	3.19	in
Inside Diameter	76.38	in
Liquid Pump Down Area (act.) =	31.36	ft²
Length (100% Vol. @ 85% Full) =	27.3	ft

Vessel Description:

Diameter =	78	in.
Overall Length =	30	ft.
Shell Length =	26.33	ft
Head Volume =	36.60	cu. ft.
Vessel Vol. =	911.0	cu. ft.
	6814	gal
Ext. Surface Area =	679.0	ft²
NH_3 Charge @ (h) =	505	lbs
NH_3 Charge @ 80% =	**26995**	lbs
% System Charge =	**100%**	
NH_3 Charge @ 100% =	33744	lbs

Percent of Volume	Level in Inches	Total Volume of Liq in cu ft	Total Mass of Liq in lbm
95%	71.22	865.46	32056.79
90%	66.61	819.91	30369.59
85%	62.63	774.36	28682.39
80%	58.99	728.81	26995.19
75%	56.24	683.26	25307.99
70%	52.28	637.71	23620.79
65%	49.09	592.16	21933.59
60%	43.67	546.61	20246.39
55%	42.88	501.06	18559.19

Here is an example of measuring the Max Intended Inventory by actually measuring the entire inventory.

Accumulator(s):

Name	Orientation	Qty	O.D. (in)	Wall Thickness (in)	Length (ft)	Level (in)	Charge (lbs)
MSA	Horizontal	1	36	0.25	9.67	4	165
FA	Horizontal	3	24	0.375	6	4	244
FA	Horizontal	2	30	0.25	6	4	186
FA	Horizontal	2	30	0.25	8	4	248
FA	Horizontal	1	20	0.375	6	4	73
FA	Horizontal	1	24	0.375	8	4	109
				-			0
				-			0

Subtotal **1,025**

Receiver(s):

Name	Orientation	Qty	O.D. (in)	Wall Thickness (in)	Length (ft)	Level (in)	Charge (lbs)
HPR	Horizontal	1	42	0.437	20	10	1,285
				-			0
				-			0
				-			0

Subtotal **1,285**

Total System Charge: **10,936** lbs

The more common example is by performing a type of operating calculation.

As an aside for refrigeration facilities, calculating 80% of every vessel in the system is not a helpful way to calculate the inventory.

Process Safety Information

Upper / Lower Limits & Consequences of Deviation

- How is this documented?
- The CalARP regulation requires this information to be incorporated into the SOPs (Section 2760.1(c)(1)(D) & (E): 2760.3 (a)(2) (A)& (B)
- Does it count if this information is in the manufacturer's manuals and the SOPs simply reference the manual?
- What is the intent of this regulations?

CalARP is a performance based regulation. The big idea is that the information should be **available, accessible and usable.**

Process Safety Information

Materials of Construction

- U1A forms for pressure vessels and heat exchanges e.g. plate and frame / chiller units
- Specification sheets for coils and condensers
- Equipment Manuals: pump, compressors, all valves
- Piping Specifications ASTM A 53 & ASME B 31

Obtain U1A forms from the National Board or manufacturer should come with the equipment

FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)
As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by Keystone Oilfield Fabrication LLC. 1870 F.M. 407 Rhome, Texas 76078.
(Name and address of Manufacturer)

2. Manufactured for California Controlled Atomsphere 39138 Rd.56 Dinuba, CA 93618
(Name and address of Purchaser)

3. Location of installation Unknown
(Name and address)

4. Type

HORIZONTAL	97015-6-001	N/A	97015-6 Rev 0	14	2017
(Horizontal or vertical, tank)	(Manufacturer's serial number)	(CRN)	(Drawing number)	(National Board number)	(Year built)

5. ASME Code, Section VIII, Div. 1

2015	N/A	NONE
[Edition and Addenda, if applicable (date)]	(Code Case number)	[Special service per UG-120(d)]

6. Shell

SA53 GR B ERW	.375"	0	19.25"	57"
(Material spec. number, grade)	(Nominal thickness)	(Corr. allow.)	(Inner diameter)	[Length (overall)]

Body Flanges on Shells

Frick®
BY JOHNSON CONTROLS

Submittal Data Form
12-20-2012

Sold To :
JOHNSON CONTROLS/FRICK
JCI Waynesboro
PO Box 2023
Milwaukee, WI 53201-2024
United States

Project:
Purchase Order No: WILL ADVISE
Order # U134840201
Frick Order # 300601800

All Information is per Unit

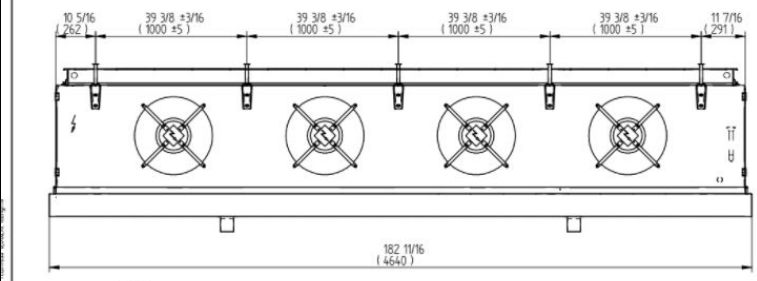
Quantity: 1 Model XLP2-1018-622 EVAPORATIVE CONDENSER

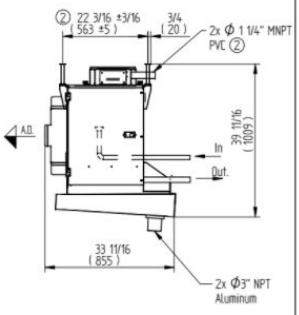
Certified Capacity: 4903.20 MBH based on 90.00°F condensing temp. with an entering air wet bulb of 75.00°F. Refrigerant: R-717.

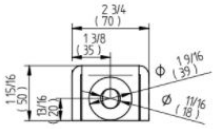
Fan Motor(s): Three (3) 7.5 HP fan motor(s): Totally Enclosed, Fan Cooled (TEFC),
1 Speed/1 Winding - Premium Efficiency (Inverter Duty), suitable for 460 volt, 3 phase,
60 hertz electrical service. Drives are based on 0 inches ESP.

NOTE: Inverter Duty fan motors, furnished in accordance with NEMA Standard Mg.1 -- Part 31, are required for applications using variable frequency drives for fan motor control.

Pump(s): One (1) 7.5 HP pump motor: 1 Speed/1 Winding, suitable for 460 volt, 3 phase, 60 hertz.







-Hanger detail with extension

IT ONLY APPLIES
FOR THIS PROJECT 511384
REV. 02
RELEASED 12/05/2015
DATE 12/05/2015
Only for Quintner production

Performance Data		Physical Data	
Capacity (Btu/h)	:111,598	Coil	:F/8/14/7.00/4000/A/V/V
Temp. Room	:32.0 °F	Surface area	:1,736 ft²
R.H.	:80%	Coil volume	:1.708 ft³
ΔT	:10.0°F	Rows deep	:8
Refrigerant	:NH3 (R717)	Dry Weight / Op. Weight	:712 lb / 789 lb
Superheating	:8.0°F	Connection side	:1x Left in air direction
Air Flow	:15,250 cfm	Defrost	:Water
Air pressure	:14.692 psi	Inlet Ø	:3/4" NPS

Reference #: 300850305 / Cal CA

Project: Bidart

Notes:
-S= Special casing
-S= Ammonia DX.
-Coil, Water Defrost
-Double tray with 13/16 in insulation
-Gallons per minute for water defrost distribution tray system 22.6 gpm
-Water Distribution To Be PVC Material 2

Quintner U.S. Ref.#: 204024

Dimensions in inches (mm)

scale	1:18.18
paper size	DIN A3
material	
weight [kg]	
notice	

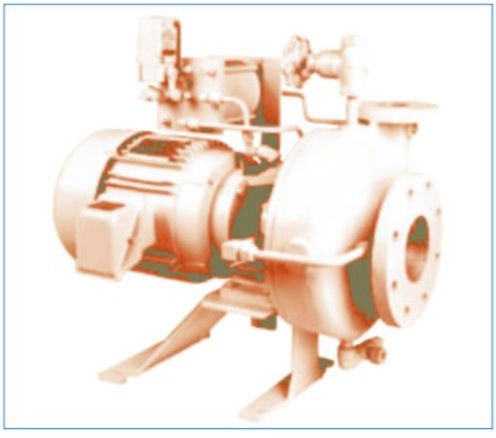
PRODUCT DATA SHEET

CORNELL PUMP COMPANY

Refrigerant Pump 2CB

PUMP SPECIFICATION

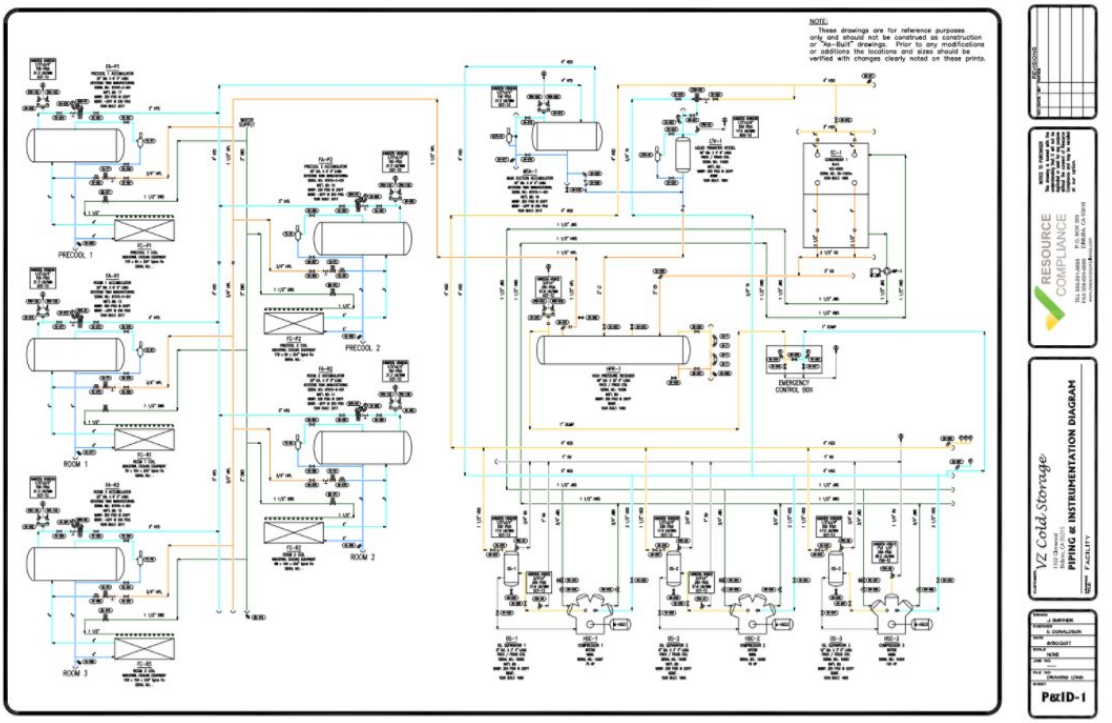
- 2CB Close coupled refrigerant pump
- 4" x 2" Class 150 Flanged suction & discharge
- Constructed of ASTM A536 60-40-18 Ductile Iron
- Industry leading two year warranty
- Four pole (1800/1500RPM) operating speed
- Optional mounting configurations available
- Polar white
- **Mechanical Seal:**
  John Crane, 1.25", T-1, double mechanical shaft seal with pressurized barrier fluid lubrication system, low oil limit switch, and seal chamber heater to maintain proper barrier oil viscosity
- **Motor Specification:**
  Close coupled to a totally enclosed fan cooled, refrigerant atmosphere, hostile environment, premium efficiency motor, with class "F" installation; suitable for VFD applications



Process Safety Information

Piping and Instrumentation Diagrams

- IIAR Ammonia Refrigeration Piping Handbook, Appendix A "Guidelines for Preparation of Ammonia Refrigeration Diagrams"


NOTE:
These drawings are for reference purposes only and should not be construed as construction or "As-Built" drawings. Prior to any modifications or additions the locations and sizes should be verified with changes clearly noted on these prints.
PRECOOL 1
PRECOOL 2
ROOM 1
ROOM 2
ROOM 3
EMERGENCY CONTROL BOX
RESOURCE COMPLIANCE
VZ Cold Storage
PIPING & INSTRUMENTATION DIAGRAM
P&ID-1

Process Safety Information

Electrical Classifications

[NFPA 70-2017 §500.5(A) General]

- Refrigerant machinery rooms that contain ammonia refrigeration systems and are equipped with adequate mechanical ventilation that *operates continuously* or is *initiated by a detection system* at a concentration not exceeding **150 ppm** shall be permitted to be classified as "unclassified" locations.

[ANSI/IIAR 2-2021 §6.8.1]

- A machinery room not provided with emergency ventilation that is either operated continuously or activated by ammonia detector shall be designated as not less than a Class I, Division 2, Group D Hazardous (Classified) Location, and electrical equipment installed in the machinery room shall be designed to meet this requirement.

Process Safety Information

Relief System Design & Design Basis

[ANSI/IIAR 2-2021 §15.3.1.1]

- Pressure vessels and equipment built and stamped in accordance with ASME B&PVC, Section VIII, Division I (2017), shall be provided with pressure relief protection in accordance with ASME B&PVC, Section VIII, Division 1.

Process Safety Information

Relief System Design & Design Basis

Relief Valve Sizing

$$C = f \times D \times L$$

Where:

C= minimum required discharge capacity of the relief device in pounds of air per minute

D= outside diameter of the vessel in feet

L = outside length of the vessel in feet

F = factor depending upon kind of refrigerant

Ammonia: f = .05

Vessel Name	PRV Setting	Minimum Required Discharge	Pressure Relief Valve Selected	Relief Size	Relief Valve Capacity	Type of Assembly	No. of Assemblies	Total Capacity	Date PRV Installed
	psig	*lb/min*			*lb/min*	*S/D*		*lb/min*	
High Pressure Receiver 1	250	72.0	R/S SRH1	1/2" x 3/4"	56.1	D	1	56.1	Apr-12
High Pressure Receiver 2	250	54.0	Hansen H5602	3/4" x 1"	57.6	D	1	57.6	Nov-13
Liquid Transfer Vessel	250	3.3	R/S SRH1	1/2" x 3/4"	56.1	D	1	56.1	Apr-12
Main Suction Accumulator	150	20.0	R/S SRH1	1/2" x 3/4"	34.8	D	1	34.8	Apr-12
Oil Separator 1		5.6	See other sheet	N/A	N/A			N/A	
Oil Separator 2		5.6	See other sheet	N/A	N/A			N/A	
Oil Separator 3		8.9	See other sheet	N/A	N/A			N/A	
Oil Separator 4		7.1	See other sheet	N/A	N/A			N/A	
Precool 1 Accumulator	150	15.0	R/S SRH1	1/2" x 3/4"	34.8	D	1	34.8	Apr-12
Precool 2 Accumulator	150	15.0	R/S SRH1	1/2" x 3/4"	34.8	D	1	34.8	Apr-12

If calculations are not available, you need to require the facility to hire an engineer or qualified person to perform calculation.

Process Safety Information

Ventilation System Design

[ANSI/IIAR 2 1974-1978 §4.3]

- "The room shall be provided with an independent mechanical ventilation system actuated automatically by vapor detector(s)…."

[ANSI/IIAR 2-2021]

- Discharge Upward
- 30 Air Changes / hr & 2,500 fpm
- Powered Independently with emergency control switch
- Interlocked with NH_3 Detection - Activated at 150 PPM

Process Safety Information

Design Codes and Standards Employed

- Design codes and standards are the basis for how the system should be built and operated
- Who is verifying design codes and standards?
- Ensure that current design codes and standards are employed during new construction
- Best place to start enforcing updated Design Code documentation is during MOC expansion projects

Design and Installation Codes and Standards Employed

To the best of the undersigned's knowledge, the Room 3 Accumulator Replacement at Company XYZ was designed and installed in accordance with the following codes and standards:

- 2013 California Mechanical Code Chapter 11 *Refrigeration*
- 2013 California Fire Code Section 606 *Mechanical Refrigeration*
- ANSI/IIAR 2-2008 Addendum B *Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems*
- ANSI/IIAR 2-2014 *Standard for Safe Design of Closed Circuit Ammonia Refrigeration Systems*
- ANSI/IIAR 4-2015 *Installation of Closed-Circuit Ammonia Refrigeration Systems*
- ANSI/ASHRAE 15-2013 *Safety Standard for Refrigeration Systems*
- ASME B31.5-2013 *Refrigeration Piping and Heat Transfer Components*
- 2015 ASME Boiler & Pressure Vessel Code Section VIII *Rules for Construction of Pressure Vessels, Division 1*

Print Name	Signature	Date

Process Safety Information

Safety Systems

- Ammonia Detection
- Emergency Shutdown Switch
- Diffusion Tanks

Process Safety Information

Ammonia Detection

ANSI/IIAR 9 - 2020 §7.3.12.1

- At least one ammonia detector shall be provided in the room or area
- The detector shall activate an alarm that reports to a monitored location so that corrective action can be taken
- Audible and visual alarms shall be provided inside the room. Additional audible and visual alarms shall be located outside of each entrance to the machinery room."
- Automatically de-energize determined equipment at a detected concentration no higher than 40,000 ppm (25% LFL).
- Automatically activate the machinery room ventilation fan at a level no higher than 150 ppm
- In the event of a loss of power to the ammonia detection and alarm system, a power failure trouble signal shall be sent to a monitored location.

Process Safety Information

Machinery Room (Low Level)

The machinery room includes one (1) low level ammonia sensor which will activate audible and visual alarms at 25 PPM, inside and outside the machinery room, along with an alarm that reports to a monitored location so that corrective action can be taken.

Furthermore, the low level ammonia sensor will activate emergency ventilation at a level no higher than 150 PPM.

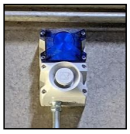
Machinery Room (High Level)

The high level ammonia sensor (15,000 PPM) will automatically de-energize primary equipment in the machinery.

Refrigerated Spaces

If ammonia is detected in a refrigerated space above 25 PPM, an alarm will activate that reports to a monitored location so that corrective action can be taken. Additionally, liquid feed valves supplying ammonia will be automatically closed.

Location	Manufacturer	Model	Type	Alarm Level	Horn	Strobe
Machinery Room	Calibration Technologies Inc.	GG-NH3	Standalone	25 ppm	Yes	Yes
Machinery Room	Calibration Technologies Inc.	GG-NH3-2%	Standalone	15,000 PPM	Yes	Yes
Export Staging Room (south)	Manning Systems	EC-F2-NH3	Standalone	25 ppm	Yes	Yes
Export Staging Room (north)	Manning Systems	EC-F2-NH3	Standalone	25 ppm	Yes	Yes
South Zone (Storage 5-10, PC 4-6, Hallway)	Calibration Technologies Inc.	GG-NH3	Sample System	25 ppm	Yes	Yes
North Zone (Storage 1-4, PC 1-3, Shipping Dock)	Calibration Technologies Inc.	GG-NH3	Sample System	25 ppm	Yes	Yes



Process Safety Information

Emergency Shutdown Switch

ANSI/IIAR 9 - 2020 §7.3.11.1

"A clearly identified emergency shut-off switch with a tamper-resistant cover shall be located outside and adjacent to the designated principal machinery room door. The switch shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed automatic refrigerant valves located in the machinery room. The function of the switch shall be clearly marked by signage near the controls."

Process Safety Information

Diffusion / Adsorption Tanks

The California Mechanical Code (CMC), which is based on the Uniform Mechanical code, has required Diffusion Tanks since the mid 90's. This requirement however, was removed in the 2016 CMC.

Refer to Resource Compliance blog for more information (https://goo.gl/D83JNQ)

Questions?

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