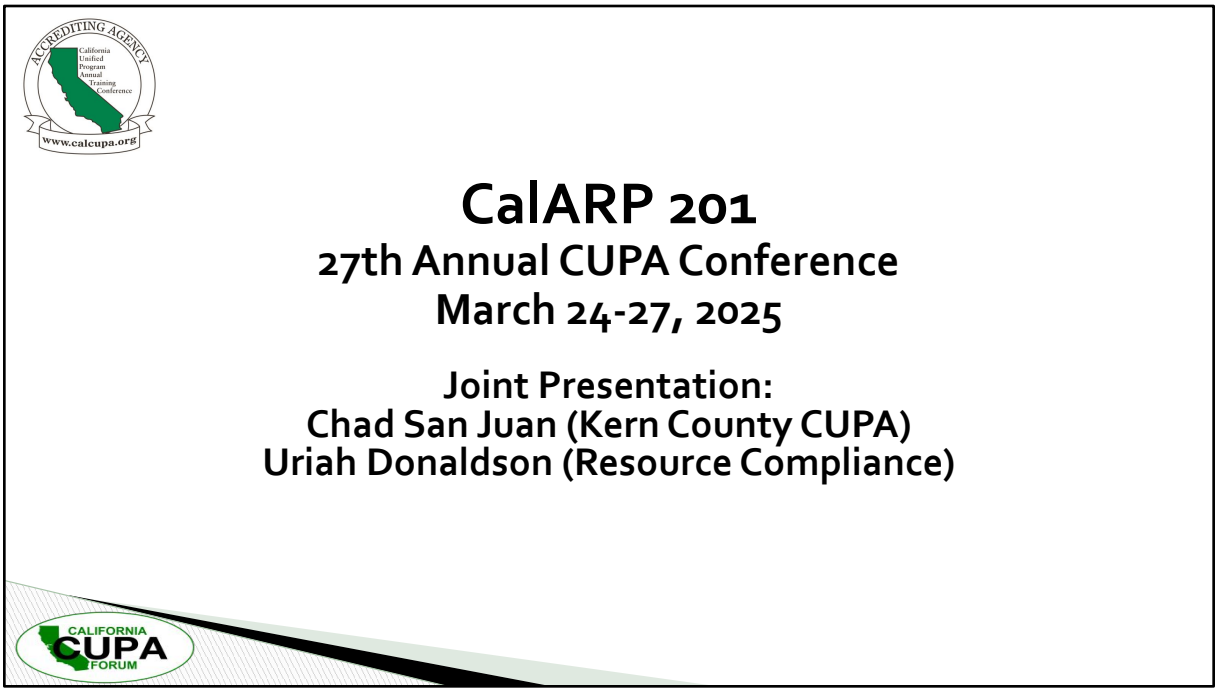


Welcome to CalARP 201 class. This presentation will be a joint effort by Dominick from Stanislaus County and myself. Now our assumption is that if you are here, you have at least some experience with CalARP in the field. As such we hope to be a practical help in answering any questions you may have throughout 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

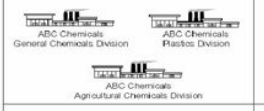
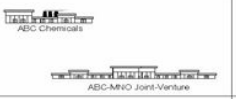
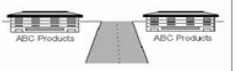
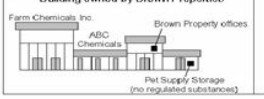
Who is subject to CalARP?

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

CalARP §5050.4. 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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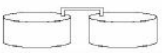
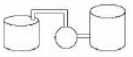
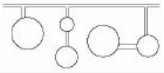
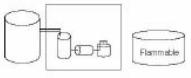
CalARP §2050.3. Definitions (xx) "Stationary source"

"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 §5050.3. Definition (mm) Process

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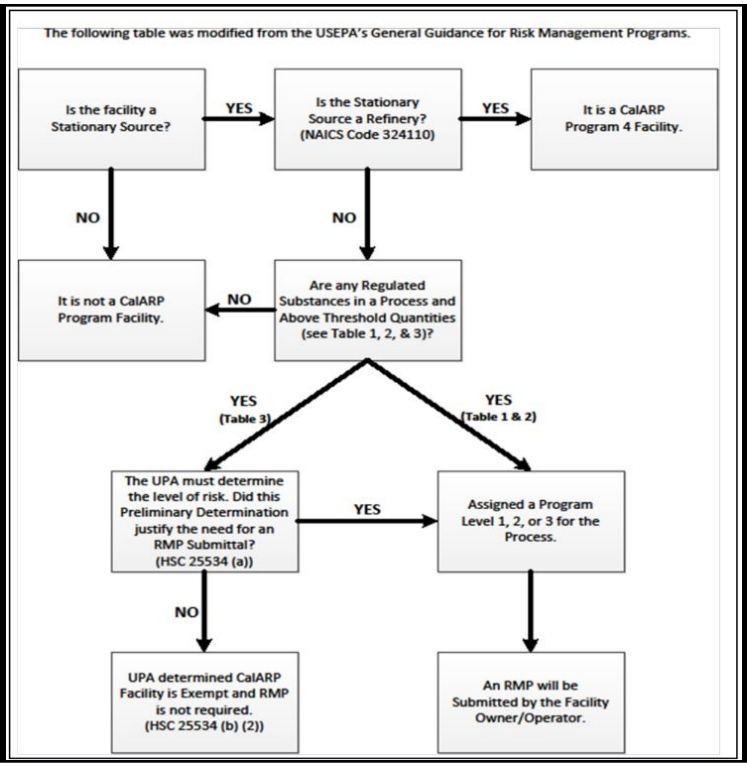
Stationary Source



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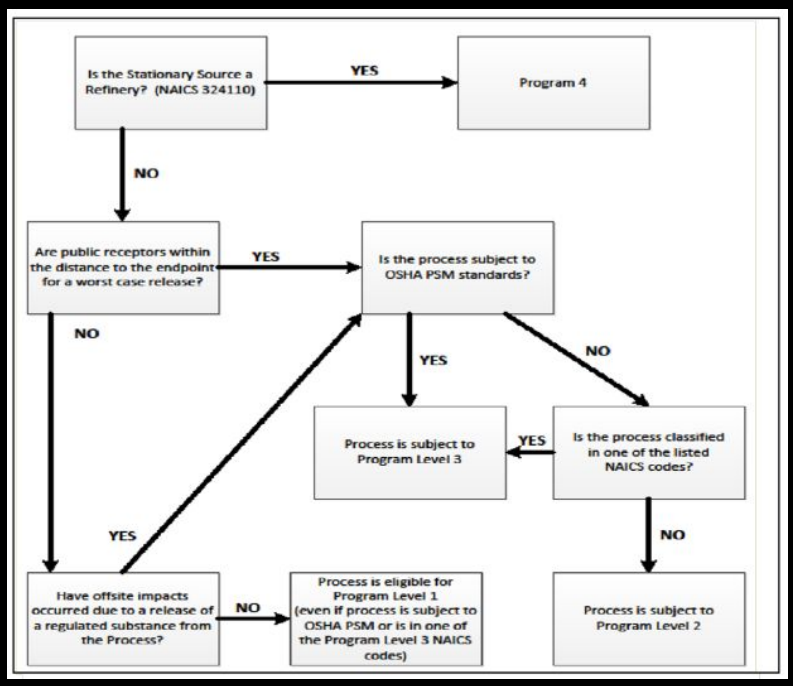
Stationary Source Program Level



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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

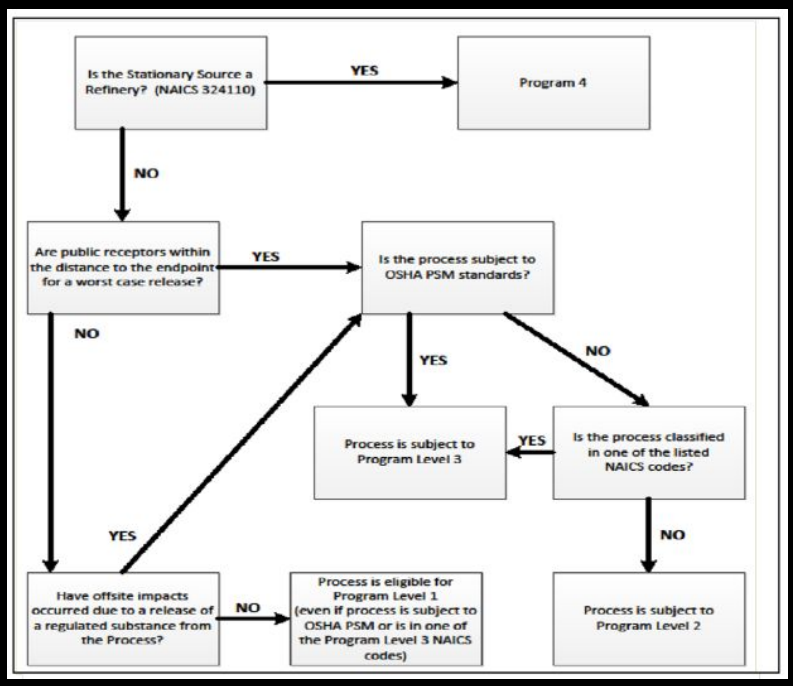
CalARP §5130.6. List of Substances Table 3

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



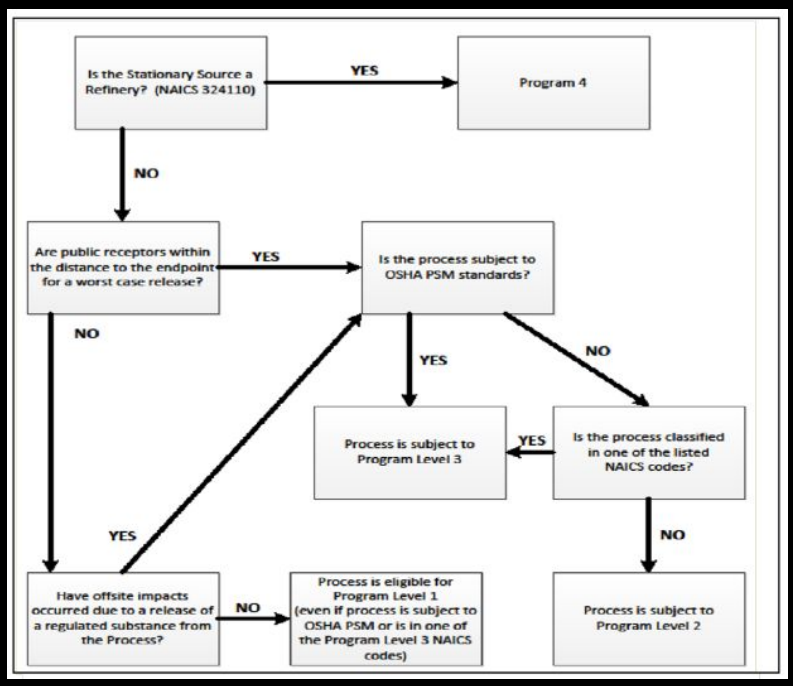
CalARP Guide 2020 page 24

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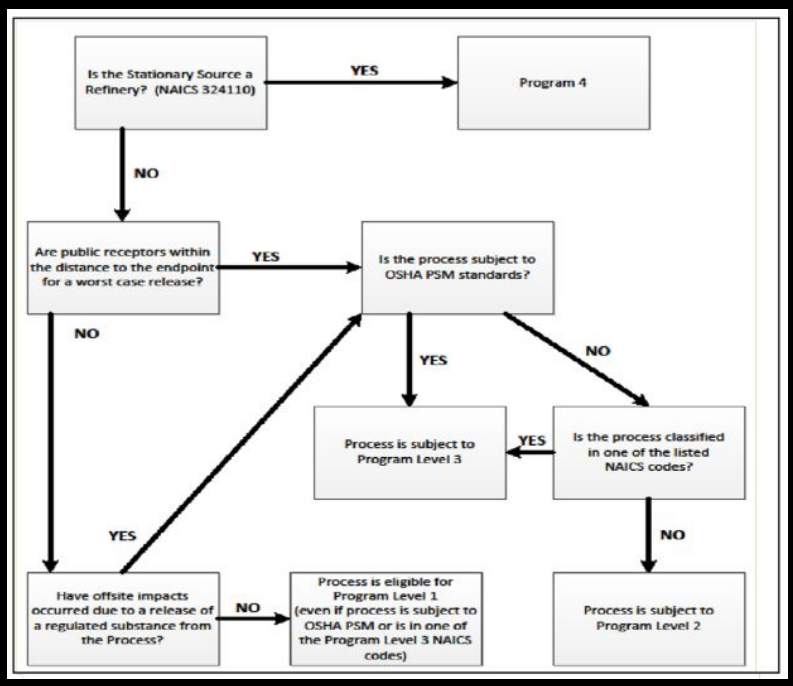
Scenario #3 - Chlorine Process – Two one-ton containers

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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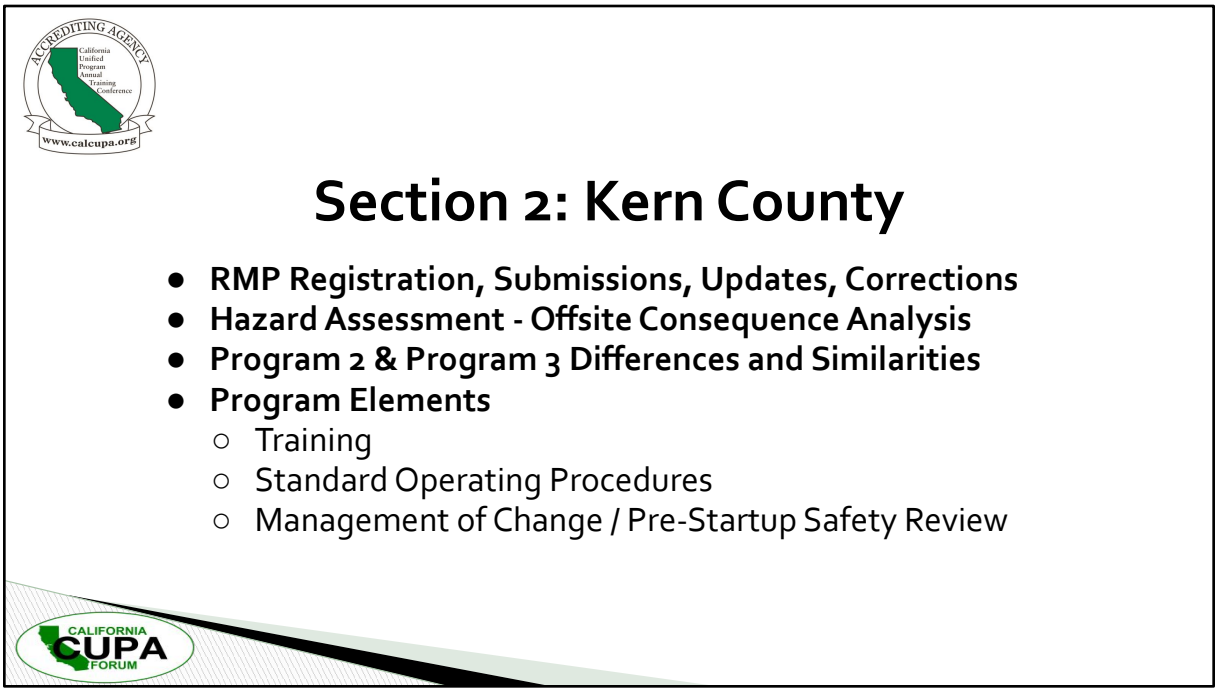


Again my name is Chad San Juan and I am with Kern County. In this section I will discuss the requirements within registrations, when submission, updates and correction are required, discussion on offsite consequence analysis, the differences between program 2 and 3, and specific program elements concerning training SOPs and management of change.

RMP Registration, Submission, Correction, Updates

Registration [§ 5060.1]

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

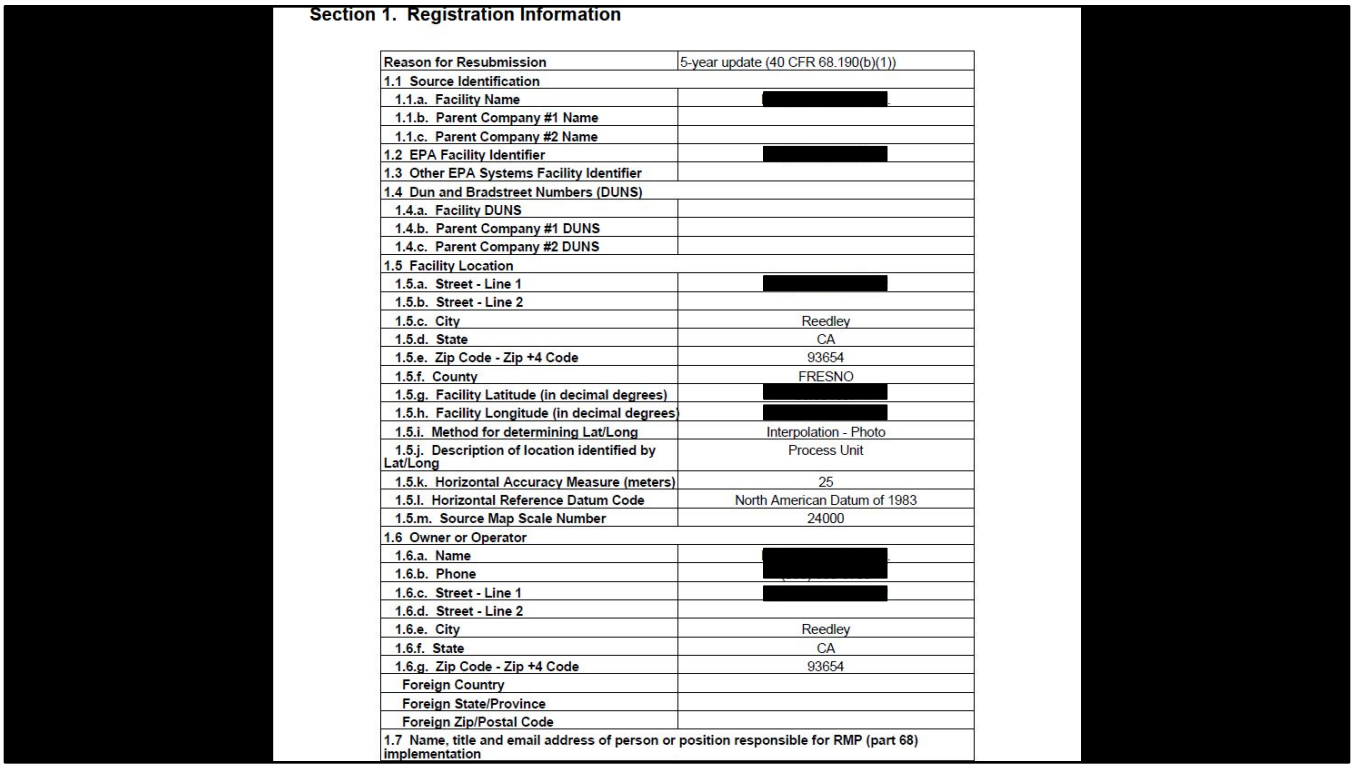
Submission [§ 5070.1]

- 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

The first part of an RMP is the registration, this is what tells the regulator basic information about your facility such as name, address, emergency contact, regulated substance and how much. If you are subject to EPA RMP, you will need to submit it to the CUPA separately as well as EPA. CUPAs do not normally have access to the CDX website to obtain submissions.. It is possible for CUPAs to obtain access but must reach out to CDX and go through a testing process to obtain access. I have obtained access when I first started back in 2017. Concerning my inspectors, they are still in the process of obtaining it.

Regardless, the operator must submit to the CUPA as a separate submission. This could be a deficiency if RMP is submitted to EPA, but not the CUPA since we have to perform our own review.

Submission is required no later than the date on which the regulated substance is first present in a process above a threshold quantity. It is possible to submit predictively if you know a regulated substance may be present In the future. This avoids having to submit an update or correction as long as it is within the limits of the submitted RMP quantity that would trigger a revision. This is more relevant to chemical warehouses and distributors



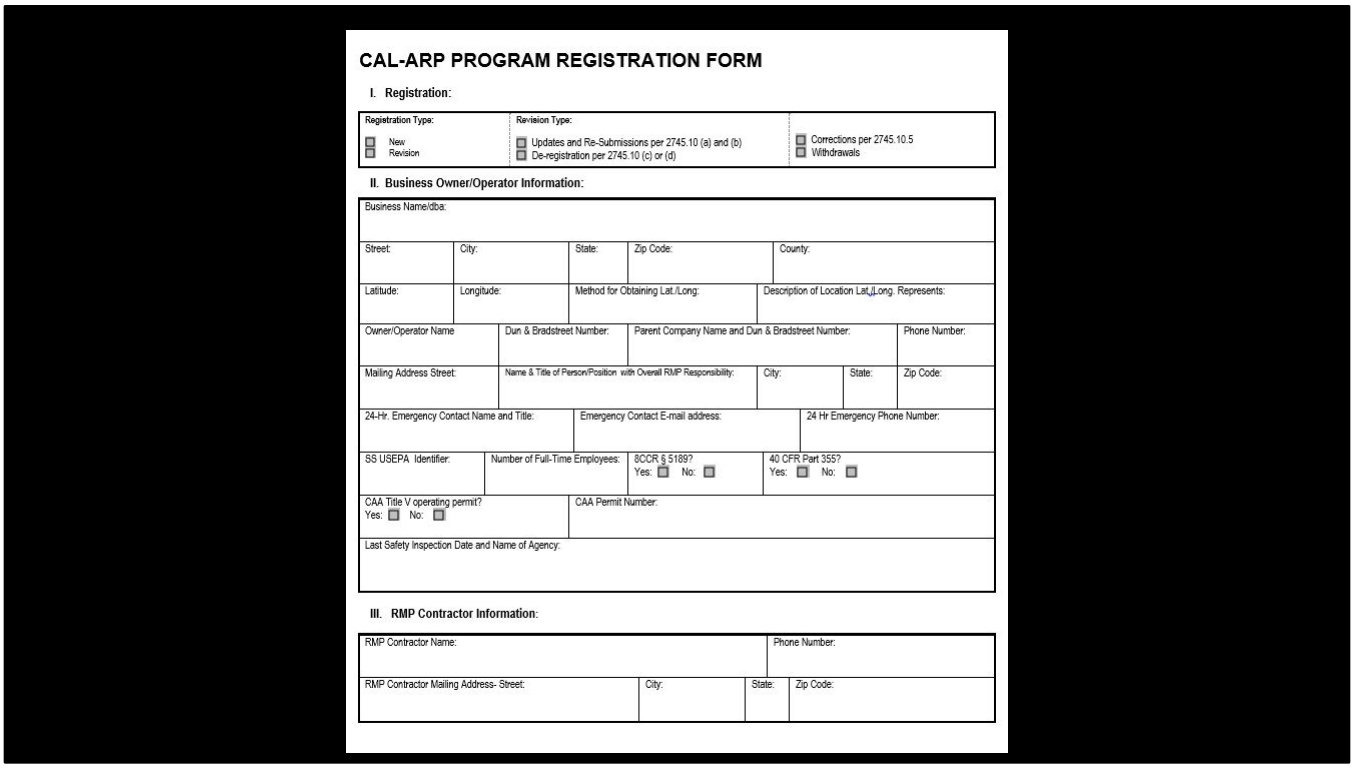
Section 1. Registration Information

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.

Please make sure that all information within the registration is complete and accurate, we will go over the validity of each section line by line and cross check with other elements such as the organizational chart.



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 § 5060.1.

County of Kern
Environmental Health Division
HazMat/CalARP
2700 M Street, Suite 300
Bakersfield, CA. 93301-2370
(661) 862-8740

CALIFORNIA ACCIDENTAL PREVENTION PROGRAM REGISTRATION FORM FOR PROGRAM 3 & 2

I. Registration Type:

Registration Type:

☐ New
☐ Revision

Revision Type:

☐ Updates and Re-Submissions per 2745.10 (a) and (b)
☐ De-registration per 2745.10 (c) or (d)
☐ Corrections per 2745.10.5

II. Business Owner/Operator Information:

Business Name/dba:				Dun & Bradstreet Number:		County Facility Identifier:	
Street:			State:	Zip Code:		County:	
Owner/Operator Name		Business Contact Name:		Email Address:		Phone Number:	
Street:	City:		State:	Zip Code:		County:	
Parent Company Name 1:		Dun & Bradstreet Number:		Parent Company Name 2:		Dun & Bradstreet Number:	
Latitude:	Longitude:	Lat./Long Method:		Lat./Long. Description:			
Horizontal Accuracy Measure (m):		Horizontal Reference Datum Code:		Source map Scale Number			
Person with Overall RMP Responsibility:	Title:	Phone:	24 Hour Phone:	Ext. or Pin:	Email Address:		
Emergency Contact:	Title:	Phone:	24 Hour Phone:	Ext. or Pin:	Email Address:		
LEPC: CalOES_LEPC_Regions_Map **Region #** Choose	Number of Full-Time Employees:	☐ CAA Title V? ☐ OSHA PSM?	☐ EPCRA 302? ☐ Cal OSHA PSM?	☐ EPA RMP? ☐ 40 CFR Part 355?			
Last Inspection performed by an External Agency: (name)	Date:						

III. RMP Preparer Information:

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

RMP Completeness Review

5070.2: Consultation and review. The RMP shall be certified complete by a qualified person and the stationary source owner or operator and shall be submitted to the UPA. Completeness shall be determined in accordance with Sections 5070.3 through 5070.10. The stationary source shall work closely with the UPA to determine that the RMP contains an appropriate level of detail.

Aside from 5070.3 through 5070.10, this includes all registration data that is accompanied with the RMP.

With federal submissions through CDX, a completeness review is completed through electronic verification for all required entries.

CUPAs may have their own completeness review checklists to perform this activity for completeness. Concerning the RMP during a completeness review, accuracy is certified by the own/operator and can be verified by the agency through audits and inspections.

RMP Completeness Review

§ 5070.3. RMP Executive Summary Component.
§ 5070.4. RMP Offsite Consequence Analysis Component.
§ 5070.5. RMP Five-Year Accident History Component.
§ 5070.6. RMP Program 2 Prevention Program Component.
§ 5070.7. RMP Program 3 Prevention Program Component.
§ 5070.8. RMP Program 4 Component.
§ 5070.9. RMP Emergency Response Program Component.
§ 5070.10. RMP Certification.

5070.3: Provides brief summary of the prevention program, info on regulated substance, emergency policies, accident history, and plans for improvement'

5070.4 Detailed information on worse case scenarios and alternative release scenarios for regulated toxics and flammable substances on site. OCA will be further discussed in the next section

5070.5 Info on accident history

5070.6 RMP program 2 prevention program information i.e. dates of hazard reviews, compliance audits, training, on site mitigation etc….

5070.7 RMP program 3 prevention program information i.e. dates of PHA, compliance audits, training, on site mitigation etc…addional info with more detail

5070.8 RMP program 4 component with more info specific to program 4

5070.9 RMP emergency response program component providing info on emergency response and notifications

5070.10 RMP certification to certify info is true, accurate and complete

RMP Completeness Review

Common Deficiencies

-Updated contacts

-Late Dates on Hazard Review, PHA, Compliance audits

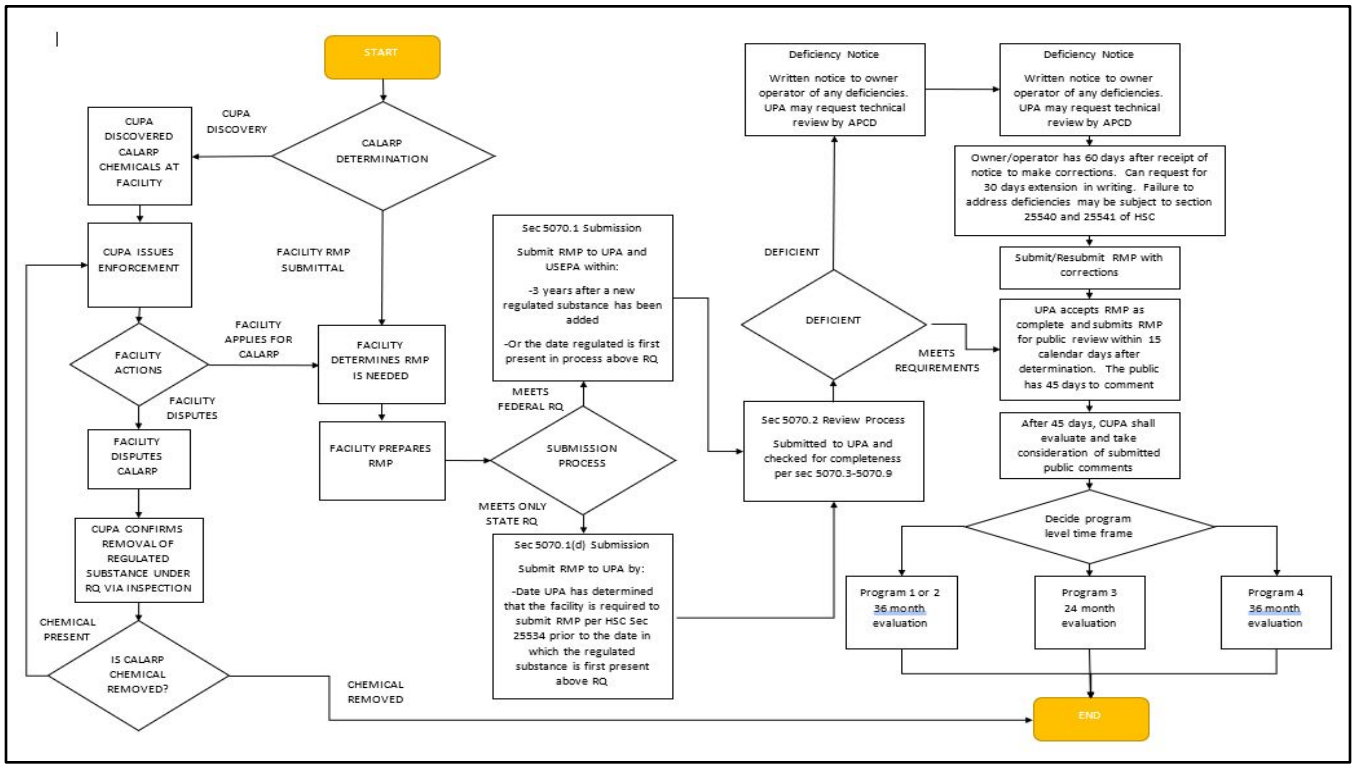
-Inclusion of additional sensitive off site receptors

-Change in quantities/ inconsistent quantities

-Missing Accident history if you are aware of incidents

-Inaccurate emergency response policies (responding vs non-responding)

-References: Recommend Cross referencing Hazardous materials business plan information, past RMP, Cal OES incident reports, facility receipts of regulated substance, known on site conditions from previous inspections etc



This flow chart depicts a RMP submission process. It does not cover all scenarios that can occur but the most likely flow of events. Concerning the requirement of an RMP submittal, either the CUPA can discover that a facility is required to develop and implement a RMP or the facility determines the need for it. This is depicted on the left side of the flow chart. Once a facility determines the need for it, the submission may fall under the requirements for either state or federal submission processes. This is seen in the more central area of the flow chart. The right portion of the flow chart depicts if there are deficiencies and the time requirements for the review process and acceptance.

RMP Registration, Submission, Correction, Updates

RMP Updates [§ 5070.11] (Subject to Public Review Process)

- 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, PHA, or Hazard review (6 Months)
- Change that alters the Program level (6 Months)

RMP Corrections [§ 5070.12]

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

Please keep your local regulator updated or corrected with these changes, especially changes in emergency contact, increases in inventory or new regulated substance. This is probably the most common issues that I see and can be compared with the hazardous materials business plan. I tend to see the hazmat business plan to be updated more often than the RMP.

There are more scenarios that may require the RMP to be updated. The EPA RMP guidance document has examples.

Any RMP updates will need to go the public review process

You'll see in RMP updates information about de-registration from CalARP, please keep your local regulator updated because closure inspections may be needed. This may also include the need for receipt of removal, confirmation inspection by the CUPA, and potentially requirements from RAGAGEP. IIAR is an example of such removal of regulated substances that has a checklist.

EXHIBIT 9-1
RMP UPDATES, CORRECTIONS AND DE-REGISTRATIONS

Change That Occurs	Date by Which You Must Update, Correct or De-register your RMP
No changes occur	At least once every 5 years from its initial submission or most recent update
A newly regulated substance is first listed by EPA	Within 3 years of the date EPA listed the newly regulated substance if your facility has more than a threshold quantity of that substance in a process
A regulated substance first becomes present above its threshold quantity in: – a process already covered; or – a new process	On or before the date the quantity of the regulated substance exceeds the threshold in the process
A change occurs at your facility that requires a revised PHA or hazard review	Within 6 months of the change
A change occurs at or near your facility that requires a revised offsite consequence analysis (e.g., you increase your inventory of a regulated substance such that it increases the distance to the endpoint by a factor of 2 or more, or a new public receptor is constructed near your facility)	Within 6 months of the change
A change occurs that alters the Program level that previously applied to any covered process	Within 6 months of the change

The EPA guidance for RMPs has a good table on RMP updates and corrections and includes these examples.

An accidental release meeting the reporting criteria of § 68.42 occurs at your facility	Add to and correct accident history information and incident investigation data elements within 6 months of the date of the accident (revising other RMP sections is not required unless facility changes resulting from an accident trigger a full update)
Facility emergency contact information changes	Correct the emergency contact information within one month of the change (revising other RMP elements is not required).
Minor administrative change (i.e., correct a clerical error or supply additional information)	Correct the information as soon as practicable (revising other RMP elements is not required).
A change occurs that makes the facility no longer subject to the requirement to submit an RMP	Submit a de-registration letter to EPA within 6 months of the change, indicating that the RMP is no longer required

More examples of updates

Hazard Assessment & Offsite Consequence Analysis

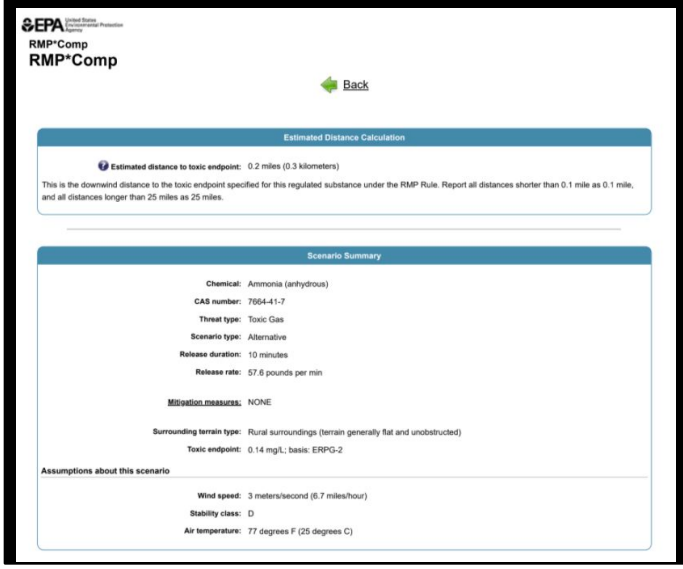
CalARP §5070.4 (OCA), Article 4 (Hazard Assessment)

Now that you know how to register, update, and correct CalARP RMPs, the next aspect to look at is HA and OCA because it's one of the main elements in a RMP

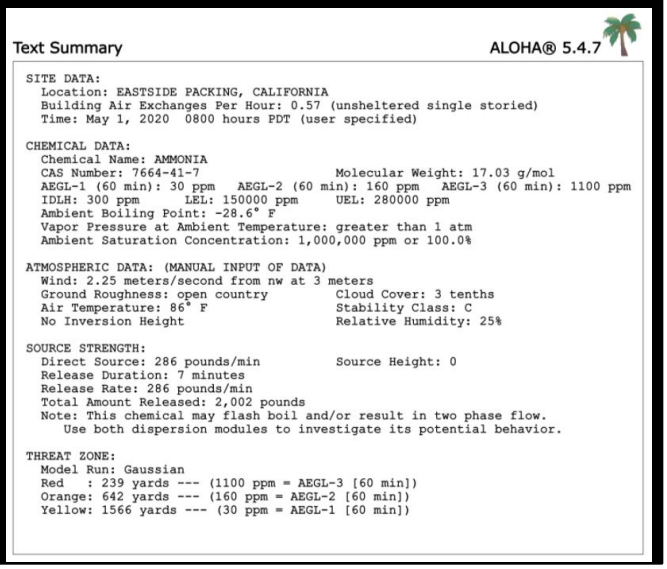
You can see that there is the Circle of Death here, what we will go over is what it means and how we arrive at this nice visual.

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



Before we dive into some of the requirements and parameters for the HA/OCA, I wanted to point out that there are programs that help you with running the analysis being:

RMP Comp

Generally used for the Worst-Case Scenarios

Areal Locations of Hazardous Atmospheres (ALOHA)

More programmable scenarios

Consultants are usually the ones running these models, but this is something that I will check for myself when doing an RMP review.

Concerning the use of the RMP comp, I like to cross check the information found in the RMP and confirm that it is calculated correctly and provides the appropriate distance points.

Hazard Assessment & Offsite Consequence Analysis

Applicability

- Program 1 processes must perform a worst-case release scenario and five-year accident history (§5080.3 and §5080.9)
- Program 2-4 processes must comply with all Hazard Assessment requirements (§5080.1-§5080.9)

Now when we look at applicability, regardless of the program level, all covered processes must perform a Hazard Assessment. With P1 only needing a WCR and P2-4 needed a full HA.

With that in mind, Hazard Assessments and Offsite Consequences Analyses are extremely detailed and can get complex. 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. The programs RMPComp and ALOHA are a big help for the plugging in of the number.

Section 5070.4 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

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 §5050.3(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 the Circle of Death, the red circle represents the endpoint of 200 ppm for this Worst-case scenario for an ammonia refrigeration process. So that means that anyone within the circle in in danger of serious injury/death and anyone outside the circle is not at that risk.

Appendix A. Table of Toxic Endpoints

[As defined in Section 5080.2 of this chapter]

CAS Number	*Chemical Name*	*Toxic Endpoint (mg/l)*
75-86-5	Acetone cyanohydrin	0.025
1752-30-3	Acetone thiosemicarbazide	0.10
107-02-8	Acrolein [2-Propenal]	0.0011
79-06-1	Acrylamide	0.060
107-13-1	Acrylonitrile [2-Propenenitrile]	0.076
814-68-6	Acrylyl chloride [2-Propenoyl chloride]	0.00090
116-06-3	Aldicarb	0.00030
309-00-2	Aldrin	0.010
107-18-6	Allyl alcohol [2-Propen-1-ol]	0.036
107-11-9	Allylamine [2-Propen-1-amine]	0.0032
20859-73-8	Aluminum phosphide	0.0047
54-62-6	Aminopterin	0.025
3734-97-2	Amiton oxalate	0.0030
7664-41-7	Ammonia	0.14

CONVERSION:

END POINT IN PPM= (END POINT(mg/L)X1000X 24.5)/Molecular weight

Molecular weight of iAmmonia=17

This will give you approximately 200 PPM .

Hazard Assessment & Offsite Consequence Analysis

Offsite Consequence Analysis Parameters [§5080.2]

- Endpoints [§5080.2(a)]
- Wind Speed [§5080.2(b)]
- Ambient Temperature / Humidity [§5080.2(c)]
- Height of Release [§5080.2(d)]
- Surface Roughness [§5080.2(e)]

WC Release Scenario – Toxic Gases [§5080.3(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. Further information can be found in the EPA guidance for Offsite consequence analysis.

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 (EQUIVALENT O 3.4 MILES PER HOUR)
- Atmospheric Stability Class = F (This is considered a stable atmosphere)
- 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 an alternative release scenario is required for each substance in a covered process. The alternate case scenario is supposed to represent the most likely event that would cause a release of a regulated substance. The scenario should also have a distance to toxic endpoint offsite and reach a public receptor unless no such scenario exists.

Hazard Assessment & Offsite Consequence Analysis

Population Impacts [§5080.5]

- 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 §5050.4(e)(3)

It is also good to check on what are the stated offsite receptors and confirm if any new receptors have been introduced. We had a facility where the facility failed to update their RMP which did not increase the OCA by a factor of two but it did introduce a school which would require the need to revise the OCA. Within the Hazardous materials business plan, this also introduces the need to contact school districts in case of a release and potentially requires updates to the facilities emergency response plan on handling this.

Hazard Assessment & Offsite Consequence Analysis

OCA Review and Update [§5080.7]

- 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

Must update OCA every 5 years, this generally is done at the same time as the required RMP update

One other requirement of the OCA is that documentation shall be maintained how the OCA was done, this is something that I will look at when I'm reviewing and RMP. I want to make sure that it's complete and accurate.

Any questions about OCA and HA?

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.

Program Level 2 & 3 Differences

P3: Management of Change - §5100.7

- P2: Safety information must be updated when a change occurs - §5090.1(c)
- P2: Operating procedures must be updated when a change occurs - §5090.3(c)
- P2: Training is required for all employees - §5090.4

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

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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.

Section 5100.6 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 5100.1, 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 5100.3, 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: Pre-Startup Review - §5100.7

- P2: Safety information must be updated when a change occurs - §5090.1(c)
- P2: Operating procedures must be updated when a change occurs - §5090.3(c)
- P2: Training is required for all employees - §5090.4

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

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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 5100.7 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 5100.6; and,

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

Program Level 2 & 3 Differences

P3: Contractors - §5100.12

- P2: Owner must ensure that every contractor is trained to perform maintenance procedures - §5090.5(c)

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

Section 5100.12 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 5100.3(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 5100.3(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
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

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 5100.10 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

Training is required for every employee responsible for operating a process. Employees that are newly assigned to a covered process will need initial training in SOP's, refresher training is required once every three years.

We can look at these examples for training in process, procedures, and response. Training is important because operators are the real boots on the ground when it comes to the system. They have the knowledge about the system, know how to operate it, and will need to know when to do in the event of an emergency.

You can remember the training requirement by thinking "Every 3 years, in 3 Categories: Process, Procedures, and Response"

Though this is minimum of 3 years, it is important to understand the frequency and the types of training that is stated within the training program established by the facility and that it is being met.

Common issues :

1. Employee not trained at all
2. Training that is past due for refresher
3. Training program does not meet the required categories
4. Actions implemented may not match training program or procedures (specific to incidents)

1. Group of employees should be categorized to meet specific levels of training based on job duties…may request an assessment of group.

Standard Operating Procedures

Operating Phases

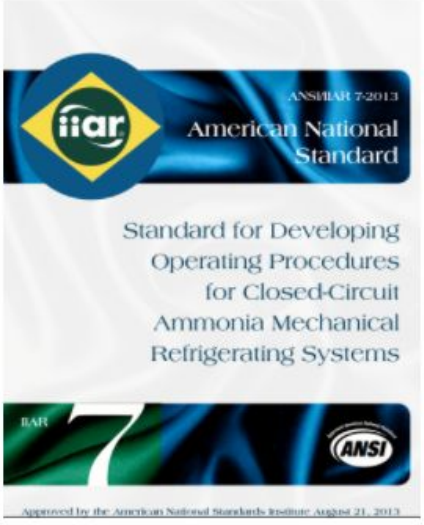
- Initial Startup
- Normal Operations
- Temporary Operations
- Emergency Shutdown
- Emergency Operations
- Normal Shutdown
- Startup Following a Turnaround

SOP Categories

- Operating Limits
- Safety and Health
- Safety Systems

Safe Work Practices

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



The owner or operator shall prepare written operating procedures that provide clear instructions or steps for safely conducting activities associated with each covered process consistent with the safety information for that process. Operating procedures will need to address operating phases, SOP categories, and safe work practices. SOP's need to be kept up to date to reflect current practice. P3 SOP's need to be certified annually.

Common issues:

-Does not meet standards of RAGAGEP

-RAGAGEP may require additional SOPs to be prepared. In IIAR, each operating phase is required to be developed for each piece of equipment.

-missing operating phase

-missing operating limits

-Does not match with other safety information or programs (i.e. mechanical integrity daily logs) or onsite conditions

-I recommend confirming stated safety information to what is discussed in SOPs. For example, deviations of parameters in safety information should properly reflect within SOPs. Another area that can be compared to the SOPs is the maintenance program. Ive seen daily logs that have had inconsistent information.

-routine activities brought up employees in an interview may not have a sop

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." (§ 5100.6)
- When is MOC/PSSR required?

As I previously discussed MOC and PSSR are P3 elements that help facilities keep track of changes to their covered process.

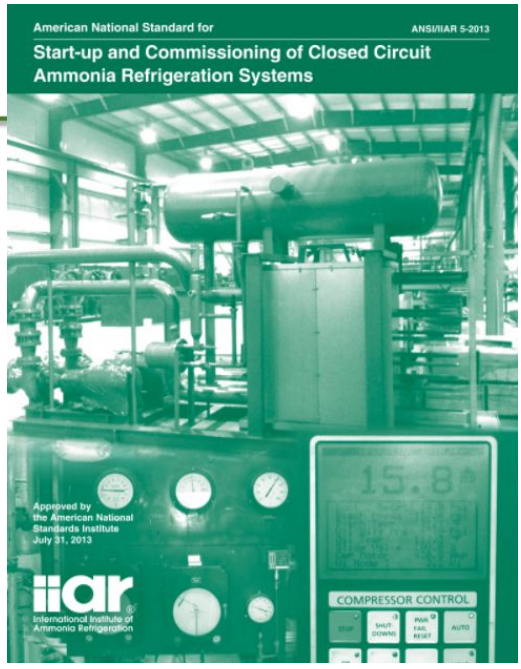
The owner or operator shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures; and, changes to stationary sources that affect a covered process.

When are some examples when an MOC/PSSR would be required?

-Increase of chemical quantity: Change of RMP, HMBP, consider capacity of vessels, change of OCA
-Change in equipment that is not replacement in kind: is it compatible, update procedures and safety information
-Safety systems: Changes in procedures, maintenance updates
-Organizational change: updating RMP, change is procedures concerning roles and responsibilities, training employees to know of the change.

Management of Change
Pre-Startup Safety Review

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



Concerning RAGAGEP, for ammonia cold storage, IIAR has published standard 5 which should be used as the baseline for PSSRs.

Coordination with AA on Modification of the Process

§ 5070.13 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
- Notify UPA in Writing (5 days prior) and consult concerning the review/revision of RMP. If prenotification not possible, written notice must be within 48 hours. Procedures should be developed and associated with MOC/PSSR program

Here are the requirements for covered process modification, please keep your local regulator in mind when you have big changes to your process coming up.

Concerning this section, I would recommend the assessment of a MOC program to include documentation to determine if a change is considered significant. This documents the thought process of this determination. Significant is vague and may be difficult to gauge. I have had a facility increase quantities that did not increase the OCA distance by a factor of two but increased it to a point where a new public receptor is introduced.

Now I'll had it back to Uriah.

§ 5070.13. 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:

Section 3: Uriah

- Process Hazard Analysis
- Mechanical Integrity
- Process Safety Information
- Emergency Response

Process Hazard Analysis

Methodologies

- What-If Checklists
- HAZOP

There are multiple approved methodologies for conducting a PHA. These are the two most frequently used that you will encounter.

Now the big idea of a PHA is this. “What could go wrong here, and what do we have in place to ensure that doesn’t happen.”

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).

Notice the risk ranking. There are some different variations, but all ranking models follow the same pattern. The higher the severity and higher the likelihood = greater risk.

There will always be a certain threshold of risk that is unacceptable and will need to be resolved through a recommenddation.

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 5100.1(c)(1)(D) & (E): 5100.3 (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

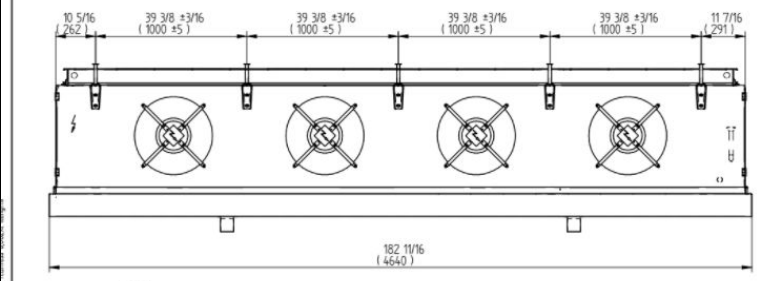
Quantity: 1 Model XLP2-1018-622 EVAPORATIVE CONDENSER

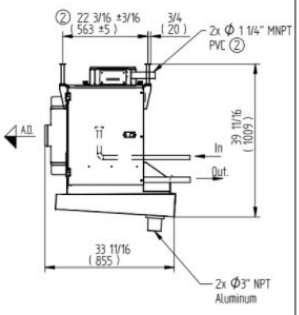
Certified Capacity: 4903.20 MBH based on 90.00°F condensing temp. with an entering air wet bulb of 75.00°F. Refrigerant: R-717.

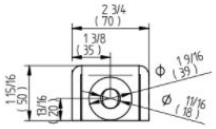
Fan Motor(s): Three (3) 7.5 HP fan motor(s): Totally Enclosed, Fan Cooled (TEFC),
1 Speed/1 Winding - Premium Efficiency (Inverter Duty), suitable for 460 volt, 3 phase,
60 hertz electrical service. Drives are based on 0 inches ESP.

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	

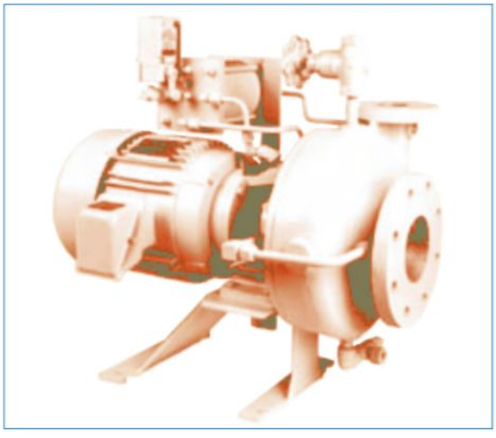
PRODUCT DATA SHEET

CORNELL PUMP COMPANY

Refrigerant Pump 2CB

PUMP SPECIFICATION

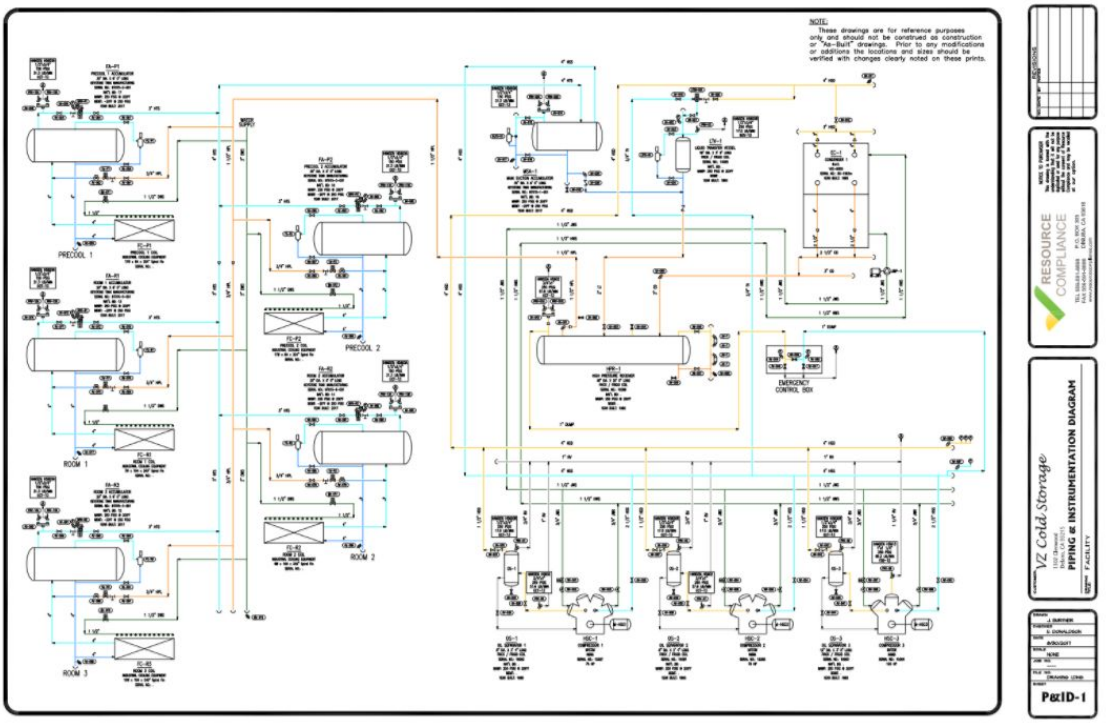
- 2CB Close coupled refrigerant pump
- 4" x 2" Class 150 Flanged suction & discharge
- Constructed of ASTM A536 60-40-18 Ductile Iron
- Industry leading two year warranty
- Four pole (1800/1500RPM) operating speed
- Optional mounting configurations available
- Polar white
- **Mechanical Seal:**
  John 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.

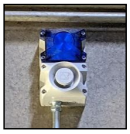
Machinery Room (High Level)

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."

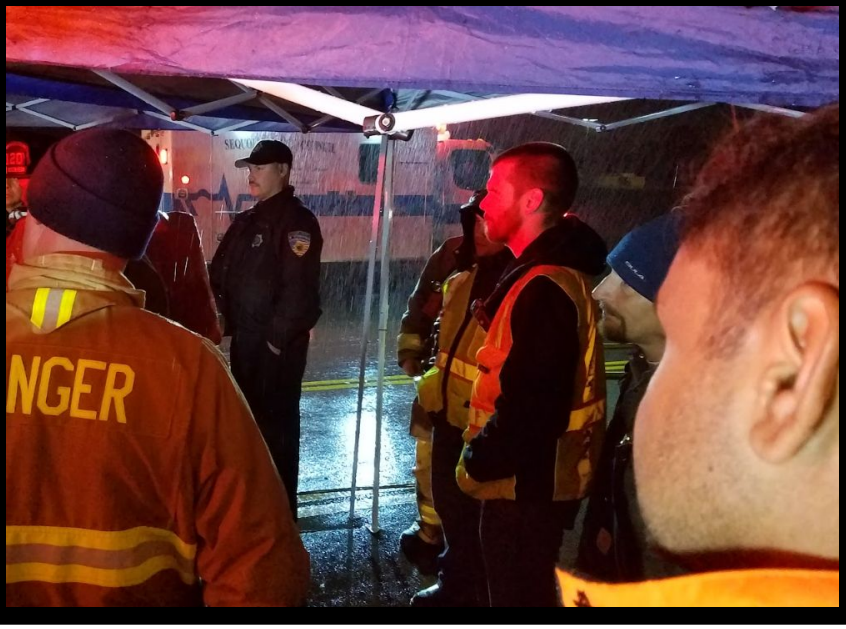
Process Safety Information

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)

Emergency Response



The vast majority of facilities in your jurisdictions are non-responding facilities. There are some which maintain a full Emergency Response Program / Hazmat Team, but we do not have time to get into the details. We will therefore take a quick look at the requirements for non-responding facilities.

Emergency Response - Non-Responding Facilities

CCR 19 § 5120.1 (b) The owner or operator of a stationary source whose employees will not respond to accidental releases of regulated substances need not comply with Section 5120.2 *(i.e. full HAZMAT TEAM)* provided that they meet the following:

1) Included in the Community Emergency Response Program, the Hazardous Materials Area Plan and/or the Business Plan Program *(i.e. Submit an HMBP)*

2) The owner or operator must document that response actions have been coordinated with the local fire department and hazardous materials response agencies *(i.e. Send a Letter and/or coordinate a response drill)*

Cal. Code Regs. title 19 § 5120.1
(b) The owner or operator of a stationary source whose employees will not respond to accidental releases of regulated substances need not comply with Section 5120.2 provided that they meet the following:

(1) For stationary sources with any regulated toxic substance held in a process above the threshold quantity, the stationary source is included in the community emergency response plan developed under Section 11003 of Title 42 of the United States Code (USC), is included in the city or county Hazardous Materials Area plans and/or is included in the business plan program, pursuant to Section 25507 of the Health & Safety Code. The owner or operator must document that response actions have been coordinated with the local fire department and hazardous materials response agencies;

(2) For stationary sources with only regulated flammable substances held in a process above the threshold quantity, the owner or operator must document that response actions have been coordinated with the local fire department and hazardous materials response agencies; and,

(3) Appropriate mechanisms and written procedures are in place to notify emergency responders when there is a need for a response.
Cal. Code Regs. Tit. 19, § 5120.1

Note: Authority cited: Section 8585, Government Code; and Sections 25531 and 25534.05,

Health and Safety Code. Reference: Section 8585, Government Code; Section 25531, Health and Safety Code; and Section 68.90, Part 68, Title 40, Code of Federal Regulations.")

Section 4: Kern County

- Inspections and Audits
- CalARP Violations and Enforcement

CalARP Inspections/Audits

- Inspection and Enforcement Plan
  - Each CUPA has similarities but may have additional requirements
  - Coordinate with your management and county council on higher levels of enforcement
- Inspections versus Audits
  - Inspections:
    - Activity normally authorized with facility permit
    - Can result in direct enforcement action
    - Normally involves onsite verification
  - Audits:
    - Selected to confirm verification of quality of the RMP based on criteria
    - Separate process requirements from inspections and resolution of findings (may not directly lead to enforcement right away, but needs to be addressed)
- EPA Guidance for conducting RMP inspections audits

CalARP Inspections/Audits

- Recommendations for conducting inspections/audits
  - Pre-Inspection: Review available documents and may request for additional documents if announced. This provides the ability to compare documentation to onsite conditions during the on-site inspection
  - On-site inspection: Confirm and review available documentation, observe overall mechanical integrity of piping, vessels, and storage; note any observations that may need to be confirmed during post inspection, perform employee interviews or observations of actions conducted.
  - Post Inspection: Request additional documents for any concerns you observed during the pre-inspection and on-site inspection
- Determine the extent "based on available resources, priorities, expertise, and other factors"

Owner/Operators should be the subject matter experts concerning their processes but may have blind spots within their programs. This can be from new organization structure, change in employees roles and responsibilities, new regulations/standards, new employees of RMP requirements that conducted changes, and various other factors. This I why regulatory inspections occur and consultants may be needed to assess those blind spots.

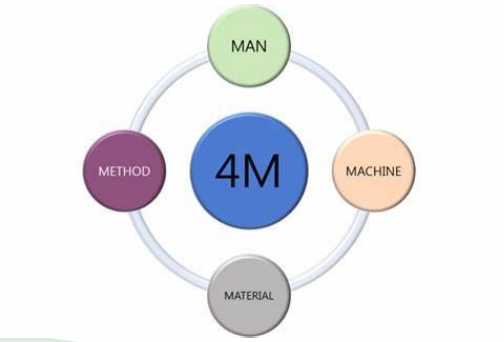
Implementing agencies have limited time and resources for inspections and audits to confirm the full accuracy and compliance, but can lead to the discovery of underlying issues that can lead to further investigations and resources devoted to the inspection.

CalARP Inspections/Audits

- Inspection/Audits Activities but not limited to:
  - Cross reference RMP to HMBP quantities, obtained receipts, and other documents with each other
  - Compare findings and recommendations of PHA and Compliance audits to on-site conditions. Are there open findings? Have they been resolved
  - Review for appropriate level of detail (i.e. does PHA cover all relevant hazards?)
  - Compare Industry standards to onsite conditions
  - Interview Employees/contractor/management vs documentation (i.e. SOPs, emergency response, etc…)
  - Observed employee/contractor/management actions vs documentation
  - Compare emergency response plans to response actions implemented in cases of hazmat release response
  - Compare mechanical integrity inspections and testing procedures to obtained logs/results and onsite conditions
  - Compare facility map layouts to onsite conditions
  - Presence, absence, or late required documentation
  - Observe damage, discrepancies, or questionable practices

CalARP Inspections/Audits

- The more complex a process is=More contributing factors that can lead to a release=More possible inspection/audit activities
  - Concept of 4Ms interaction model: Man, Material, Management/Method, and Machinery



CalARP Inspections/Audits

- Consistency between:
  - Regulations
  - On-site conditions
  - Codes and Standards
  - Facility Programs/procedures
  - Facility Personnel

CalARP Violations and Enforcement

- Degree of Violation
  - Minor:
  - Class II:
  - Class I:
  - Default class determined by CUPA forum board and state
- Can be upgraded based on:
  - Deviation
  - Severity
  - Overall Discovery of the violation (inspection vs emergency response)
  - Repetitive
  - Negligence (knowingly)

CalARP Violations and Enforcement

- Levels of Enforcement
  - Notice of Violation
  - Administrative Enforcement Order
  - Civil/Criminal Cases
- Recommend attending enforcement courses here at CUPA for more information

Examples of enforcement cases I have been apart of were:

-Disposal of ammonia down the drain
-Increasing ammonia quantities
-Critical staff in ICS positions
-deviation of limits

Questions?

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Kern County
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Phone: 661-862-8708

Uriah Donaldson, OHST
Resource Compliance
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