California Unified Program Agency Conference

CalARP Risk Management Plan Review

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Agenda

- Owner or Operator Coordination
- CalARP Applicability
- CalARP RMP Submission
- CalARP Review Cycle
- Completeness Review
- Evaluation Review

Disclaimer

Instructor will describe the CalARP RMP regulatory review process as developed and implemented for Monterey County CUPA (former employer) since 1991.

Each CUPA has the authority to establish it's own CalARP RMP submission content, level of RMP detail, and it's interpretation of RMP review criteria. As such, this course is intended to provide an overview of one example of CalARP RMP development and implementation process.

Any examples of RMP and prevention program facility implementation is taken from the ammonia refrigeration industry, which were the majority of CalARP processes in Monterey County. Therefore, the prevention programs will cover Program 1, 2 and 3 only.

CalARP law & regulation

Owner or Operator of a stationary source with a threshold quantity of a regulated substance per Tables 1, 2, 3, in a process.

Health & Safety Code Division 20, Chp. 6.95, Article 2, *§25531 et. seq.*

Calif. Code of Regs. Title 19, Div. 2, Chp. 4.5, Article 1, *§2735.1 et. seq.*

Owner/Operator Coordination

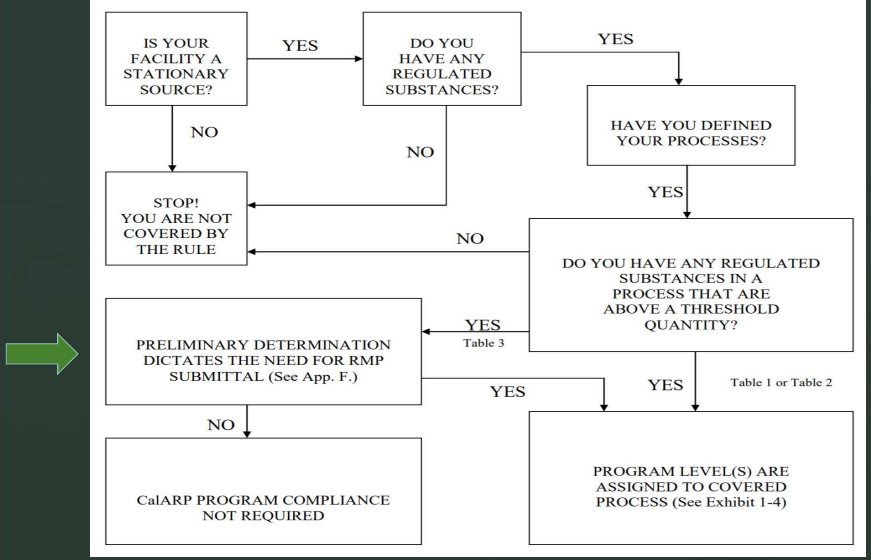
CalARP laws and regulations requires many layers of **coordination** (for example):

Owner or operator shall coordinate with the CUPA to determine the appropriate **level of documentation** in a RMP submittal (*CCR §2735.5(a)*);

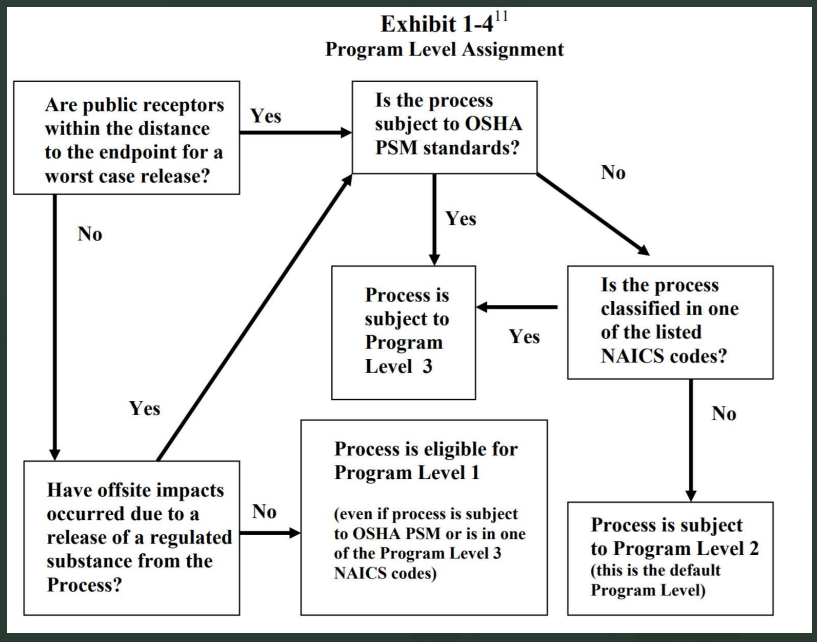
Owner or operator shall closely coordinate with CUPA to ensure appropriate **technical standards** are applied to their implementation of this chapter *(CCR § 2785.1).*

Exhibit 1-3[10]

Program Applicability



* Page 21 of 174 of CalOES CalARP CUPA Guidance (2005)



* Page 22 of 174 of CalOES CalARP CUPA Guidance (2005)

Program 1	Program 2	Program 3
Executive Summary	Executive Summary	Executive Summary
Worst-case release analysis	Worst-case release analysis	Worst-case release analysis
	Alternative release analysis	Alternative release analysis
5-year accident history	5-year accident history	5-year accident history
	Document management system	Document management system
Prevention Program		
Certify no additional prevention steps needed	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 Review
		Contractors
		Employee Participation
		Hot Work Permits
Emergency Response Program		
Coordinate with local emergency responders	Develop a plan and program (if applicable) and coordinate with local emergency responders	Develop a plan and program (if applicable) and coordinate with local emergency responders
Submit One Risk Management Plan for All Covered Processes		

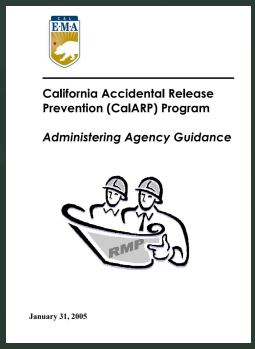
* Page 16 of 174 of CalOES CalARP CUPA Guidance (2005)

CalARP RMP Applicability

For **Table 3** facilities, the AA must first make a ***preliminary [risk] determination*** whether the facility must comply with the CalARP Program and submit an RMP. Once the AA has made this determination, the AA shall, in consultation with the facility owner or operator, establish an RMP submittal date. The AA does not have the same preliminary determination option with facilities with more than a threshold quantity of a Table 1 or Table 2 chemical. See Appendix F for a discussion of AA risk determination and issues of CalARP Program surcharge collection from "RMP exempt" facilities.*

* Page 25 of 174 of CalOES CalARP CUPA Guidance (2005)

CalARP Preliminary Risk Determination



- CUPA must make a preliminary determination of risk posed by the stationary source per *CH&SC § 25534, whether there is a significant likelihood the facility poses a risk of an accidental release:*
  - Nature of regulated substance;
  - Amount of regulated substance;
  - Accident history of stationary source;
  - Potential public receptors;
  - Stationary source process operations, etc.

CalARP Preliminary Risk Determination

Monterey County CUPA Risk Ranking Calculation:

Risk Score = (OCA + 1) * (I + S) *R)) + A

OCA = Worst case release distance to level of concern in miles

I = Impacted Population
S = Sensitive facilities
R = Release Potential
A = Alarms and Detectors

CalARP Preliminary Risk Determination

Monterey County CUPA Risk Rank in Order:

Name	Location	City	Regulated Substance	Total on Site	Total in Process	Rel. W/C	Distance to W/C	Pop. Imp.	Sen. Fac.	Rel. Pot.	Alarm Det.	Risk Score
1			Ammonia	100000	100000	100000	3.5	5	25	4	2	542
2			Ammonia	46000	46000	46000	2.5	5	11	4	1	225
3			Ammonia	17300	17300	17300	2.3	5	12	3	2	170.3
4			Ammonia	73000	73000	73000	4.9	4	4	3	4	145.6
5			Ammonia	68000	68000	68000	3	5	6	3	1	133
6			Ammonia	49000	49000	49000	4	5	3	3	1	121
7			Ammonia	47750	17750	17750	1.6	5	10	3	2	119
8			Ammonia	19100	19100	19100	1.7	5	9	3	2	115.4
9			Ammonia	38000	30000	30000	2	5	5	3	1	91
10			Ammonia	21000	9500	9500	1.2	5	6	3	2	74.6
11			Ammonia	27500	20000	20000	1.2	4	4	4	2	72.4
12			Ammonia	17250	4250	4250	0.8	3	4	5	4	67
13			Ammonia	15000	7800	4290	0.8	5	2	5	3	66
14			Ammonia	40000	40000	22000	2.7	4	1	3	1	56.5
15			Ammonia	9000	9000	4950	0.9	3	4	4	3	56.2
16			Ammonia	8000	8000	8000	1.1	5	2	3	5	49.1
17			Chlorine Gas	32000	2000	1100	2.2	4	1	3	1	49
18			Ammonia	30000	30000	30000	2	5	0	3	3	48
19			Ammonia	9500	9500	5225	0.9	3	3	4	2	47.6

CalARP Preliminary Risk Determination

CUPA **cannot** reassign Program Levels for **Table 1** or **Table 2** facilities.

CUPA **can** reassign Programs Levels for **Table 3** facilities *only*:

- Program Level 2 → Program Level 3
- Program Level 3 → Program Level 2
- Program Level 2 → Program Level 1

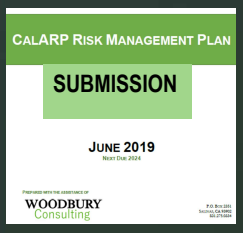
CalARP Preliminary Risk Determination

Once CUPA determines an RMP is required, owner/operator notified to prepare and submit a RMP. This RMP submitted to the CUPA only, e.g. Table 3.

CUPA and owner/operator shall consult to establish RMP submittal date. The CUPA shall not require an RMP to be submitted earlier than 12 months or later than 3 years after owner/operator received notice of that determination from the CUPA.

CalARP RMP Submission

Owner or Operator

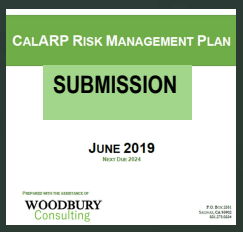


- RMP components and submission requirements identified in Article 3.
- Regs. Article 1 contains RMP scope, definitions, applicability (Program 1,2, 3 or 4*) and
- General Requirements
  - Ow/Op "**shall closely coordinate"** with CUPA to implement Chapter 4.5 and determine appropriate level of documentation required for an RMP to comply with *CCR §2745.3 – §2745.9*

* Level 4 not covered in this presentation

CalARP RMP Submission

Owner or Operator



RMP includes *CCR §2745.3 – §2745.9* components

- Executive Summary
- RMP Offsite Consequence Analysis
- Five-Year Accident History
- Prevention Program 2, 3, or 4* element
- Emergency Response
- EPA RMP submit report
- RMP Certification by ow/op
- Qualified Person Certification (*CCR 2745.2(a*)

* Level 4 not covered in this presentation

CalARP RMP Review Cycle

Owner or Operator

CUPA

Consultation & Review

60 days*

Deficiency Notice

Completeness Review

15 days

Formal Public Review

45 days

Evaluation Review

Site Walkthrough

* One time 30 day extension

CalARP RMP Review Cycle

CUPA shall complete Evaluation Review as follows:

- Program 1 or Program 2 – 36 months
- Program 3 – 24 months

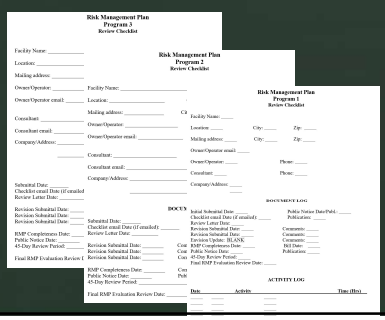
CUPA Submittal Guidance

CUPA should prepare and disseminate a CalARP RMP submittal guidance to assist CalARP facilities to prepare and submit a compliant RMP. For example,

- Format of submittal (binder, PDF copy, CD, etc.);
- Elements and documents to be submitted;
- Level of detail required for each RMP element, e.g. list of sensitive receptors for OCA – daycares, schools, etc.;
- Owner/Operator and CUPA Coordination requirements or expectations;
- Closely work with CUPA to approve PHA method(s) for a given process, need to schedule w/CUPA to facilitate participation;
- Magnitude/Scope of external events analysis, e.g. seismic assessment required?

Completeness Review

- Owner/operator RMP submittal document
- RMP Review Checklist (Program Level 1, 2, 3)
- CalARP law and regulation
- CalARP/EPA guidance documents and fact sheets
- Lots of coffee!



Completeness Review

Management System

- Qualified person or position with overall responsibility for implementing the RMP elements at your facility.
- For persons other than qualified person or position, document persons/positions and lines of authority w/organizational chart or similar.
- Define Position or Person? Depends…
  - Accountability chart w/title, responsibility to manage RMP element
  - Team approach:

    Facilities, Production, Operations, Refrigeration, Security, Sanitation, Safety, Refrigeration Contractor, etc.

Completeness Review

Hazard Assessment

- How far will ammonia travel 360 degrees from facility up to given regulated substance toxic endpoint?
- Populations in release zone listed by location such as Daycares, Schools, State/Federal Parks, etc.
- **Worst case** – Unlikely – parameters used?
- **Alternative case** – Likely – local weather conditions verified?
  - Emergency Response procedures prepared to address this likely scenario?

Completeness Review

Process Safety Information

Chemical Hazards	Process Technology	Process Equipment
✓Toxicity ✓Permissible exposure limits (PEL) ✓Physical data ✓Reactivity ✓Corrosivity ✓Thermal & chemical stability ✓Hazardous effects of inadvertent mixing of materials	✓Block flow diagram or simplified process flow diagram ✓Process chemistry ✓Maximum intended inventory ✓Safe upper and lower limits for items such as temperature, pressure, flows or composition ✓Evaluation of the consequences of deviation	✓Materials of construction ✓Piping and instrument diagrams (P&IDs) ✓Electrical classification ✓Relief system design & design basis ✓Ventilation system design ✓Design codes & standards employed ✓Safety systems ✓Material and energy balances for processes built after June 21, 1999

Completeness Review

Process Safety Information

Owner/Operator **shall document** equipment complies with recognized and generally accepted good engineering practices (RAGAGEP).

CODES/STANDARDS

- All ammonia refrigeration piping and equipment was installed in accordance with ANSI B31.5 Refrigeration Piping, Addenda (a.)1989, (b.)1981, (c.)1992
- All ammonia refrigeration piping and equipment was installed (as required by Monterey County) in general accordance with:
  - ANSI 15-1989 Safety Code for Mechanical Refrigeration
  - Uniform Mechanical Code (UMC) Latest Edition 1993
  - ANSI/IIAR 2-1984 ("Equipment , Design and Installation of Ammonia Mechanical Refrigeration Systems").
  - Uniform Fire Code (UFC), Article 63, Latest Addition.
  - Uniform Building Code (UBC) Latest Addition.

CUPA may require a Code Compliance Review which audits process(es) to verify compliance with noted RAGAGEPs.

Completeness Review

Process Hazard Analysis

Assembled team member(s) met following:

- Expertise in engineering and process operations
- Experience and knowledge specific to the process being evaluated
- Knowledgeable in the specific process hazard analysis methodology being used
- Common industrial refrigeration Hazard Review/PHA methods: What-If/Checklist, HazOP

Was CUPA notified of PHA schedule?

Completeness Review

Process Hazard Analysis

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Was CUPA notified of PHA schedule?

Completeness Review

Process Hazard Analysis

Team members evaluated the following:

- Process hazards
- Previous incidents with potential for catastrophic results (including near misses)
- Engineering and administrative controls
- Consequences of failure of controls
- Stationary source siting
- Human Factors
- Qualitative evaluation of health and safety impacts of control failure
- External events considered, including seismic events*

* CalARP Program Seismic Guidance, updated 2019

Completeness Review

Process Hazard Analysis

2019 PHA

RECOMMENDATIONS LIST

No.	Recommendation	References
1	Consider Installing walls and ventilation fans around the three LPR areas inside the facility	1.7 Are populations (other than control room personnel) sited with consideration of buffer zones from incidents? – Facility Siting 1.9 Is there potential for an incident with non-refrigeration equipment to affect refrigeration equipment or vice versa? – Facility Siting 4.1 The emergency ventilation system is nonexistent, inadequate, or inoperable during an emergency situation – Emergency Conditions
2	Consider implementing a shelter in place protocol	1.10 Is the emergency plan, the evacuation routes, and assembly points sited with consideration of possible incident locations? – Facility Siting
3	Determine if there is a program in place to re calibrate the ground fault every three years	1.16 Is the facility properly grounded from lightning strikes? – Facility Siting
4	Consider having an Arc Flash assessment conducted of your electrical panels and having the appropriate stickers placed on each panel	1.16 Is the facility properly grounded from lightning strikes? – Facility Siting
5	Consider installing eye wash safety showers inside the LPR areas	1.23 Are eye wash stations located inside and outside compressor rooms and in other critical locations? – Facility Siting
6	Replace the missing ventilation fan in the compressor room	4.1 The emergency ventilation system is nonexistent, inadequate, or inoperable during an emergency situation – Emergency Conditions 12.5 A seal component (e.g., packing, O-ring, mechanical seal, gasket/flange, etc.) fails – Screw Compressors 12.22 The compressor coalescer drum gasket blows out – Screw Compressors

Completeness Review

Process Hazard Analysis

- Process hazards
- Previous incidents with potential for catastrophic results (including near misses)
- Engineering and administrative controls
- Consequences of failure of controls
- Stationary source siting
- Human Factors
- Qualitative evaluation of health and safety impacts of control failure
- External events considered, including seismic events*

Completeness Review

Process Hazard Analysis

- As of 2015, owner and operator must either enter into written agreement with CUPA to resolve findings or default to 2.5 years from date of PHA
- Limited time to complete recommendations, or
- Encourage owner or operator to communicate with CUPA to establish a mutually agreed written schedule to address open items

* CalARP Program Seismic Guidance, updated 2019

Completeness Review

Operating Procedures

- Appropriate for equipment and operations
- Complete
- Easily understood by operators
- Readily accessible to worker's who operate process
- Reviewed/modified as necessary to reflect current practices and process changes
- Document annual certification as current and accurate

Completeness Review

Training

Each employee involved in process shall be trained in

- Process overview;
- Process safety and health hazards;
- Emergency procedures, including shutdown;
- Safe Work Practices;
- Refresher training at least every three years;
- Means to verify employee received/understood training

Completeness Review

Training

In establishing their training programs, employers must clearly define

- the employees to be trained and
- what subjects are to be covered in their training

Completeness Review

Training

In establishing their training programs, employers must clearly define

- the employees to be trained and
- what subjects are to be covered in their training

Completeness Review

Training Program Elements

Operating Procedures

Maintenance or Mechanical Integrity

- Hazards of the process
- How to avoid or correct an unsafe condition
- Procedures applicable to job tasks

Management of Change and Pre-Startup

- Operators, maintenance and contract employees must be trained in any updated or new procedures prior to startup of a process after a major change
- Training must be complete prior to introduction of regulated substance to a new or changed process

Completeness Review

Training Program Elements

Contractor

- Known fire, explosion, toxic hazards of process;
- Process hazards related to their job;
- Emergency Action Plan;
- Safe work practices;
- Maintenance procedures related to process hazard

Emergency Response

- Employees must be trained in relevant ER procedures

Completeness Review

Employee Participation

Written plan of action regarding the implementation of the employee participation.

- Training - topic and frequency
- Mechanism for Operator Input
- Contact
- Scheduled review
- Availability of PHA documents

Completeness Review

Employee Participation

Written plan of action regarding the implementation of the employee participation.

Consult with employees and their representatives on the conduct and development of:

- Process hazards analyses
- Other process safety management elements in chemical accident prevention provisions

Completeness Review

Mechanical Integrity

- Establish list of equipment covered;
- Establish and implement written procedures to maintain on-going integrity of equipment;
- Training for maintenance activities;

Completeness Review

Mechanical Integrity

- Inspect and test equipment;
- Document inspection results:
  - Frequency consistent with manufacturer's recommendations and good engineering practices
- Correct equipment deficiencies;
- Establish quality assurance of equipment;
  - Appropriate checks and inspections.

Completeness Review

Compliance Audit

- Owner/Operator certify program in compliance every 3 years to ensure procedures and practices are adequate and are being followed per RMP/PSM.
- Conducted by at least one person knowledgeable in process
- Develop report and recommendations:
  - Document response and actual date of correction of deficiencies
  - Enter into agreement with CUPA or resolve recommendations within 1.5 years of performing the audit
- Retain 2 most current audits

Completeness Review

Incident Investigation

- Incidents which did or could result in catastrophic release of hazardous chemicals
  - Investigation initiated within 48 hours
- Report and recommendations
- System to address recommendations
  - Enter into agreement with CUPA OR resolve w/in 1.5 years after completion of incident investigation or 2 yrs w/in date of incident, whichever is first
- Review with affected personnel
- Retained 5 years

Completeness Review

MOC and PSSR

Management of Change (MOC)

- Document changes in equipment & SOPs
- Update PSI, SOPs, PHA

Pre-Startup Safety Review (PSSR)

- If change in PSI -> PSSR
- Confirm construction/equipment confoms to design specs
- Safety, Operating, Maintenance, ER in place
- PHA performed and recommendations resolved
- Employee training complete

Completeness Review

MOC and PSSR

Written procedures, with authorization requirements, to manage changes to process chemicals, technology, equipment, procedures.

Examples of changes in procedures include

- Operating Procedures.
- Preventive maintenance procedures.
- Inspection & testing procedures & frequencies.
- Training procedures & requirements.
- Emergency operating procedures.

Examples of changes in process technology

- An increase in ammonia.
- Equipment unavailability.
- Installation of new equipment, such as a new compressor.

Completeness Review

Modification

Process Modification (CalARP *CCR §2745.11(1)*):

5 days in advance of process modification, notify CUPA in writing

- Significant increase in ammonia onsite;
- Risk of handling a regulated substance as compared to the amount of risk identified in the RMP.
- Update documents "expeditiously" or within 60 days.

What is *significant* ? Each CUPA has their own interpretation.

Completeness Review

Hot Work Permit

✔Issue a hot work permit.	You must issue this permit for hot work conducted on or near a covered process.
✔Implement fire prevention and protection.	You must ensure that the fire prevention and protection requirements in 29 CFR 1910.252(a) are implemented before the hot work begins. The permit must document this.
✔Indicate the appropriate dates.	The permit should indicate the dates authorized for hot work.
✔Identify the work.	The permit must identify the object on which hot work is to be performed.
✔Maintain the permit on file.	You must keep the permit on file until workers have completed the hot work operations.

Completeness Review

Emergency Response

Non-responding facility

- Stationary source included in community emergency response plan, e.g. Hazardous Materials Area Plan;
- Document response actions have been coordinated with local fire dept. and hazmat response agencies;
- Appropriate mechanisms and written procedures to notify emergency responders when there is a need for a response.

Completeness Review

Emergency Response

Responding facility develops an Emergency Response Plan with:

- External agency notification procedures and procedures to interface with public and ER agencies;
- Documentation of proper first aid and emergency medical treatment;
- Procedures and measures for ER after a release
- Procedures for use of emergency response equipment and it's inspection, testing, and maintenance;
- Training for all employees in relevant procedures and relevant aspects of the ICS
- Procedures to review and update the ER Plan to reflect changes and ensure employees are informed of changes

RMP Implementation Notice

Owner or Operator → CUPA

CALARP RMP

CALARP IMPLEMENTATION NOTICE

REQUIREMENT

H&SC §25535(b) Upon implementation of an RMP, the stationary source shall notify the administering agency that the RMP has been implemented and shall summarize the steps taken in preparation and implementation of the RMP.

IMPLEMENTATION NOTICE

XYZ Cooling has implemented the Risk Management Plan as required by §25535(b), Article 2, Chapter 6.95 of the California Health and Safety Code (H&SC).

Please refer to the RMP Executive Summary which summarizes the RMP elements and program implementation activities.

QUALIFIED PERSON

_____ _____

Qualified Person
XYZ Cooling

Date

Completeness Review – without deficiencies

Re: Completeness Review, Risk Management Plan (RMP)

Dear Ms. Ammonia:

I have finished the completeness review of the Risk Management Plan (RMP), submitted by XYZ Engineering for your vegetable processing and cold storage facility at Alta Street, Gonzales. I have determined that this RMP adequately addresses all of the required components of the RMP as specified by Chapter 4.5 of the California Code of Regulations (CCR), and therefore, I find that the document is complete and meets the intent of Chapter 4.5 of the California Code of Regulations, and Article 2, Chapter 6.95, of the California Health and Safety Code.

Pursuant to CCR section 2745.2, public notification will be made via a notice in the Salinas Californian, and the RMP document will then be made available at the Health Department for formal public review and comment for a 45-day period. At the end of this 45-day public review period this department shall conduct an evaluation review of the RMP, taking into account any public comments received. The evaluation review shall include a field inspection and audit of onsite documents and records pertinent to the facilities Risk Management Program, such as training certification records, maintenance logs and schedules and operating procedures.

The risk reduction recommendations and schedule determined by the process hazard analysis are acceptable. Please be sure to keep records of the implementation status of these recommendations for my inspection and review, and to update the RMP as necessary.

Note that staff have expended numerous hours reviewing documents, attending meetings and performing computer modeling of chemical release scenarios. Under separate cover you will receive a bill for these services.

Feel free to contact me at 755-4511 if you have any questions or require any additional information concerning this matter.

RMP Updates

- At least once every five years from the date of initial submission or most recent update;
- No later than three years after a newly regulated substance is first listed;
- No later than the date on which a new regulated substance is first present in an already covered process above a threshold quantity;
- No later than the date on which a regulated substance is first present above a threshold quantity in a new process;
- Within six months of a change that requires a revised PHA or hazard review;
- Within six months of a change that requires a revised OCA; and,
- Within six months of a change that alters the Program level.

Revised RMPs are subject to public review process outlined in *CCR §2745.2*

Evaluation Review

CUPA Evaluation Review may include:

- RMP verification (onsite document review)
- Standard application of engineering & scientific principles
- Site specific characteristics
- Technical accuracy
- Severity of offsite consequences
- Any other information in possession of or review by the CUPA including public input

Evaluation Review

- Complete Program 3 RMP Evaluation Reviews within 24 months
- Complete Program 1 or 2 RMP Evaluation Reviews within 36 months

Evaluation Review

Hazard Assessment

- Utilize computer modeling software listed in RMP, verify model output of distance to toxic endpoint
  - RMP*comp, ALOHA – common and freely available

FIGURE 2 RMP OCA – WORST-CASE SCENARIO MAPPING

Google Earth 2019.

Text Summary ALOHA® 5.4.7

```
SITE DATA:
  Location: SAN JUAN BAUTISTA, CALIFORNIA
  Building Air Exchanges Per Hour: 0.50 (enclosed office)
  Time: August 18, 2019  1355 hours PDT (using computer's clock)

CHEMICAL DATA:
  Chemical Name: AMMONIA
  CAS Number: 7664-41-7              Molecular Weight: 17.03 g/mol
  AEGL-1 (60 min): 30 ppm   AEGL-2 (60 min): 160 ppm   AEGL-3 (60 min): 1100 ppm
  IDLH: 300 ppm      LEL: 150000 ppm     UEL: 280000 ppm
  Ambient Boiling Point: -28.4° F
  Vapor Pressure at Ambient Temperature: greater than 1 atm
  Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
  Wind: 1.5 meters/second from WSW at 3 meters
  Ground Roughness: open country          Cloud Cover: 5 tenths
  Air Temperature: 25° C
  Stability Class: F (user override)
  No Inversion Height                     Relative Humidity: 50%

SOURCE STRENGTH:
  Direct Source: 506.9 pounds/min         Source Height: 0
  Release Duration: 10 minutes
  Release Rate: 507 pounds/min
  Total Amount Released: 5,069 pounds
  Note: This chemical may flash boil and/or result in two phase flow.
    Use both dispersion modules to investigate its potential behavior.

THREAT ZONE: (HEAVY GAS SELECTED)
  Model Run: Heavy Gas
  Red   : 1.0 miles --- (200 ppm)
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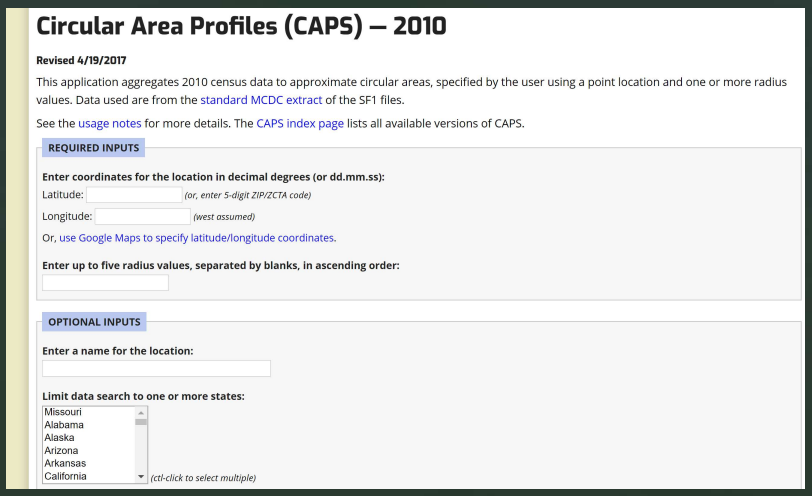
- Verify population impacts within Worst Case and Alternative Case circle

Evaluation Review

Population estimates, *Missouri Census Data Center*:



Circular Area Profiles (CAPS) — 2010

Revised 4/19/2017

This application aggregates 2010 census data to approximate circular areas, specified by the user using a point location and one or more radius values. Data used are from the standard MCDC extract of the SF1 files.

See the usage notes for more details. The CAPS index page lists all available versions of CAPS.

REQUIRED INPUTS

Enter coordinates for the location in decimal degrees (or dd.mm.ss):

Latitude: *(or, enter 5-digit ZIP/ZCTA code)*

Longitude: *(west assumed)*

Or, use Google Maps to specify latitude/longitude coordinates.

Enter up to five radius values, separated by blanks, in ascending order:

OPTIONAL INPUTS

Enter a name for the location:

Limit data search to one or more states:

Missouri
Alabama
Alaska
Arizona
Arkansas
California

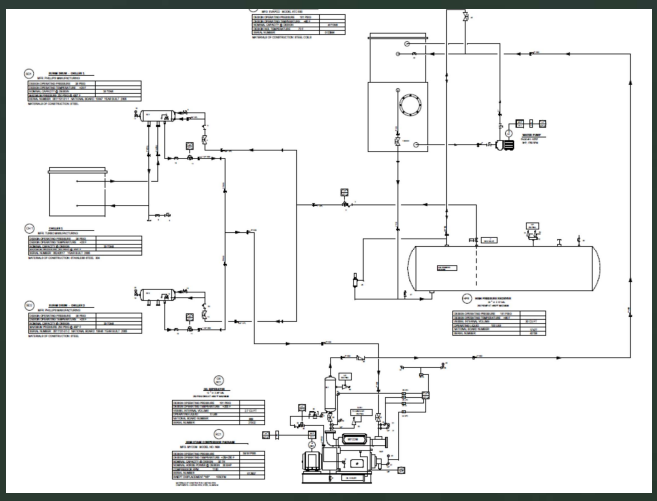
(ctl-click to select multiple)

http://mcdc.missouri.edu/applications/caps2010.html

Evaluation Review

Process Safety Information

Piping & Instrumentation Diagrams

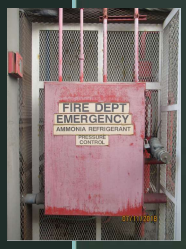


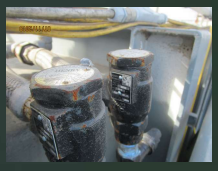
Conduct Walkdown:

- valves type and if all valves are present
- Vessel nameplate data
- Piping connections and terminations
- Instrumentation identified

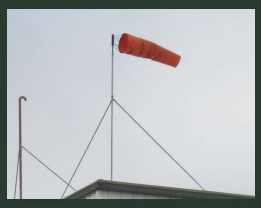
Evaluation Review

Process Safety Information









Safety Systems

- Ammonia Detectors
- Emergency Control Box
- PRVs
- Diffusion Tank
- PLC/Switch & Light Panel
- Compressor Safeties
- Float Switches
- King Valve
- Kill Switch
- Eye wash/Shower
- Wind sock
- Fire System
- Shut offs - Equipment

Evaluation Review

Process Hazard Analysis

Photo 17: Area 2 ammonia tank supported on a steel skid.

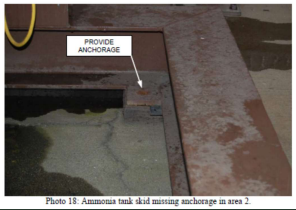


Photo 18: Ammonia tank skid missing anchorage in area 2.


Photo 11: Vacuum tube in Area 1.


Photo 12: Chain restraints on vacuum tube in area 1.

* CalARP Seismic Assessment Report

Evaluation Review

Operating Procedures:

- Initial Startup
- Normal Operations
- Temporary Operations
- Emergency Operations
- Normal Shutdown
- Startup following normal/ emergency shutdown

Safe Work Practices:

- Lockout/Tagout
- Confined Space Entry
- Opening Process Equipment or Piping
- Entrance into the Facility

ANSI/IIAR 7: Standards for SOPs

Evaluation Review

Training Program Elements

Prepare a record which contains:

- Employee ID,
- Date of training, and
- The means used to verify that the employee understood the training

Ascertain that each employee:

- Received and understood the training,
  - Review training record, obtain training material, and interview employee

Evaluation Review

Mechanical Integrity

TABLE 6.1
Compressor Inspection, Testing, and Maintenance Tasks

ITM Task Description	Frequency		
	Screw	Reciprocating	Rotary Vane
Inspection			
a) Runtime hours	WA-D	WA-D	WA-D
b) Suction pressure	D	D	D
c) Discharge pressure	D	D	D
d) Oil pressure	D	D	D
e) Oil temperature	D	WA-D	D
f) Discharge temperature	D	WA-D	D
g) Verify oil levels are adequate	D	D	D
h) Oil filter differential pressure	D	WA-D	NA
i) Oil leaks	D	D	D
j) Lubricator oil level and drip rate	NA	NA	D
k) Jacket cooling oil level	NA	NA	D
l) Determine shaft seal leak rate	WA-W	WA-W	WA-W
m) Indicator of Compressor Capacity	D	WA-D	WA-D
n) Motor amperage (current)	D	WA-D	WA-D
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D
p) Free from abnormal sounds and excessive vibration	D	D	D
q) Drive guard in place	D	D	D
r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
s) Visually inspect mounting bolts are in place	A	A	A
t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
u) Visually inspect coupling for wear	A	WA-A	WA-A
v) Visually inspect starter connections and associated timers and relays	A	A	A
w) Operation of oil heaters	A	A	A
x) Operation of unloader	M	M	M
y) Visually inspect alignment of compressor-motor drive shaft	A	A	A

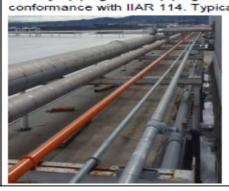
ITM Task Description	Frequency		
	Screw	Reciprocating	Rotary Vane
Testing			
Test safety shutdowns:			
a) Low suction pressure cutout	A	A	A
b) High discharge pressure cutout (HPCO) See Section 6.1.1	A	A	A
c) High discharge temperature cutout	A	WA-A	A
d) Low oil pressure cutout	A	A	A
e) High liquid level cutout	A	A	A
Maintenance			
a) Add Oil	As Needed	As Needed	As Needed
b) Change oil filter	As indicated by oil filter ΔP, runtime hours, oil analysis, or A	As indicated by oil filter ΔP, runtime hours, oil analysis, or A	As indicated by oil filter ΔP, runtime hours, oil analysis, or A
c) Clean external oil pump suction strainer	WA-S	NA	NA
d) Oil Analysis—Take oil sample and obtain oil analysis results from qualified testing lab [Not required if oil is changed on an Annual (A) frequency or a determined runtime hours frequency]	A or runtime hours	A or runtime hours	A or runtime hours
e) Align external oil pump shaft	WA-S	WA-S	WA-S
f) Change oil	As indicated by oil analysis, predetermined runtime, or A	As indicated by oil analysis, predetermined runtime, or A	As indicated by oil analysis, predetermined runtime, or A
g) Verify coupling bolts are in place	A	A	A
h) Replace shaft seal	When maximum pre-determined leak rate is approaching or reached	When maximum pre-determined leak rate is approaching or reached	When maximum pre-determined leak rate is approaching or reached
i) Measure (hot) compressor-motor drive shaft alignment	A and Align when maximum pre-determined alignment parameters are exceeded	WA-A and Align when maximum pre-determined alignment parameters are exceeded	A and Align when maximum pre-determined alignment parameters are exceeded
j) Lubricate compressor and external oil pump electric motor bearings	WA-S	WA-S	WA-S
k) Remove electrical connection box cover and	A	A	A

Evaluation Review

Compliance Audit

Compliance Audit
Recommendations

February 2019

Rank	Checklist Item(s)	Recommendation(s)	Assignment	Due Date	Status / Date of Resolution
High	NA	Where a section of insulation is materially damaged, it should be repaired or replaced. Underlying areas affected by surface corrosion should be cleaned off, inspected, and appropriately treated before reinstatement of the protective finish, insulation and vapor barrier. *As required per IIAR 110 Section 6.4.3.1*	EBF	June 2019	
Med	NA	At rooftop, adjacent to units *FC10-4, FC10-5, FC10-6* piping appears to show signs of corrosion. Clean, coat, and paint piping and valves. See figure below. 	EBF	September 2020	
Low	NA	Identify piping with piping labels throughout in conformance with IIAR 114. Typical. See figure below. 	EBF	March 2020	

Evaluation Review

Incident Investigation

INCIDENT INVESTIGATION REPORT FORM
INCIDENT DESCRIPTION

Incident Number		Incident Date	
Incident time		Incident Duration	
Facility Information			
SIC Code		Investigation Start Date	
Facility Name			
Facility Address			
System Horsepower		System Ammonia Inventory	
Incident Summary			
Incident Description			
Total Quantity of Ammonia Released			
Incident Type (check any the apply)			
☐ Near-Miss	☐ Liquid Spill	☐ Vapor Release	
☐ Fire / Explosion	☐ Other:	Describe	
Primary Source (check one)			
☐ Oil Drain Valve	☐ Pump	☐ Pressure Safety Relief	
☐ Compressor	☐ Pressure Vessel	☐ Automatic Control Valve	
☐ Compressor	☐ Piping	☐ Charging Connection	
☐ Evaporator	☐ Manual Valve	☐ Manual Valve	
☐ Other:	Describe		
Cause(s) Contributing to Release (check any that apply)			
☐ Human Factors	☐ Equipment Malfunction	☐ Controls Failure	
☐ Design Shortcoming	☐ Improper Installation	☐ Process Upset	
☐ Misapplied Equipment	☐ Mechanical Damage	☐ Power Failure	
☐ Hydrostatic Expansion	☐ Improper Procedures	☐ Corrosion	
☐ Hydraulic Shock	☐ Maintenance Activity	☐ Earthquake	
☐ Inad. Adm. Controls	☐ Inadequate Labeling	☐ System Change	
☐ Inadequate Maintenance	☐ Other:	Describe	

- A report must be prepared at the conclusion of the investigation.
- A system must be developed to promptly address, resolve and document the incident report findings, recommendations and corrective actions.
- The incident report must be made available to affected employees as well as contractors

Evaluation Review

Hot Work Permit

HOT WORK PERMIT

All temporary operations involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, Brazing, Cutting, Grinding, Soldering, Thawing, and Welding.

INSTRUCTIONS FOR FIRE SAFETY SUPERVISOR

1. **Verify precautions listed at right (or do not proceed with the work).**
2. **Complete page 1 and retain for job files.**
3. **Post page 2 in vicinity of hot work.**

DATE | JOB NO.

LOCATION/BUILDING & FLOOR (Be Specific)

DESCRIPTION OF WORK BEING PERFORMED

NAME OF PERSON DOING HOT WORK

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED: _____
(Permit Authorizing Individual)

SIGNED: _____
(Person doing Hot Work)

SIGNED: _____
(Fire Watch)

TIME STARTED: Date: _____ Time: _____ AM/PM

OK	HOT WORK CHECKLIST	N/A
☐	Sprinklers and hose streams in service/operable.	☐
☐	Hot Work Equipment in good condition (e.g., power source, welding leads, torches, etc.)	☐
☐	Multi-purpose fire extinguisher and/or water pump can.	☐
	REQUIREMENTS WITHIN 35 FEET OF WORK	
☐	Dust, Lint, Debris, Flammable Liquids and oily deposits removed; floors swept clean.	☐
☐	Explosive atmosphere in area eliminated.	☐
☐	Combustible floors (e.g., wood, tile, carpeting) wet down, covered with damp sand or fire blankets.	☐
☐	Remove flammable and combustible material where possible. Otherwise protect with fire blankets, guards, or metal shields.	☐
☐	All wall and floor openings covered.	☐
☐	Walkways protected beneath hot work.	☐
	WORK ON WALLS OR CEILINGS	
☐	Combustibles moved away from other side of wall.	☐
	WORK IN CONFINED SPACES	
☐	Confined space cleaned of all combustibles (example: grease, oil, flammable vapors).	☐
☐	Containers purged of flammable liquids/vapors.	☐
☐	Follow confined space guidelines.	☐
	FIRE WATCH/HOT WORK AREA MONITORING	
☐	Fire watch will be provided during and for 30 minutes after work, including any coffee or lunch breaks.	☐
☐	Fire watch is supplied with an extinguisher, and/or	☐