

RESOURCE COMPLIANCE

Kern County Department of Public Health California Accidental Release Prevention (CalARP) Training



Polls and Quizzes





PollEv.com/rescompliance



2 76% 페 🖓 2:48 PM ••••• Verizon 🗢 **Polls and Quizzes** 1 4 https://pollev.com/rese rescompliance's presentation Login Why are you at this training event? Response recorded I love CalARP regulations 0 My boss made me attend I don't know Ō To learn how to better implement my CalARP Program 0 Clear response



Why are there so many process safety requirements?





Oppau, Germany (1921)

- 4,500 tons of Ammonium Sulfate/Ammonium Nitrate mixture exploded
- 500-600 people killed
- 2,000 people injured





Bhopal, India (1984)

- Pesticide plant released 42 tons of methyl isocyanate
- 2,259 people died immediately
- 8,000 people died within two weeks
- Total death toll approx. 15,000
- More than 500,000 people exposed





Bhopal, India (1984)





Pasadena, TX (1989)

Phillips Petroleum Company

- 23 Deaths
- 132 Injuries



Providing Solutions. Simplifying Regulation.

More

- Text +

G+1 0

Tweet



Cincinnati, OH (1990)

BASF

2 Deaths



WORKERS HAD LITTLE WARNING BEFORE BLASTS

JOE MCDONALD, Associated Press 🚱 Jul. 20, 1990 12:47 PM ET

CINCINNATI (AP) _ A quick-thinking chemical plant foreman "very likely saved a lot of lives" when he sounded an alarm just seconds before explosions ripped through the building, killing one worker and injuring 68, authorities said.

"One of the maintenance foremen noticed a vapor cloud, immediately ran over and pulled the alarm," Ron Leisner, a quality assurance manager for BASF Corp., said at a news conference. "He was very calm under pressure and very likely saved a lot of lives by doing so."

Leisner said the foreman, Joe Brock, was outside the resin building when he saw the vapor, what Leisner described as being similar to the shimmering effect above a blacktop road on a hot day.



Sherlington, LA (1991)

IMC Fertilizer

- 8 Deaths
- 128 Injuries

Death Toll Reaches 8 in Louisiana Blast

May 03, 1991 | From Associated Press

STERLINGTON, La. — Emergency crews found more bodies Thursday amid the wreckage left by a thunderous explosion at a chemical plant, bringing the death toll to eight, authorities said.

Firefighters pumped water on the rubble, extinguishing small fires that lingered after the Wednesday blast, and state environmental officials checked air quality.

Area hospitals treated 123 people for injuries, including plant workers and nearby residents. Six were reported in critical condition.

Roughly 500 to 600 of the town's estimated 1,200 residents were evacuated immediately after the blasts but were allowed to return home Thursday night.

Highways on both sides of the town began backing up with traffic as the state Department of Environmental Quality reported no serious contamination, Police Chief Walter Kemper said.



Texas City, TX (2005)

BP Refinery

- 15 Deaths
- 170 Injuries





North Carolina (2009)

Ammonia Leak at NC Plant Kills 1 Employee, Injures 6 More

By David Goguen on June 22, 2009 11:05 AM | No TrackBacks

An ammonia leak at a poultry processing plant in North Carolina killed one employee and injured half a dozen more over the weekend. It's the second high-profile workplace accident at a North Carolina food processing facility in recent weeks.

Saturday's ammonia leak at the Mountaire Farms poultry plant in Lumber Ridge, North Carolina killed 49 year-old mechanic Clifton Swain, injured at least six of his co-workers, and caused the evacuation of as many as 40 employees. Ammonia was released through a break in a high-pressure refrigeration line at the facility, which employs 2,500 workers, according to the North Carolina News & Observer.



BP Oil Spill (2010)







San Francisco (2012)





Sanger Winery (2012)

Chemical Spill Kills Worker At Sanger Winery

Recommend 3 people recommend this. Be the first of your friends.

Posted: Sep 11, 2012 10:30 AM PDT Updated: Sep 11, 2012 1:42 PM PDT By KMPH Web Staff - email



SANGER, Calif. (KMPH) - Authorities in Sanger are investigating a deadly chemical spill at a winery.

It happened just before 12:30 a.m. Tuesday at the Gibson Winery, located on Academy and Cherry avenues.

Sanger Police say one of the workers accidentally opened a wrong valve and released ammonia into a confined area.



West Texas, TX (2013)

BP Refinery

- 15 Deaths
- 160 Injuries
- 150 Buildings damaged or destroyed





Executive Order 2013

The White House

Office of the Press Secretary

🖾 E-Mail 💆 Tweet 🚺 Share 🔶

August 01, 2013

For Immediate Release

FACT SHEET: Executive Order on Improving Chemical Facility Safety and Security

Today, the President signed an Executive Order to improve the safety and security of chemical facilities and reduce the risks of hazardous chemicals to workers and communities. Chemicals and the facilities that manufacture, store, distribute and use them are essential to our economy. However, incidents such as the devastating explosion at a fertilizer plant in West, Texas in April are tragic reminders that the handling and storage of chemicals present serious risks that must be addressed. While the cause of the Texas explosion is under investigation, we can take some common sense steps now to improve safety and security and build on Federal agencies' ongoing work to reduce the risks associated with hazardous chemicals.

The Executive Order on Improving Chemical Facility Safety and Security directs the Federal Government to:

- · improve operational coordination with state and local partners;
- enhance Federal agency coordination and information sharing;
- · modernize policies, regulations and standards; and



Innovation in Improving College Access, Affordability and Completion The White House, the U.S. Departments of Education and Treasury, and the General Services Administration host an Education



Flint, MI (2014-2016)





Theodore, AL (2010)









Overview of RMP, PSM, and CalARP

- **RMP:** Risk Management Program
- **PSM:** Process Safety Management
- CalARP: California Accidental Release Prevention

These are a "*family*" of regulations that have a common objective - Accidental Release Prevention



History of Process Safety Regulations

- **EPCRA/SARA** 1986
- OSHA PSM February 24, 1992
- CalOSHA PSM July 10, 1992
- **USEPA RMP** June 21, 1999
- CalARP June 21, 1999
- RMP Amendment April 5, 2004
- CalARP Amendment #1 June 28, 2004
- CalARP Amendment #2 January 1, 2015
- CalARP Amendment #3 Spring 2017?



Process Safety Management

- Title 29 CFR §1910.119
- Title 8 CCR §5189
- 14 Elements
- OSHA's focus is employee safety







Risk Management Program (RMP)

- Title 40 CFR §68
- RMP is composed of 3 elements
 - o Hazard Assessment
 - Prevention Program
 - Emergency Response Program
- Prevention Program is nearly identical to OSHA's PSM





CalARP Program

- Nearly identical to Federal RMP
- Chemical list is longer than RMP
- Threshold quantities are lower than RMP
- CalARP is composed of 3 elements
 - Hazard Assessment
 - Prevention Program
 - Emergency Response Program











Hazard Assessment



Comparison of Program Requirements		
Program 1	Program 2	Program 3
Executive Summary	Executive Summary	Executive Summary
Worst-Case Release Analysis	Worst-Case Release Analysis	Worst-Case Release Analysis
	Alternate Release Analysis	Alternate Release Analysis
5-Year Accident History	5-Year Accident History	5-Year Accident History
	Document Management System	Document Management System
	Prevention Program	
	Safety Information	Process Safety Information
	Hazard Review	Process Hazard Analysis
	Operating Procedures	Operating Procedures
	Training	Training
	Maintenance	Maintenance
	Incident Investigation	Incident Investigation
	Compliance Audit	Compliance Audit
		Management of Change
		Pre-Startup Safety Review
		Contractors
		Employee Participation
		Hot Work Permits
	Emergency Response Program	·
Coordinate with Local 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









Process Safety Information

Piping and Instrumentation Diagrams (P&IDs)





Process Safety Information

Block Flow Diagram





Relief System Design and Design Basis

$$L = \frac{0.2146d^5(P_0^2 - P_2^2)}{fC_r^2} - \frac{d \times ln(P_0/P_2)}{6f}$$







Process Safety Information

Ventilation System Design





Process Safety Information

Design Codes and Standards Employed - RAGAGEP





Process Hazard Analysis






Operating Phases

Initial Startup

- The specific initial startup procedures used when commissioning new air-cooling evaporators are not contained within this document. All air-cooling evaporator initial startups will be performed in accordance with the latest version of IIAR 5 Start-up and Commissioning of Closed Circuit Ammonia Refrigerating Systems. The facility Pre-Startup Safety Review (PSSR) checklist has been designed with the requirements of IIAR 5 in mind.
- Upon successful completion of the PSSR, the air-cooling evaporator can be started by following the steps outlined in the Startup Following a Turnaround, or After an Emergency Shutdown operating phase.

Normal Operations

- During normal operation, ammonia supplied to the air-cooling evaporator will be controlled automatically based on the room/zone temperature.
- 2. Air-cooling evaporator fan speed will be controlled automatically in units equipped with variable frequency drives.
- Visually inspect each air-cooling evaporator at least twice per day for any problems such as ice-buildup, vibration, or ammonia leaks.
 - NOTE: Bunker-mounted air-cooling evaporators can be inspected by checking under the bunker wall.
- If the air-cooling evaporator pressure appears to be outside of the acceptable range, the following actions are to be taken:
 - a. Check position of suction isolation valve on the air-cooling evaporator

Operating Procedures





Training

Providing Solutions. Simplifying Regulation.

Certificate of Successful Completion

Ron Bryan

has successfully completed the 5-hour Ammonia Awareness and Refrigeration training workshop on <u>December 10, 2015</u> at California Controlled Atmosphere in Dinuba, CA.

Workshop included the following sessions:

Ammonia Awareness
 Condenser Maintenance
 Control Valves
 Daily Checklist

Refrigeration Cycle
 Temperature Probe Calibration
 SOPs Fit For Your Facility
 Non-Destructive Testing

PSM Compliance
 Oil Draining
 Relief Valves
 System Balance Demo





Petr Sh

Peter Thomas - Engineer

Certificate No. 2753





Mechanical Integrity





$$L = 2.234D^2 \rho_1 \sqrt{\frac{144P_g}{\rho_1} + \Delta h}$$

Incident Investigations





Compliance Audit





Management of Change and Pre-Startup Safety Review





Contractors





Employee Participation





Hot Work Permits

Providing Solutions. Simplifying Regulation.





Program 2	Program 3
Prevention Pre	ogram Element
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



- P3: Management of Change §2760.6
 - P2: Safety information must be updated when a change occurs - §2755.1(c)
 - P2: Operating procedures must be updated when a change occurs -§2755.3(c)
 - P2: Training is required for all employees - §2755.4

Program 2	Program 3	
Prevention Program Element		
Safety Information	Process Safety Information	
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Operating Procedures	Operating Procedures	
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Compliance Audit	Compliance Audit	
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	Pre-Startup Safety Review	
	Contractors	
	Employee Participation	
	Hot Work Permits	



- P3: Pre-Startup Review §2760.7
 - P2: Safety information must be updated when a change occurs -§2755.1(c)
 - P2: Training is required for all employees - §2755.4

Program 2	Program 3
Prevention Pro	ogram Element
Safety Information	Process Safety Information
Hazard Review	Process Hazard Analysis
Operating Procedures	Operating Procedures
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Compliance Audit	Compliance Audit
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	Pre-Startup Safety Review
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	Employee Participation
	Hot Work Permits



- P3: Contractors §2760.12
 - P2: Owner must ensure that every contractor is trained to perform maintenance procedures - §2755.5(c)

Program 2	Program 3
Prevention Program Element	
Safety Information	Process Safety Information
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- P3: Employee Participation §2760.10
 - P2: The hazard review shall be performed by a team familiar with process operations and shall include at least one employee who has experience and knowledge specific to the process being reviewed. -§2755.2(c)

Program 2	Program 3
Prevention Program Element	
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Program 2	Program 3
Prevention Proc	gram Element
Safety Information	Process Safety Information
Llozard Daview	Draces Hezerd Applyria
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Training Maintenance Incident Investigation Compliance Audit	Training Mechanical Integrity Incident Investigation Compliance Audit Management of Change Pre-Startup Safety Review Contractors Employee Participation Hot Work Permits



Break



CalARP – Training Requirements



Training Requirements

All Facility Employees

- Chemical Safety & Awareness (ammonia safety)*
- Emergency Response

Facility Operator/Maintenance

- Operating Procedures
- Process Overview/Safety Information
- Mechanical Integrity/Maintenance

- Initial & refresher training
- Competency verification

	Ron Bryan	
has successfully complete workshop on <u>December 1</u>	ed the 5-hour Ammonia Aware 0. 2015 at California Controlled	ness and Refrigeration training Atmosphere in Dinuba, CA.
Workshop included the fo	llowing sessions:	
Ammonia Awareness Condenser Maintenance Control Valves Daily Checklist	Refrigeration Cycle Temperature Probe Calibration SOPs Fit For Your Facility Non-Destructive Testing	PSM Compliance Oil Draining Relief Valves System Balance Demo
CAL CALIFORNIA CONTROLL		Petry Sh
VUM AIMUSP	HERE	Peter Thomas - Engineer
PERO	IDCE	
RESOL	JRCE	Certificate No. 2753



Documentation If it wasn't documented...it didn't happen

CalARP §2745.6(g)

(1) The type of training provided-classroom, classroom plus on the job, on the job; and,

(2) The type of competency testing used.

	TRAINING	FORM	
Date: <u>5.3.16</u>			
Description: Ammonic	Awareness a	nd Emergency	Response
Туре:			
tts, Initial	o Re	fresher	
Delivery:			
C Classroom	O On	the-job training	
 Demonstration 	Q Tai	igate safety meeting	
Competency Verification:	144 AND 1		
 Demonstration Observation 	O Ora	al test Ø Discuss itten test □ None	ion
14/1			
Who was trained:	/	Signature	
Employee Hume	/		
Levis Mar	TINGZ	2 Sis Mo	No1
Usé A. Feman	2 AMOND	Jose A. Tennon	da Amo
Difunda 11	alera	Ortical 1/2	ava
mit Devel	and sa	March - March	Sta(X)
THAT THE	19	Din ATT	
John Dubuce	/	annel	1
Jatele Sotate	/	PATHICK JOHN	STON
		,	
0			
	0 / 11.	11/1	1.
Trainer: Chao	Collin	Signatures	h
Print Na	me	Signature	
I certify that the employee(s) nam	ned in this training certifica	tion received the training descr	ibed above and pa
the required competency verificat	ion.	~	. / .
	124/2016	(),01	010
Date of Certification:	and the second se	1111	4
Date of Certification:	IN. FRIMAINTON	An late 11.	
Date of Certification:	ILE TOMNSTON	Metto /u	an
Date of Certification: Certifying Supervisor Print Nar	ILE TOHNSTON	Signature	ans



Strategies to Train Employees

- Do you have someone who coordinates all training for the company?
- Group trainings together (ex. Chemical Awareness & Emergency Response)
- Train all employees during initial orientation
- Annual refresher built into company training program



Chemical (Ammonia) Awareness & Emergency Response Training



Properties of Ammonia

- Color: Colorless gas and liquid
- Boiling Point: -28.1°F
- Vapor Pressure: 93 psig @ 60°F
- Vapor Density: 0.60
- Solubility: Highly Soluble in Water (high affinity)
- Smell: (Most recognizable) Extremely pungent, irritating odor



Hazards of Ammonia

Health

 Very toxic in high concentrations; corrosive to skin and irreversible eye damage

Flammable Limits

- Lower Flammable Limit (LFL): 15-16%
- Upper Explosive Limit (UEL): 25-28%

Reactivity Data

- Ammonia is considered stable
- Water stream applied to liquid ammonia will increase vaporization



Ammonia Labeling – National Fire Protection Association



Exposure Limits

- Permissible Exposure Limit (PEL): 25 ppm
- Short-Term Exposure Limit (STEL [15 min.]): 35 ppm
- Toxic Endpoint: 200 ppm
- Immediately Dangerous to Life or Health (IDLH): 300 ppm





Potential Health Effects

Routes of Entry:

- Inhalation
- Skin Contact
- Eye Contact
- Ingestion

Target Organs (affinity to water):

- Eyes
- Skin
- Respiratory System





First Aid Procedures

Health Effects

Irritation, chemical burns, eye damage and fatal in high concentrations.

Inhalation - First Aid

Depending Remove from exposure area. If breathing has stopped administer artificial respiration.

Skin/Eye Contact - First Aid

Flush with water for 15 minutes and contact a physician.

















Catastrophic Release/Vapor Cloud

- In the unlikely event of a Catastrophic Release, a Vapor Cloud could form.
- Immediately evacuate and report to the assembly area.
- If wind is going towards the assembly area, proceed to the secondary location.











Training Requirements

All Facility Employees

- Chemical Safety & Awareness (ammonia safety)
- Emergency Response

Facility Operator/Maintenance

- Operating Procedures
- Process Overview/Safety Information
- Mechanical Integrity/Maintenance

- Initial & refresher training
- Competency verification



Operating Procedures Training

CalARP §2755.4 Training

(d) 'The owner or operator shall ensure that <u>operators</u> are trained in any updated or new procedures <u>prior</u> to needing to use the procedures.'

(e) 'Operating Procedure training should be done <u>at least</u> every three years.'



Operators must...

- Know the location of the Operating Procedures
- Know how to navigate and reference the Operating Procedures
- Know the hazards of the process
- Be competent in the Operating Procedures
- '...each employee involved in operating a process has received and understood the training.' (§ 2760.4)





Sample Compressor Operating Procedure – Normal Operations

Normal Operations

- 1. During normal operations, the compressor will automatically load and unload based on suction pressure.
- During low load conditions, the compressor may enter 'Standby' mode until the system load requires it to operate at some capacity.
- Visually inspect the compressor at least twice per shift for any problems such as vibration, excessive pressure, ammonia leaks, or lubrication oil leaks.
- 4. The following minimum operating parameters must be checked to ensure that they are within the desired range:
 - a. Suction Pressure
 - b. Discharge Pressure
 - c. Oil Pressure
 - d. Oil Temperature
- 5. Complete the daily log as required by the facility Mechanical Integrity program.

How do you know your operator is competent in the procedure?



• Document

• Create a quiz and test them

SOP Quiz - Sample	
Required	
mployee Name *	
our answer	
/hen truck off-loading, what do you do after starting the point ompressor? *	
) Slowly open the liquid valve on the trailer.	
) Monitor pressure differential between the customer equipment and the trailer.	
) Close all bleeders.	
) Monitor liquid levels and pressure until the trailer is empty or the customer equipment has reached 85% maximum capacity.	
/hich activity is not completed after truck off-loading? * • • • point	
) Lockout all valves on the customer equipment.	
) Return hoses to their holding cradles.	



Process Overview/Safety Information Training






Process Safety Information

PSI Elements

- Safety Data Sheet (SDS)
- Block Flow Diagram (BFD)
- Process Chemistry
- Maximum Intended Inventory
- Safe Operating Limits & Consequences of Deviation
- Materials of Construction
- Piping & Instrumentation Diagrams (P&IDs)





Process Safety Information

PSI Elements

- Electrical and Safety Classifications
- Relief System Design
- Ventilation System Design
- Design Codes and Standards
- Material and Energy Balances
- Safety Systems
- Electrical Supply and Distribution Systems







Mechanical Integrity/Maintenance Training

- Daily Operations Checklist
- Monthly Inspection
- Annual Inspection
- 5-Year Inspection











Which coolant temp gauge would you want in your car?





		Ammo	nia Refrigeration	n System			
						100	
		Date					
		Time					
Gauge Board	Suction Pressure	33 - 50 psig					
Gauge Board	Discharge Pressure	120 - 195 psig					
1	Running	Yes/No					
	Run Time	Hours					
	Oil Level	Sight glass should be 1/2 full					
	Alarms	Yes/No - check microprocessor					
	Suction Temperature	19*F - 34*F					
icrew Compressor #1	Suction Pressure	33 psig - 50 psig			-		
	Discharge Pressure	120 psig - 195 psig					
	Oil Temperature	120*F - 170*F					
	Oil Filter Pressure	60 pelg - 90 pelg					
	Motor Amps	A					
	Slide Valve	%					
	Fans Running	Yes/No					
Condenser #1	Pump Running	Yes/No					
	Belts	Too loose or too tight?			- 1		
iquid Recirculator	Visual Inspection	Free from unusual vibration, sounds, and smells.					
Pilot Receiver	Visual Inspection	Free from unusual vibration, sounds, and smells.					
Ice Generator	Visual Inspection	Free from unusual vibration, sounds, and smells.					-
		Initians					



- Annual Inspections are usually performed by a refrigeration contractor using IIAR's B109 form.
- 5-Year Mechanical Integrity Inspection is performed by an engineer and it a thorough inspection of all process equipment.

Ammonia Refrigeration	Ammonia Refrigeration Safety Inspection Checklist
ijar.	
TT (T *	ID Number:
	AIR-COOLING EVAPORATORS
Plant Owner.	
Address:	
Contact:	Telephone:
Inspector:	Date:
Air Cooling Evaporators	
Air Cooling Evaporator Location:	
Ar Cooing Identification Mark/No:	
Annliention	Time of Battinesent Food
Blast Freezer Store	e Freezer Liquid Re-circulation Dry Emansion (DX)
Process Room Dock	Flooded (Surge Drum)
	C Other (Derotibe)
Application Data	
Tube and Fin Material: carbon ste	el 🗆 stainless steel 📄 aluminum
Defrost Type:	water hot cas other
Defrost Type: air besign Room Air Temperature ("F):	water hot gas other Normal Refrigerant Temperature ("F):
Defrost Type: air (Design Room Air Temperature (°F): Design Capacity (TR):	water hot gas other Normal Retrigerant Temperature ('F): Desian Air Flow (CFM):
Defrost Type: air t Design Room Air Temperature ("F):	water ht das deher Nomal Rehigerant Temperature (°F): Design Air Flow (CFM):
Defrost Type: air Ebsign Room Air Temperature (°F): Design Capacity (TR): Total Internal Vol. (cubic ft) Normal Ammonia Inventory (VolumeWHeight):	water ht gas other Nomal Rehigeratit Temperature (*F): Design Air Row (CFM):
Defrost Type: air (Design Room Air Temperature (°F): Design Capacity (TR): Total Internal Vol. (oubic ft) Normal Ammonia Inventory (Volume/Weight):	water hd gas deher Normal Refrigerant Temperature ("F): Design Air Row (CFM): Cubic ft. Lb.:
Defrost Type: air Design Room Air Temperature ("F): Design Capacity (TR): Total Internal Vol. (oublic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep	water hed gas deher Normal Rehigerant Temperahure (*F): Design Air Flow (CFM): Cubie ft: Lb: Inte Data
Defosit Type: air (Design Capacity (TR): Design Capacity (TR): Tala Internal You (cubic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufacturer, Name, Model, Genal No	water hd gas dher Normal Refrigerant: Temperafure (*F): Design Air Flow (CFM): Cubic t. Lb.: late Data
Defost Type: air Design Capacity (TR): Tatal Internal Vol. (cubic ft) Tormal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufacturer, Name, Model, Serial No	
Defosi Type: air (Deligo Type) beigo Capaely (TP): Total Internal Vol. (cubic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufacture, Name, Model, Serial No: Year Manufactured:	water hd gas deher Normali Refrigerant Temperature (*F): Design Air Flow (CF M): Guble ft: Lb: Inter Data Design Pressure (psig): Design Pressure (psig):
Defosit Type: air (Design Room Air Temperature ('P): Design Capaeldy (TR): Tafal Internal Val. (cubic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufacturer, Name, Model, Serial No. Year Manufactured: Fan Motor Nameplate Data	water hed gas deber Normal Rehigerant Temperature (*F): Design Air Flow (CFM): Cubic ft: Lb.: Inter Data Design Pressure (psig):
Defosi Type: air Design Capacity (TR): Design Capacity (TR): Tala Internal Va. (cubic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufusturer, Name, Model, Serial No: Year Manufischured; Team Motor Nameplate Data Manufusturer, Name, Model, Serial No, Year	
Detost Type: air Design Capacity (TR1): Total Internal Vol. (cubic ft) Normal Ammonia Inventory (VolumeWeight): Air Cooling Evaporator Namep Manufactures, Name, Model, Serial No. Year Manufactured. Fan Motor Nameplate Data Manufactures, Mane, Model, Serial No. Year /	
Defosi Type: air (Design Caseaby (TR): Design Caseaby (TR): Total Internal Vol. (cubic ft) Normal Ammonia Inventory (Volume/Weight): Air Cooling Evaporator Namep Manufacturer, Name, Model, Serial No. Year Manufactured: Tan Motor Nameplate Data Manufacturer, Name, Model, Serial No. Year Frame Size: Type: Valage (V);	water hd gs oher Nomail Refrigerant Temperature (*F):

IIAR BULLETIN 109 - 10/97



Useful Training Resources

- Chemical Safety Days <u>www.cvcsd.org</u> (Bakersfield Feb. 23, 2017)
- Refrigerating Engineers & Technicians Association (RETA) classes and certification – <u>www.reta.com</u>
- Local RETA chapters
- US Chemical Safety Board <u>www.csb.gov</u>





Useful Training Resources

- Resource Compliance Blog <u>www.resourcecompliance.com/blog</u>
- Garden City Ammonia Program (GCAP) www.ammoniatraining.com
- Contractor Training
- Consultants





Break



Mechanical Integrity / Maintenance



Mechanical Integrity

The process of ensuring that process equipment is fabricated from the proper materials of construction and is **properly installed**, **maintained**, and **replaced** to **prevent failures and accidental releases**.







Program Level 2 - Maintenance Program Level 3 - Mechanical Integrity

- 1. Applies to all process equipment.
- 2. Must have written procedures.
- 3. Training to ensure the job task is completed in a safe manner.
- 4. Document inspections.
- 5. Equipment deficiencies shall be corrected.
- 6. Perform inspections according to *RAGAGEP*.







RAGAGEP - Recognized and Generally Accepted Good Engineering Practices

Industry standards

- IIAR Bulletin 109 & 110
- CGA
- Chlorine Institute

Manufacturer's recommendation

- installation, operation & maintenance manual

Prior operating experience

- Historical operating data



COMPLIANCE

Providing Solutions. Simplifying Regulation.

International Institute of Ammonia Refrigeration (IIAR)

IIAR Bulletin 110: Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigeration Systems

"contains <u>recommendations</u> on the type and frequency of inspection and maintenance required to ensure the safety of refrigerating systems."

IIAR 6: Inspection, Testing and Maintenance of Closed-Circuit Ammonia Refrigeration Systems

"This proposed standard specifies *minimum* criteria for the maintenance and inspection of a closed-circuit ammonia mechanical refrigeration system."

Guidelines for: Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems

Bulletin No. 110 3/93



Coming Soon...

IIAR 6

Working Title: Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems This proposed standard specifies minimum criteria for the maintenance and inspection of a closed-circuit ammonia mechanical refrigeration system, including the ammonia side of a cascade refrigeration system.



Components of a Mechanical Integrity Program

- 1. Process Equipment to be inspected or serviced
- 2. Frequency of inspections
- 3. Summary of work or checklists

4. Report or log

ltem	Type of Work	Carried Out By	Frequency	Summary of Work	Documentation
	Operational Inspection		Daily	Pressure and temperature readings, Oil Level, Oil Return, Noise, Vibration	Daily log or other approved form
Commence			Every 3 Months	Drive condition including guards	Daily log or other approved form
Compressors	Major Inspection		Bi-Annually	All safety cutouts	IIAR Bulletin 109: Compressor Inspection Form
			Annually or according to manufacturer's recommendation	Drive alignment, foundation bolts, valves and cylinder heads, further inspection as manufacturer recommends, oil change, clean/change filters/strainers	IIAR Bulletin 109: Compressor Inspection Form

Ammonia Refrigeration Maintenance, Inspection, and Documentation Calendar



Hard Copy Checklists

COMF	RESSOR	
MONTHLY MECHANICA	L INTEGRIT	Y INSPECTION
Equipment Name:		
Location:		
Tag ID:	-	
Inspection Date:		
Name of Person Performing Test/Inspection:	-	
Manufacturer:		
Model #:		
	· · · · · · · · · · · · · · · · · · ·	
	Conforms?	Comment
Have the compressor components been lubricated as necessary? As a general rule, bearing requiring oil should be lubricated monthly, while those requiring grease at least once every six months.		
Does a visual inspection of the drive show no signs of damage? Visually inspect the drives for tightness and alignment.		
Are all belts and bearings in good condition?		
Do all belts have the proper tension? There should be no "chirp" or "squeal" when the compressor motor is started.		



Maintenance Software

Due Date		Frequency			
		Monthly			
Туре		WO Assign	ed to		
Mechanical Integrity					
Completed Date		Completed	Ву		
West Description				_	
Work Description					
Necessary Tools and F	Parts				
Equipment					
Required Steps					
Recommendations					
(21) Checklist					
	Add New Question	Toggle Unanswered	Show Questions		



Daily Checklist Exercise



Frequency	Equipment
Daily	Compressors Vessels Pumps
Weekly	Condensers Air-Cooling Evaporators Heat Exchangers
Monthly	Compressors Vessels Pumps Condensers Air-Cooling Evaporators Heat Exchangers Auto-Purger Piping
Annual	Compressors Vessels Pumps Condensers Air-Cooling Evaporators Heat Exchangers Relief Valves Valves General Safety Safety Devices Piping
5-Year	Vessels Condensers Air-Cooling Evaporators Heat Exchangers





COMPLIANCE

Providing Solutions. Simplifying Regulation.

Gauge Board















Compressors | Company XYZ





AN	ANALOG DATA					
1	0	Control Suction Pressure	47.1	Psi		
1	0	Discharge Pressure	141.3	Psi		
1		Oil Differential Pressure	42.3	Psi		
1	0	Inlet Oil Pressure	183.7	Psi		
1		Oil Filter Differential	2.3	Psi		
1	4	Oil Filter Inlet Pressure	185.3	Psi		
1	9	Oil Separator Temperature	150.5	*F		
1	0	Inlet Oil Temperature	118.4	°F		
1	0	Discharge Temperature	157.4	°F		
1	Õ	Suction Temperature	33.6	*F		
1	0	Slide Valve Position (travel %)	77.8	%		
1		Slide Position Indicator	16.5	mA		
1	0	Motor Current	48.6	Amp		
1	-	kW Demand	0.0	kW		
1	-	kW Average Usage	0.0	kW		
1	-	Panel Temperature	102.8	۴F		
1	-	Line Voltage	120	Volts		



















Pumps





Break



Emergency Response and Coordination



Safety, Isolation and Notifications





Safety, Isolation and Notifications

Definition of First Responder and "SIN"

- Definition of "SIN":
 - Safety
 - Isolation
 - Notifications
- All Hazmat responders should "SIN" as the basic initial on-scene actions at all Hazmat incidents.



Safety, Isolation and Notifications

First Operational Thought - SAFETY

- Three techniques to ensure safety:
 - Safe Approach
 - Safe Assessment
 - Key Safety Guides for all responders to follow.



Safety, Isolation and Notifications

First Operational Priority - ISOLATION

- Responders can safely isolate and deny entry by establishing perimeters and control zones.
 - Perimeter security line surrounding control zones to isolate and deny entry to any unnecessary people (usually established by law enforcement).
 - Control Zone zones to ensure safety, limit spread of the hazard, and control hazard area (established by Hazmat Group)



Safety, Isolation and Notifications

First Operational Alert – NOTIFICATIONS

- Types of notifications:
 - Mandatory notifications
 - Resource requests
 - Report of conditions




Safety, Isolation and Notifications

- Mandatory notifications:
 - Local dispatch 9-1-1
 - CUPA/Local Administering Agency (AA)
 - State Warning Center (800) 852-7550
 - National Response Center (800) 424-8802





Safety, Isolation and Notifications

- Local CUPA/Local Administering Agency (AA)
 - Kern County Environmental Health
 - Fresno County Environmental Health
 - Kings County Environmental Health
 - Tulare County Environmental Health



Safety, Isolation and Notifications

- Other notifications:
 - Pesticide spill County Agriculture
 - Spill in state waters OES
 - Spill on state highway/freeway CHP
 - Radiological release DHS (Radiological Branch)
 - Release impacting state wildlife DFG
 - Workplace injury/fatality CalOSHA
 - Schools within ½ mile





Safety, Isolation and Notifications

- General information needed for mandatory notifications:
 - Name/Agency of person reporting
 - Location
 - Hazmat involved
 - Nature of problem
 - Quantity released (if known)
 - Potential hazards, etc.



Safety, Isolation and Notifications

First Operational Alert – NOTIFICATIONS

LOS ANGELES – The U.S. Environmental Protection Agency has fined [******] <u>\$81,400</u> for ammonia air releases that occurred in 2007 and 2008 at its Torrance and Carson, Calif.

[*****] *did not immediately* notify the National Response Center and the State Emergency Response Commission ... with reportable quantities ranging from 250 to 665 pounds.





Safety, Isolation and Notifications

First Operational Alert – NOTIFICATIONS

2014 News Releases

Food Processing Company Settles Violations of Chemical Release Reporting Requirements at Allentown, Pa. Facility

Release Date: 01/15/2014 Contact Information: Donna Heron 215-814-5113 / heron.donna@epa.gov

PHILADELPHIA (Jan. 15, 2014) -- The U.S. Environmental Protection Agency today announced that SunOpta Consumer Products Group, a division of SunOpta Foods, Inc., has agreed to pay a \$19,049 penalty for failing to properly report a September 12, 2012 ammonia release at its food processing facility in Allentown, Pa.

The Emergency Planning and Community Right-to-Know Act (EPCRA) mandates that facilities immediately notify state and local emergency response officials of significant releases of hazardous chemicals, and to provide follow-up reports on response actions and public health effects. This information ensures that state and local officials have timely and complete information to respond to chemical emergencies.



Safety, Isolation and Notifications

First Operational Alert – NOTIFICATIONS

Four northwest companies agree to settle EPA chemical emergency planning and release reporting violations

Release Date: 02/18/2015 Contact Information: Mark MacIntyre/EPA Seattle/206-553-7302/macintyre.mark@epa.gov

EPA: Law informs and protects communities, first responders before & during chemical emergencies

(Seattle—February 17, 2014) Four northwest companies (2 in Washington, 1 in Oregon, 1 in Idaho) have agreed to follow federal requirements when it comes to reporting the storage, handling, and accidental release of hazardous chemicals. The companies have agreed to correct the violations and pay fines.

Two of the firms (Stack & Dickinson) violated the hazardous chemical release reporting requirements of the Emergency Planning and Community Right-to-Know Act (EPCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The companies failed to report releases of ammonia (over reporting thresholds) at their facilities in a timely way. Two other firms (Apple King & Wind Flow) violated the

hazardous chemical inventory reporting requirements of EPCRA. The four companies collectively paid \$166,555 in penalties as part of the settlements.



Safety, Isolation and Notifications

LEARN THE ISSUES SCIENCE & TECHNOLOGY LAWS & REGULATIONS NEWSROOM ABOUT EPA News Releases Multimedia Media Contacts **News Feeds** EPA Home Newsroom News Releases from Region 10 Dyno Nobel, Inc. to pay \$17,000 for Failure to **News Releases from Region 10** Dyno Nobel, Inc. to pay \$17,000 for Failure to Properly Report Release of Ammonia Release date: 09/08/2009 Contact Information: Suzanne Powers, EPA CERCLA Program, (360) 753-9475, powers.suzanne@epa.gov Tony Brown, EPA Public Affairs, (206) 553-1203, brown.anthony@epa.gov Company will provide \$72,000 for ammonia monitoring system and emergency response equipment for Columbia River Fire & Rescue as part of settlement (St. Helens, Ore. - September 8, 2009) The Environmental Protection Agency reached a settlement with Dyno Nobel, Inc., for its alleged failure to report the release of approximately 448 pounds of ammonia from Dyno Nobel's Deer Island. Ore, facility in a timely manner. EPA announced the settlement today, which include \$17,000 in penalties and \$72,000, to povide emergency response equipment for local firefighters and a new ammonia monitoring system at the facility.





Operating Procedures



Overview

- 1. Purpose of Operating Procedures
- 2. The Importance of Procedure Accuracy
- 3. Ideas for Competency Verification





A People of Procedures

The Purpose of Procedures



Is that right?

The Accuracy of Procedures



Introduction

• Is this a well written procedure?





Procedure for Washing Your Hands

- 1. Wet your hands
- 2. Soap your hands
- 3. Wash your hands for 20 seconds
- 4. Rinse your hands
- 5. Dry your hands with a paper towel
- 6. Turn off the water with the paper towel









Have you read your own SOPs?





Emergency Shutdown Procedure

- Locate Emergency Refrigeration Switch for system with emergency. <u>NOTE:</u> The Emergency Break Glass switch is usually located in the vicinity of the Emergency Control Box.
- 2. Break the glass on the Emergency Refrigeration Switch with the attached hammer.
- 3. If a leak is occurring in a particular location, consult the appropriate SOP for isolation.



Emergency Shutdown Procedure

- Start the engine room ventilation fans for all leaks in or around the engine room. The switches to manually start the ventilation fans are located in the vicinity of the Emergency Control Box.
 <u>NOTE:</u> The ammonia detector in the engine room will automatically start the ventilation fans if an ammonia release is detected.
- 5. Call 911 if necessary and notify any other facility personnel.
- 6. Initiate other elements of the Emergency Response Plan as necessary. <u>NOTE:</u> Refer to the facility's Emergency Response Plan



Where to Start

- Read
- Mark Up



Emergency Shutdown Procedure

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Emergency Shutdown Procedure

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How do I know that you know what you say you know?

Ideas for Competency Verification



goo.gl/p0cvwJ



Lunch



Incident Investigations Ammonia Leak Case Study



6:00am

 During a daily system inspection, a facility employee reports that the Compressor is operating at 225 psig discharge pressure. He typically expects the compressor to operate at 165-180 psig.





6:15am

 Facility employee turns the Compressor "OFF" to reduce the pressure. He is not a "trained technician" so he calls the cold storage operator to inform him of the situation.





6:30am

• The cold storage operator turns the Compressor "ON" to begin troubleshooting the problem.





6:32am

• The cold storage operator receives a phone call and walks outside the machinery room in order to hear better.







6:35am

 Facility evacuation is initiated due to a reported ammonia leak inside the processing room. The ammonia concentration inside the machinery room is 0 ppm.







6:36am

 The cold storage operator witnesses that the condenser fans are not running and suspects that the High Pressure Receiver relief valve has lifted.







6:39am

• The cold storage operator witnesses that the discharge pressure in the machinery room is 260psig, yet the compressor is still running. He shuts off the compressor immediately.







6:40am

• The relief valve appears to have reseated and is no longer relieving ammonia.





7:00am

• Facility evacuation is completed and all employees and visitors are accounted for.





7:05am

 Cold storage operator begins to investigate how ammonia was allowed to enter the processing room.




 The investigation reveals that the relief valve discharged through a termination pipe to a location approximately 2ft above the roof of the processing room.





 The production room is equipped with two (2) exhaust fans. One fan was running at the time of the release, while another was "OFF".





7:25am

- The safety manager makes the mandatory notifications to government agencies:
 - o NRC
 - o Cal OES
 - o CUPA
 - o **911**



7:30am

• The local fire department arrives onsite





7:35am

 12 production room employees report ammonia exposure and respiratory discomfort and are transferred to a local hospital for examination.





Root Cause Analysis

1. Motor failure caused the condenser fans to turn off which lead to a reduction in condenser capacity and an increase in discharge pressure





Root Cause Analysis

2. The compressor high pressure cutout failed to shut the compressor off prior to the relief valve lifting.





Root Cause Analysis

3. The operator failed to monitor the compressor after turning it back on.





Root Cause Analysis

4. The relief valve discharge termination piping was configured in such a way that ammonia was directed toward the production room exhaust fans.





Root Cause Analysis





Incident Investigation Recommendations

- Repair the condenser fan motor.
- Repair and test the compressor high pressure cutout.
- Ensure that mechanical integrity program includes annual testing of compressor high pressure cutout.
- Provide additional training to operator. Emphasis must be given to monitoring the system during start up or when troubleshooting an issue.
- Modify the relief valve discharge termination piping to comply with current requirements (at least 15 ft above roof and 20 ft from a building opening)





Incident Investigation Recommendations

- Replace the relief valve that lifted.
- Interlock the production room exhaust fans with the ammonia detection system.
- Provide training to employees responsible for reporting releases to ensure that releases are reported within 15 minutes.



Process Hazard Analysis (PHA) Common Recommendations



PHA Requirements

Process Hazard Analysis (Hazard Review)

- Required by RMP/PSM/CalARP regulations.
- Required at least every five (5) years or major modification.

Purpose:

• Identify, evaluate, and control the hazards involved in the process.





PHA Checklist

1: Flooded Accumulato	or (Surge Drum) Scenarios	Consequences	Severity	Likelinood	Spectral Safeguards
1: What if the equipment or associated components is damaged by nearby activity?	A forklift driver accidentally hits this piece of equipment.	1, Death 2, Injury 3. Low pressure liquid ammonia release 4. Reactive maintenance	4	1	 C 1. The flooded accumulators are located behind bunker walls which provide some protection from forklift Impact. 2. Facility forklift drivers have been trained to take extra care when driving around the refrigeration equipment. 3. The flooded accumulators are located on the roof which is inaccessible to vehicle traffic.
2: What if the back pressure regulator on the suction return line fails?	Actuator sticks in the closed position causing pressures/temperatures to continue to rise, letting the room warm up.	1, Product damage 2. Reactive maintenance	2	3	 C 1. Each room/zone is equipped with temperature probes which provide continuous temperature monitoring and alarm capabilities if the temperature in the room/zone deviates outside of a predetermined range. Facility performs maintenance on all valves and control valves annually.





PHA Checklist

Risk Matrix

Risk Ranking Profile: Resource Compliance



Severity	Description
1	Not detectable by employees/Not reportable/No downtime/<\$5K Costs
2	Odor to employee(s)/ <reportable \$5-25k="" <1="" costs<="" day="" downtime="" qty="" td=""></reportable>
3	Reportable injury(ies)/>Reportable qty/1-5 Days downtime/\$25-100K Costs
4	Serious injury(ies) or fatality/Offsite injury(ies)/>5 Days downtime/>\$100K Costs
Likelihood	Description
1	Not expected to occur in the lifetime of the facility/Less than once in 20 years
2	Could occur once in the lifetime of the facility/Once in 20 years

Could occur once in the lifetime of the facility/Once in 20 years Could occur several times in the lifetime of the facility/Once every five years

Occurs frequently/One or more times a year

3

4

Risk Ranking	Description
A	Acceptable - No risk control measures are needed
с	Acceptable With Control - Risk control measures are in place
N	Not Desirable - Risk control measures to be introduced within a specified time period
U	Unacceptable - Risk control measures to be completed at earliest possible opportunity



Valve Protection





Access Ports





Clean and Paint





Unauthorized Access





Electrical Wiring





Flammable Materials

Section V - Fire Fighting Measures

Flash Point: N/A

Autoignition Temperature: 651° C; 1204°F

Lower Explosive Limit: 16% by Volume

Upper Explosive Limit: 25% by Volume

Unusual Fire and Explosion Hazards: Gas may ignite at vapor concentrations between 16% and 25% in air. However, ammonia-air mixtures are difficult to ignite and burn with little vigor. In the absence of oxygen enrichment, the risk of initiating an accidental fire or explosion is low. Do not allow ammonia vapors to accumulate in confined areas where ignition may occur. Intense heating particularly in contact with hot metallic surfaces may cause decomposition of ammonia generating hydrogen, a flammable gas.





Fall Protection





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Abandoned Equipment



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Machinery Room Doors





Authorized Personnel Only





Permanent Sign



CALIFORNIA CONTROLLED ATMOSPHERE CLN 481142 SYSTEM INSTALLED FOR: SYSTEM INFORMATION: REFRIGERANT Ammenia - 717 EMERGENCY INFORMATION Emergency Reponse 911	CALIFORNIA CONTROLLED ATMOSPHERE CLN 481142 SYSTEM INFORMATION: REFRIGERANT Ammonia - 717 CHARGE 9,950 lb. DINUBA, CA 93618 (559) 591-8874 FAX (559) 591-8896 SYSTEM INSTALLED FOR: EMERGENCY INFORMATION Emergency Reponse 911 Tulare County Health 559-733-6441 Office I Bergency Services 800-857-7550		A	3	9138 RE	56
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CHARGE 9,950 lb. Tulare County Health 559-733-6441	Office of Emergency Services 800-852-7550	REFRIGER CHARGE	ANT_Ammonia - 717 9,950 lb.	Emergenc Tulare Count	y Heponse y Health	911 559-733-6441
DATE June 2004		HIGH SIDI	<u>260 PSIG</u>			



Pipe Marking



COMPLIANCE

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Equipment Identification





Valve Tags





Ammonia Detectors











Mechanical Ventilation







Remote Controls





Pressure Relief Valves





Discharge Piping





Eyewash and Body Shower Unit




Safe Access





Maintenance Schedule

MAINTENANCE		HOURS OPERATION (MAXIMUM)																				
		1000	5000	8000	10000	15000	20000	25000	30000	35000	40000	45000	50000	55000	60000	65000	70000	75000	80000	85000	90000	95000
CHANGE OIL							1. C		As	direc	ted b	y oil a	analy	sis								
OIL ANALYSIS									1	Then	every	/ 6 m	onths			_						
CHANGE FILTERS														() 								
CLEAN OIL STRAINERS	-																					
CLEAN LIQUID STRAINERS																						
CHANGE COALESCERS																			1.1			
CHECK AND CLEAN SUCTION SCREEN																						
CHECK ALIGNMENT																						
CHECK COUPLING																						
VIBRATION ANALYSIS		Every 6 months, more frequently if levels increase																				
REPLACE SEAL		When leak rate exceeds 7 - 8 drops per minute																				



Mechanical Integrity Inspection





Nondestructive Testing





Manufacturer's Data Report U-1A Form

Jot	W1328 o/Sales Order # rchase Order #	FORM U-1A MA (Alternative Form As Required by the Provis	NUFACT for Single C sions of the A	URER'S DATA Chamber, Comple ASME Boiler and	A REPORT FC tely Shop or Field Pressure Vessel	PR PRESS Fabricated V Code Rules, S	JRE VESSELS Tessels Only) Section VIII, Divisio	Corr Con 1	rected opy		
1. Manufac	tured and certified by	. A. Phillips & Co.	, 770 Ent	erprise Aven	ue, DeKalb,	Illinois, 60	115				
					(Name and add	ress of manu	ifacturer)				
2. Manufac	stured for Stock										
				(Na	me and address	of purchaser)				
3. Location	of Installation Not Kno	wn									
		1			(Name and	address)					
4. Type	Horizontal W	1328-2 to W1328-3		N/A		14334(G)	139	996-13997		2013
(He	prizontal or vertical, tank) (N	anufacturer's serial number)		(CRN)		(Drawing numb	per)	(Nationa	al Board num	ber)	(Year built)
5. The ch	emical and physical prop	erties of all parts me	et the requ	irements of m	aterial specific	ations of th	e ASME BOIL	ER AND P	RESSUR	E VESSE	L
CODE.	The design, constructio	n, and workmanship	conform to	DASIME Rules	s, Section VIII,	Division 1	2010	10	N//	4	
	N/A			N	I/A		(year)	[Add	lenda, if appli	cable (Date)]	
	(Code Case numbe	rs)		(Special Servic	e per UG-120(d))						
6. Shell:	SA-53 Gr. B	0.375	in	0.0	00 in	2	(OD)			2' 1"	
	(Material spec. number, gra	de) (Nominal th	ickness)	(Corr	allow.)	(Inn	er diameter)		[Leng	gth (overall)]	
7. Seams:	ERW	RT3	100%	N/A	N/A		2	N	/A	80%	1
	[Long. (welded, dbl., sngl., lap, b	utt)] R.T.(Spot or Full)	Eff.(%)	(H.T. temp)	Time (hr)	[Girth. (weld	ded, dbl., sngl., lap,	[R.T. (sp	ot or full)]	Eff(%)	No. of Courses
8. Heads:	(a) Material	SA-516 Gr. 70	Normaliz	ed	(b) Mate	rial	SA-	516 Gr. 70	Normal	ized	
		(Spec. no.,	grade)					(Spec. no	., grade)		



Piping and Instrument Diagram (P&ID)





Ammonia Diffusion Tanks







Windsocks





Compliance Audits



Overview

- 1. Definitions and Requirements
- 2. Best practices for conducting an Audit
- 3. Common deficiencies found during Audits and resources to correct them





What does the law say?

Definitions and Requirements



Definitions

Definition #1

A Compliance Audit is a tool to gauge how well the program is being implemented.



Regulatory Requirements

- Certify compliance every three (3) years
- Conducted by at least one (1) person knowledgeable in the process
- Develop a report of scope, methods used, and findings.
- Document responses to audit findings
 - \circ 1.5 year general limit to resolve a finding
 - \circ $\,$ Must document the actual completion date



How do I conduct an audit?

Audit Best Practices



Questions to Consider

- 1) Who should lead?
- 2) Who should participate?
- 3) How long will it take?
- 4) How long do I have to complete action items?
- 5) Does someone need to sign off on the report?
- 6) Is there a prescribed checklist I have to use?



What we see lacking in most programs

Common Deficiencies



Deficiency #1 - Recommendation Tracking

Deficiency: Facility has numerous outstanding recommendations.

Solution: Develop or utilize a recommendation tracking system.





Deficiency #2 - Inspections and Tests

<u>Deficiency</u>: Documentation relating to inspections and tests on process equipment are lacking.

<u>Solution</u>: Develop a system for using standard forms which can be easily distributed to persons responsible (or hired) to perform the inspection.



Solution - Inspections and Test

Basic Mechanical Integrity Schedule:

- Daily Inspections
- Monthly Inspections
- Annual Inspections & Tests
- Five (5) Year Inspections & Tests



Solution - Inspections and Test

Daily Inspections

		Date					1.1	1
		Time						
Course Based	Suction Pressure	33 - 50 psig	_					
Gauge Board	Discharge Pressure	120 -195 psig		-	10.0			
Reciprocating Compressor 1	Running	Yes/No				N		-
	Run Time	Hours				1.1.1.1.24	1.	4
	Oil Level	Sight glass should be 1/2 full						
	Alarms	Yes/No - check panel				1	1	
	Suction Pressure	33 psig - 50 psig						
	Discharge Temperature	190°F - 205°F				1		· · · · · · · · ·
	Discharge Pressure	120 psig - 195 psig			 1.1.2	a		(
	Oil Temperature	110°F - 135°F						1
	Oil Filter Pressure	40 psig - 55 psig						
	Water Jacket Flow	Heads too hot to touch? (Yes/No)			2.0	2		10 m =
	Running	Yes/No				P		
	Run Time	Hours				1		
	Oil Level	Sight glass should be 1/2 full			 1	1		10 A
	Alarms	Yes/No - check panel						
Designed for Company 2	Suction Pressure	33 psig - 50 psig				1		1
Reciprocating Compressor 2	Discharge Temperature	190°F - 205°F				1		
	Discharge Pressure	120 psig - 195 psig			100	1		100
	Oil Temperature	110°F - 135°F	· · · · · · · · · · · · · · · · · · ·		 	j		/
	Oil Filter Pressure	40 psig - 55 psig				5		
	Water Jacket Flow	Heads too hot to touch? (Yes/No)		· · · · · · · · · · · · · · · · · · ·		0.000		



Solution - Inspections and Test

Monthly Inspections

MONTHLY SYSTEM MECHANIC	CAL INTEGR	ITY INSPECTION		
Equipment Name:	All Compressors, HPR 1, MSA, LTV, Condensers, A Coils			
Inspection Date:				
Name of Person Performing Test/Inspection:				
	Conforms?	Comment		
Room #1 Are the ammonia coils free from excessive vibration, ice buildup, and dirt?				
Room #1 Does any associated equipment (fans, impellers, guards) need to be adjusted or lubricated?				
Room #2 Are the ammonia coils free from excessive vibration, ice buildup, and dirt?				
Room #2 Does any associated equipment (fans, impellers, guards) need to be adjusted or lubricated?				
Room #3 Are the ammonia coils free from excessive vibration, ice buildup, and dirt?				
Room #3 Does any associated equipment (fans, impellers, guards) need to be adjusted or lubricated?				
Room #4 Are the ammonia coils free from excessive vibration, ice buildup, and dirt?				



Solution - Inspections and Test

Annual Inspections & Tests

- System wide / component specific inspections such as IIAR B-109 inspections or equivalent
- Testing of Safety Devices
 - Compressor Safeties
 - High Level Float Switches
 - o E-Stop
 - Vibration Analysis
 - Oil Sampling
 - Ammonia Detection (For most facility 6 Months)



Solution - Inspections and Test

Five (5) Year Inspections & Tests

- Replacement of Relief Valves
- Non-Destructive Testing





Deficiency #2a - Contractor Documentation

<u>Deficiency</u>: Inspection documentation from refrigeration contractors is lacking necessary detail.

Example: "Tested detection system"

<u>Solution</u>: As part of you MI schedule, use standard forms which can be given to a refrigeration contractor to fill out.



Deficiency #2 - Training Documentation

Deficiency: Training documentation for employee "xyz" is lacking in several areas.

<u>Solution</u>: Develop a training matrix to track training topics and employee's training status.



Solution - Training Documentation

		Company: Demo Co 20150925 Facility: De	omo Cold Storage User: Admi	n User Jser		
		Home Reports TNG Writer Creat	e New Training Export	8		
				Demo Co	20150925	
			Adam Ammonia	Joe Manager	Mike Supervisor	Sally CalARP
1	Ammonia Safety and Health Hazards (ONCE)		09/09/2015	09/09/2015		09/09/2015
2	The Refrigeration Cycle (ONCE)					
3	Operating Limits and Conseq. Of Dev. (ONCE)					
4	Mechanical Integrity (ONCE)					
5	Operating Procedures (ONCE)					
6	Emergency Response (ONCE)					
7	Personal Protective Equipment (ONCE)					
8	Process Safety Information (ONCE)					
9	Lockout/Tagout (ONCE)		09/09/2015	09/09/2015		09/09/2015
10	Hot Work Permit (ONCE)					



Deficiency #2 - Training Documentation

Required Training for CalARP

- Process Overview (Refrigeration Theory)
- Operating Procedures
- Emergency Response
- Safety Work Practices



Deficiency #3 - Evacuation Drills

Deficiency: Facility has not performed an evacuation drill within the last year.

Solution: Schedule and perform an evacuation drill at least annually



Break



Management of Change

COMPLIANCE

Overview

- 1. What Management of Change is.
- 2. When *Management of Change* is required.
- 3. Resources for documenting a *Management of Change*
- 4. Coordination with Contractors
- 5. Practice scenarios



Providing Solutions. Simplifying Regulation.



What is Management of Change?

Requirements & Definitions



Regulatory Requirements

The owner or operator shall establish and implement written procedures to manage changes (except for "replacement in kind") to process chemicals, technology, equipment, and procedures; and, changes to stationary sources that affect a covered process. (CalARP Title 19 CCR §2760.6)



Definitions

Definition #1

Management of Change is a process through which we ensure changes made to the system, or changes which may affect the system, are implemented safely, installed correctly, documented appropriately and communicated effectively

Definition #2

Management of Change is a process to manage how a change affects everything else.



When is Management of Change Required?

A Simple Question

COMPLIANCE

Will My Drawings Change?

-----Net 11 -14 C 1463 1 1 AGER EC-2 (MONER 2 842 09404 EC-1 BAL EC-3 A DESCRIPTION OF A DESC 14 .) 1(*** (CED) -----GEED 00 00 (000) ÎED CE en ra en a Bidart Brothers 9 1000 1.40 1000 4000 4 N. IL 1 -498-904 DRANSHIS LOWIS C-4 MPRESSOR COMPRESSO INC. RO ACC . P&ID-1

Providing Solutions. Simplifying Regulation.


MOC Common Examples

- Expansion Project
- Adding a Compressor
- Removing Equipment



How to Document a Management of Change?

Documentation Resources



Documentation

- Checklist
- Supporting Documents



Checklist - Resource Compliance





Checklist - IIAR PSM 2012

(Insert Town, State of Facility)

Management of Change

Management of Change (MOC) Form

(Insert Company Name)

MOC Number: _____

Management of Change: Initiation

This section of the MOC Form (except for the MOC number) should be completed by the individual initiating the MOC Form and forwarded to the (*Insert Title or Name*).

1. Facility Information Plant: Location: Person Initiating the MOC Form: MOC Form Initiation Date: Anticipated Startup Date:

2. Reason for Request (check one)

[] Incident Investigation Recommendation (Ref. No	
[] Mechanical Integrity Audit Recommendation (Ref. No.)
[] Pre-start Safety Review Recommendation (Ref. No.	
[] Process Hazard Analysis or Hazard Assessment (Ref. No	
[] Change in Refrigeration Requirements	
[] Expansion or Renovation of Facility or Systems	
[] Other (Explain)	

3. Description of Technical Basis for Change

3a. Describe the Purpose for the Change and Any Alternatives Which Were Considered



Checklist (cont'd)

- Section #1 Initial Screening
- Section #2 RMP/PSM Elements Affected
- Section #3 Safety Review Checklist
- Section #4 Return From Temp Change
- Section #5 Verification and Approval

 Pre-Startup Safety Review



You get what you pay for...

Coordinating with Contractors



Current Codes & Standards

ANSI/IIAR 2 - 2014



Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems



ANSI/IIAR 5 - 2013





Contractor RFP Addendum



Practice Scenarios

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

1) Which elements of the CalARP program would need to be updated (if any) if a compressor was added to the refrigeration system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

1) Which elements of the CalARP program would need to be updated (if any) if a compressor was added to the refrigeration system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

2) Which elements of the CalARP program would need to be updated (if any) if an old condenser was removed from the refrigeration system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

2) Which elements of the CalARP program would need to be updated (if any) if an old condenser was removed from the refrigeration system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

3) Which elements of the CalARP program would need to be updated (if any) if your facility rented an auto-purger for 2 weeks to purge the system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

3) Which elements of the CalARP program would need to be updated (if any) if your facility rented an auto-purger for 2 weeks to purge the system?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

4) Which elements of the CalARP program would need to be updated (if any) if your current operator resigned and you hired a new one?

SOP	MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	PSI	CQ	MOC	PHA	II	HWP



Practice Scenarios

4) Which elements of the CalARP program would need to be updated (if any) if your current operator resigned and you hired a new one?

SOP	**MI	TNG	AUDIT	PSSR	HA	EP
RMP Submit	**PSI	**CQ	MOC	PHA	II	HWP



Relationship with the CUPA



Commonly asked questions

What type of release does the CUPA want me to report?

How frequent will the CUPA inspect my facility and what do they want to inspect at my facility?

What is the CUPAs expectation for completing CalARP Program recommendations?

What methodology does the CUPA expect me to use for my next PHA?





Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

Process Hazard Analysis (Hazard Review)

(b) The owner or operator shall work closely with AAs in deciding which PHA methodology is best suited to determine the hazards of the process being analyzed. The owner or operator shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed:





Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

Process Hazard Analysis (Hazard Review)

(e) The owner or operator shall establish a system to address the team's findings and recommendations; assure that the recommendations are resolved and documented; document what actions are to be taken; develop a written schedule of when these actions are to be completed; complete these actions on a timetable agreed upon with the AA, or within two and one half (2.5) years of performing the PHA, or the next planned turnaround, for those items that require a turnaround; document the final resolution taken to address each recommendation and actual completion date; and communicate the actions to operating, maintenance and other employees whose work assignments are in the process and who may be affected by the recommendations or actions. The above timelines shall not apply to any process hazard analysis completed prior to January 1, 2015.





Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

Compliance Audit

(d) The owner or operator shall promptly determine and document an appropriate response to each of the findings of the compliance audit. The owner or operator shall enter into an agreement with the AA on a timetable for resolution of these findings. Otherwise these responses will be completed within one and one half (1.5) years after performing the compliance audit, or the next planned turnaround for items requiring a turnaround. These timelines shall not apply to any compliance audit completed prior to January 1, 2015. The



Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

RMP Submit

(a) 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 AA. Completeness shall be determined in accordance with Sections 2745.3 through 2745.9. The stationary source shall work closely with the AA to determine that the RMP contains an appropriate level of detail.





Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

Incident Investigation

(e) The owner or operator shall establish a system to promptly address and resolve the incident report findings and recommendations. The owner or operator shall enter into an agreement with the AA on a timetable for resolution of these findings and recommendations. Otherwise these resolutions shall be completed no later than one and one half (1.5) years after the completion of the incident investigation, or two (2) years after the date of the incident, whichever is the earlier of the two dates, or the next planned turnaround for those





Not only is coordination with your CUPA encouraged, it is <u>REQUIRED</u>.

Management of Change

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



CalARP Emergency Response - §2765.1(b)(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 2765.2 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;



Communication – Scenario 1









Practical Application

Email Correspondence with CUPA inspectors

- Invitation to PHA
- PHA Report and Findings
- Audit Report and Findings
- Incident Investigation Report and Findings
- RMP Submit
- Inform of process changes





Practical Application

Phone Calls

- Potential Incident Investigation/Reportable Release
- General CalARP questions
- Discuss status of process changes





Practical Application

Onsite Meetings

- Participation in your Process Hazard Analysis
- Emergency Response Drills
- CUPA Inspection





September 7, 2015

Communication





Kings County Fire Department 1033 Chittenden Ave Corcoran, CA 93212

Attention: Rick Smith

Reference: Buttonwillow Warehouse Company Emergency Response Coordination

The purpose of this letter is to communicate key information regarding the Emergency Response Program at Buttonwillow Warehouse Company Corcoran Field Storage and Corcoran Service Yard. The facilities are located at 715 Yoder Blvd, Corcoran, CA 93212 and used to store and mix fertilizer products. The facilities store numerous chemicals including anhydrous ammonia in excess of 10,000 lb. As it relates to emergency situations involving hazardous materials, Buttonwillow Warehouse Company Corcoran Field Storage and Corcoran Service Yard have elected to use a minimal response strategy in which employees will evacuate to a safe refuge area and make notifications to trained, public responders. We have identified the Kings County Fire Department the agency most likely to fulfill the function of First Responder at Corcoran Field Storage and Corcoran Service Yard.

Pursuant to Title 19 Division 2 Chapter 4.5 §2765.1(b)(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. <u>The owner or operator must</u> document that response actions have been coordinated with the local fire department and hazardous materials response agencies."

We invite you to review the attached Emergency Response Program and provide feedback should you have any. We would welcome your department to make a site visit to Corcoran Field Storage and Corcoran Service Yard to walk our facility and further coordinate our activities.

Please let me know if you have any questions.

Truly yours, Resource Compliance

PUT 0 Peter Thomas, P.E. President

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Break