



# RESOURCE COMPLIANCE

## **CalARP Training Requirements**

**Eli Macha – Process Safety Consultant**

# Objectives

1. **Understand** CalARP training *requirements*
2. **Learn** strategies for *developing* and *implementing* an internal training program
3. **Know** the *resources* available to you

# Training Frequency

Training should be performed...

- initially,
- when a change occurs,
- at least every three (3) years, and
- more frequent if necessary.



# Training Content

The regulations list three (3) categories of training:

1. Process Overview → **Process Safety Information**

2. Operating Procedures (SOPs)

3. Emergency Response and Safety & Health Hazards

**Evacuation & Notification**

**Chemical Safety**

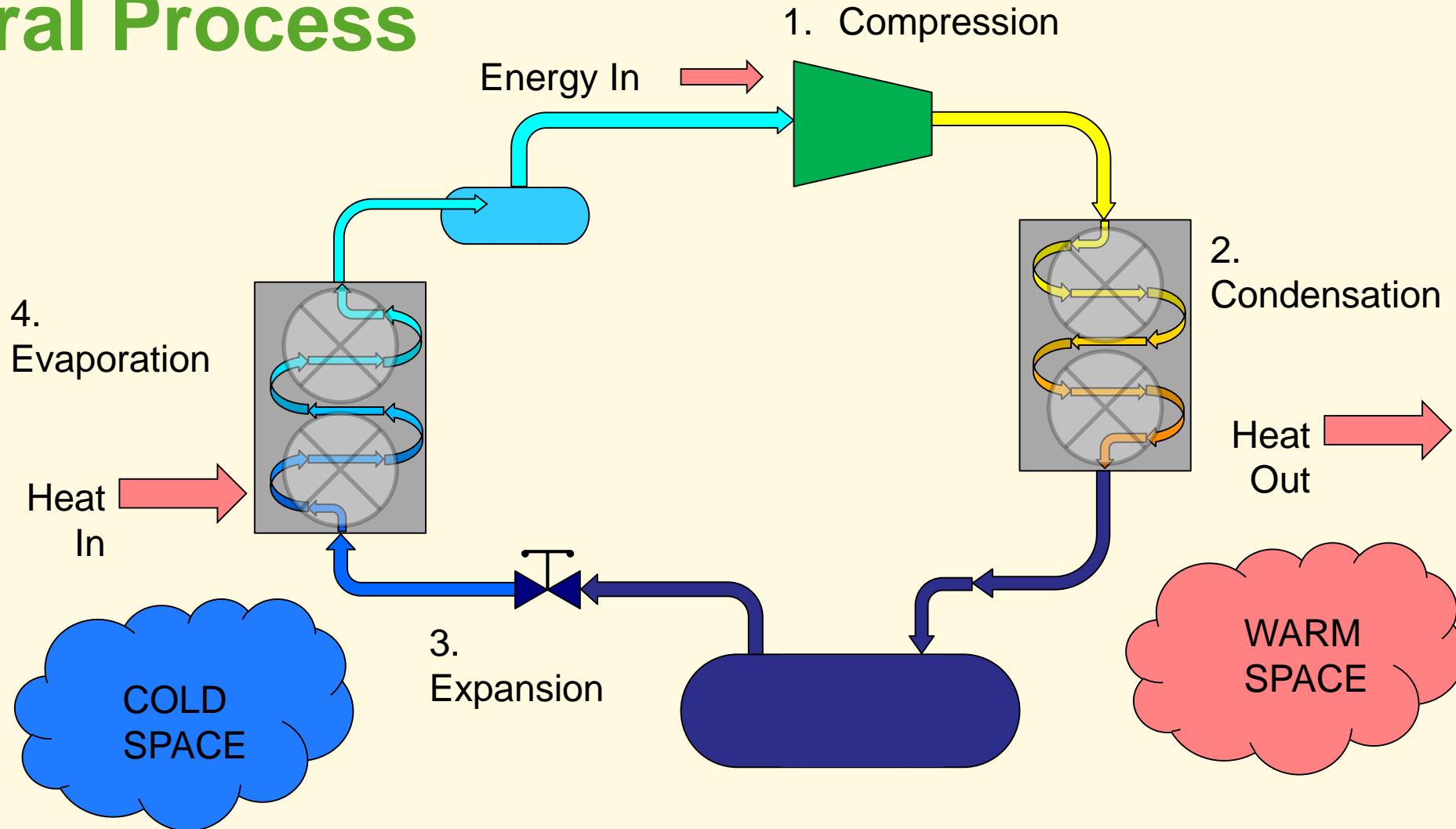
# Training Simplified

Employees must be trained on the  
Process, Procedures, and Response.

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# General Process



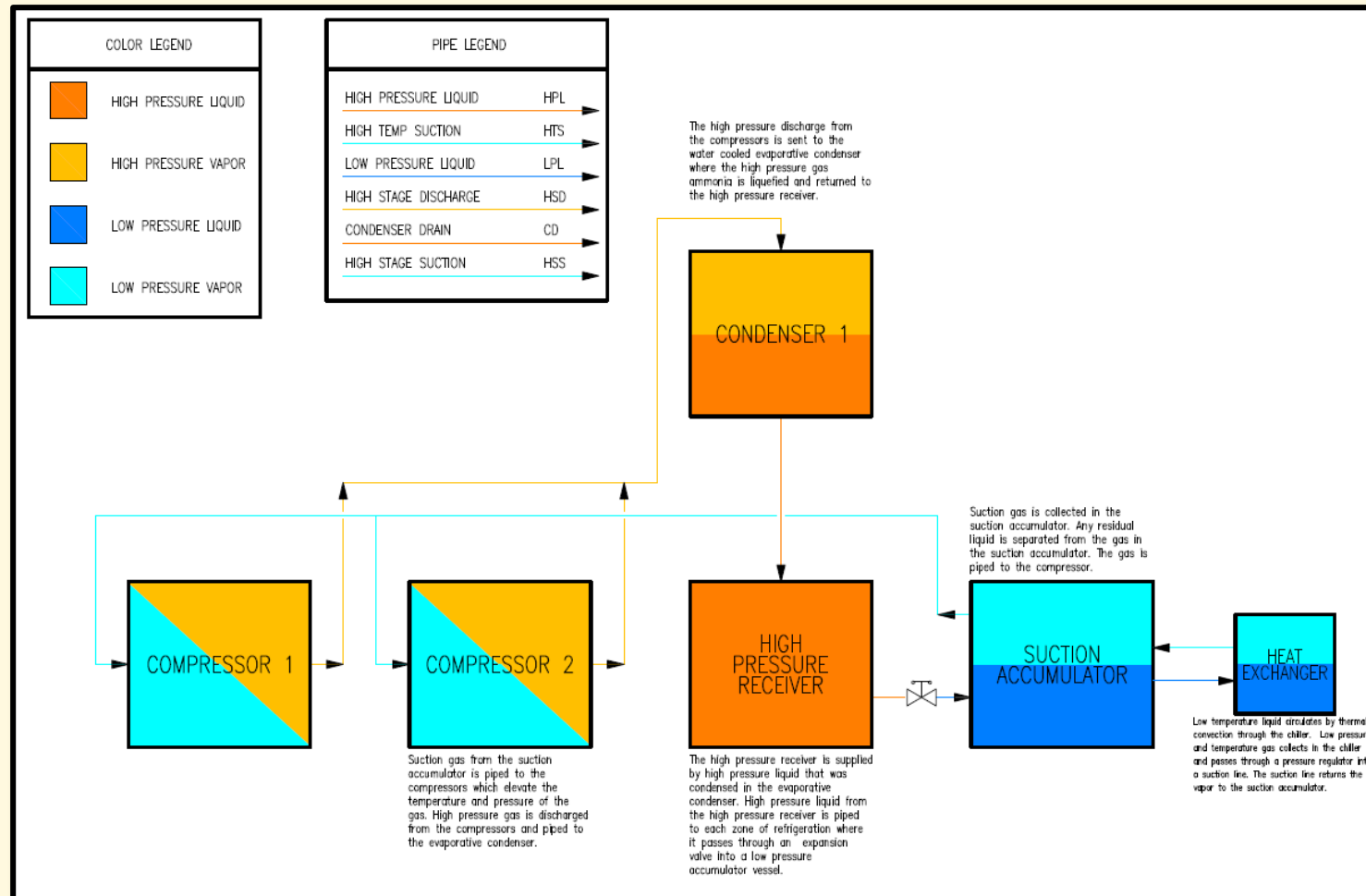
# Why is Process Safety Information Important?

## ***Process Safety Management Guidance Document:***

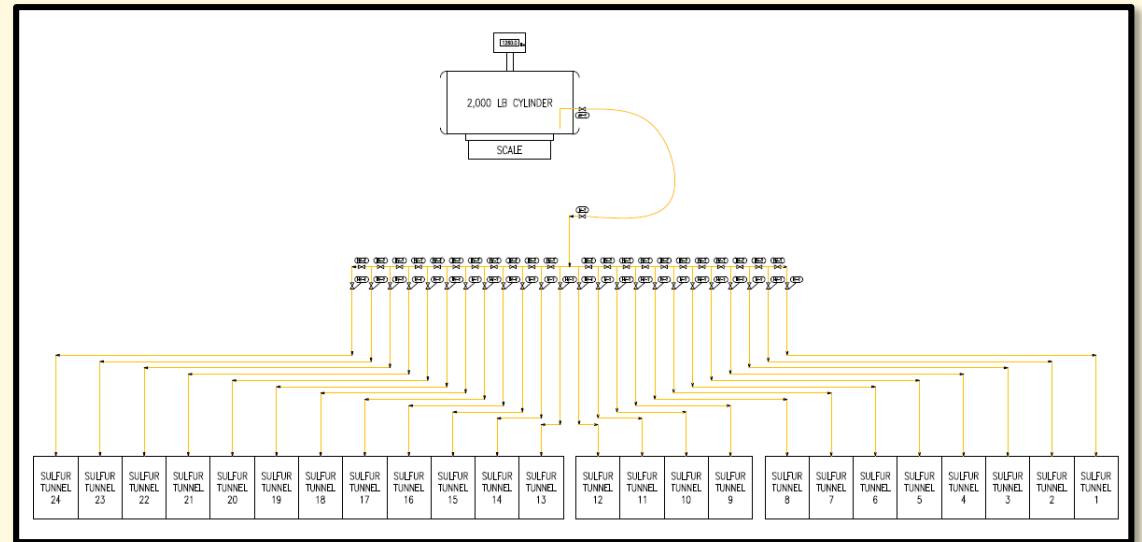
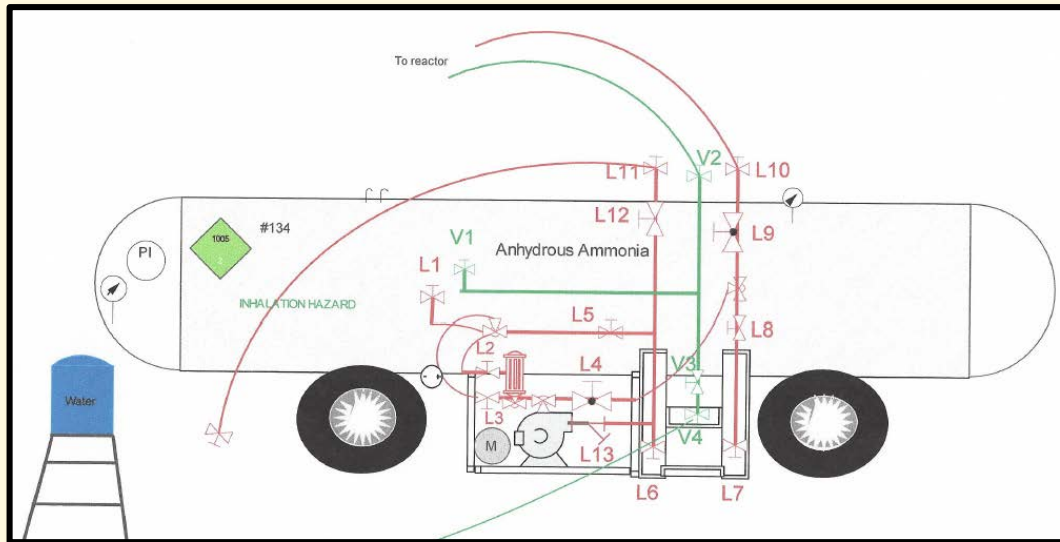
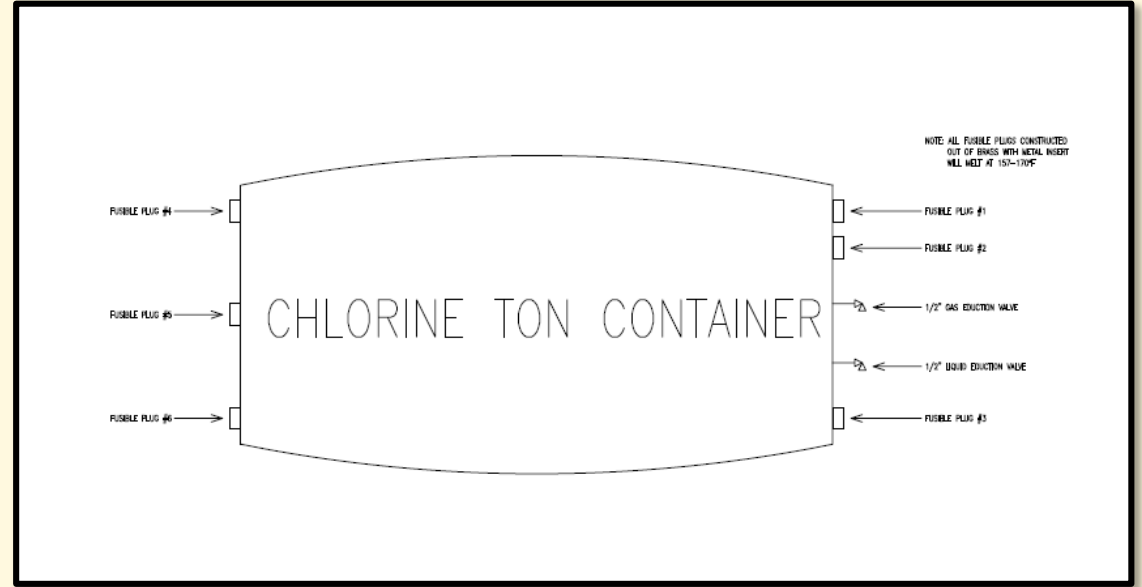
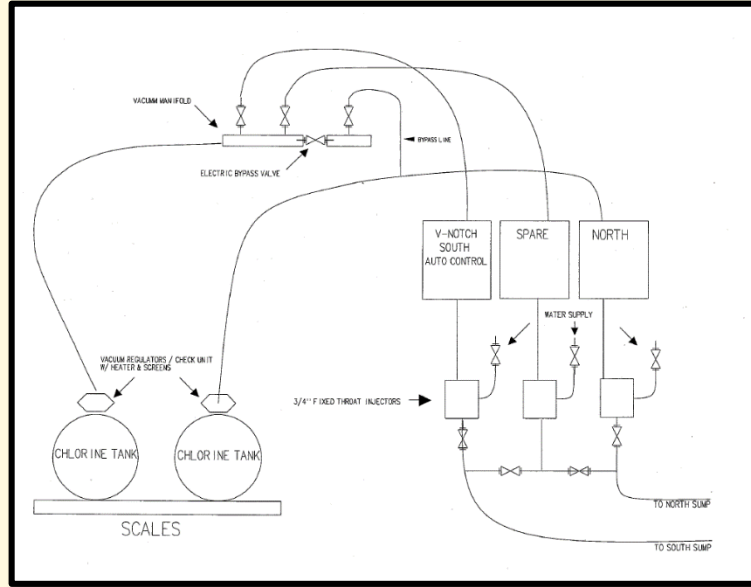
“The compiled [process safety] information will be a necessary resource to a variety of users including ... those developing the **training programs** and the **operating procedures...**”



# Block Flow Diagram



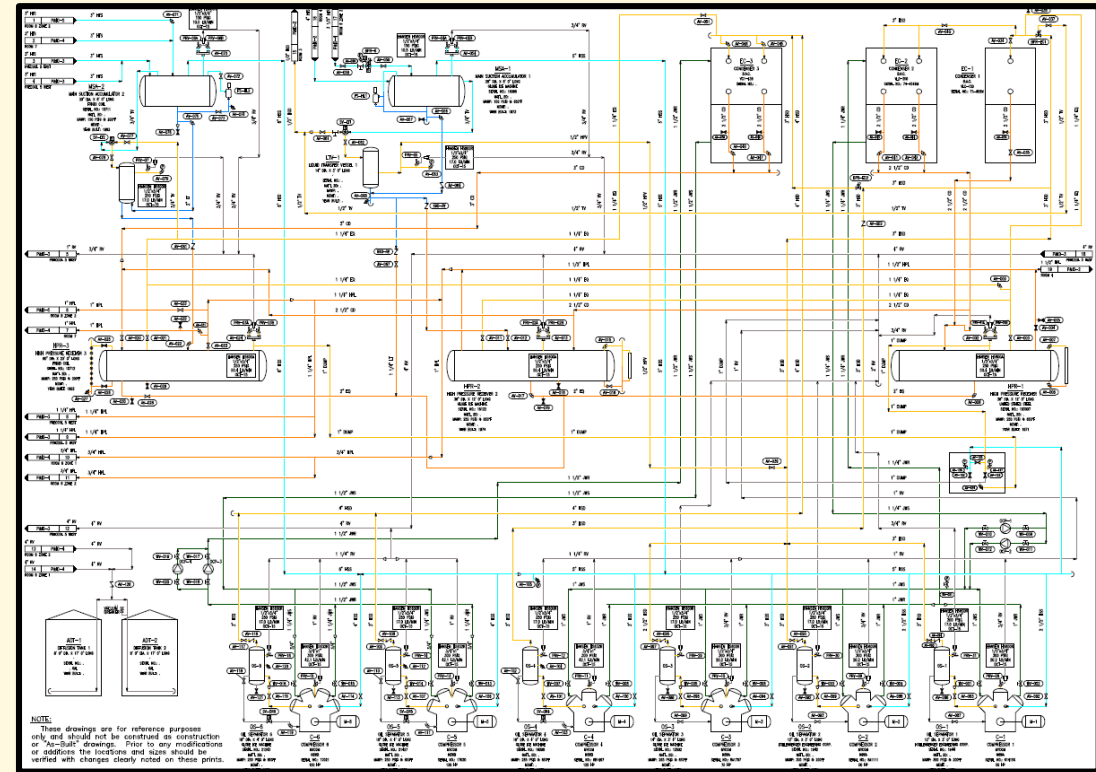
# P&IDs



# Process Safety Information

## *PSI Elements*

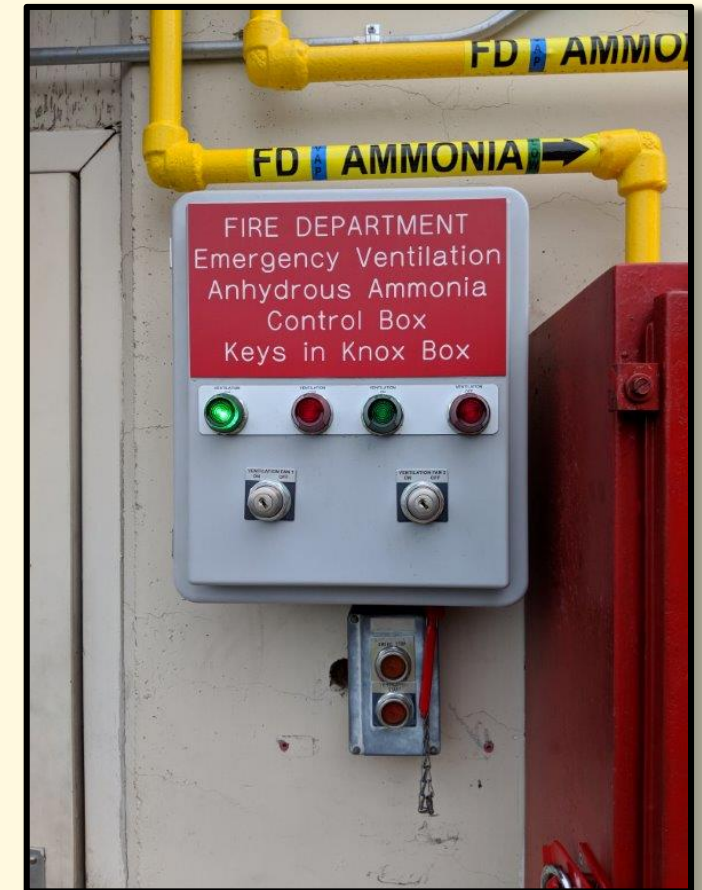
- Safety Data Sheet (SDS)
- Block Flow Diagram (BFD)
- Process Chemistry
- Maximum Intended Inventory
- Safe Operating Limits & Consequences of Deviation
- Materials of Construction
- Piping & Instrumentation Diagrams (P&IDs)



# 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



# Training Simplified

Employees must be trained on the  
Process, Procedures, and Response.

# 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



## Sample Compressor Operating Procedure – Normal Operations

### ***Normal Operations***

1. During normal operations, the compressor will automatically load and unload based on suction pressure.
2. During low load conditions, the compressor may enter 'Standby' mode until the system load requires it to operate at some capacity.
3. 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?***

# “Competency is King”

## SOP Quiz - Sample

\* Required

Employee Name \*

Your answer

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When truck off-loading, what do you do after starting the compressor? \* 1 point

- 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.

Which activity is not completed after truck off-loading? \* 1 point

- Lockout all valves on the customer equipment.
- Return hoses to their holding cradles.



# Mechanical Integrity/Maintenance Training

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



### Daily Operations Checklist Ammonia Refrigeration System

		Date						
		Time						
<b>Gauge Board</b>	Suction Pressure	33 - 50 psig						
	Discharge Pressure	120 -195 psig						
<b>Screw Compressor #1</b>	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						
	Suction Pressure	33 psig - 50 psig						
	Discharge Pressure	120 psig - 195 psig						
	Oil Temperature	120°F - 170°F						
	Oil Filter Pressure	60 psig - 90 psig						
	Motor Amps	A						
	Slide Valve	%						
<b>Condenser #1</b>	Fans Running	Yes/No						
	Pump Running	Yes/No						
	Belts	Too loose or too tight?						
<b>Liquid Recirculator</b>	Visual Inspection	Free from unusual vibration, sounds, and smells.						
<b>Pilot Receiver</b>	Visual Inspection	Free from unusual vibration, sounds, and smells.						
<b>Ice Generator</b>	Visual Inspection	Free from unusual vibration, sounds, and smells.						
		Initials						

## Safe Work Practices

### Safe Work Practices

#### ***Confined Space***

In general, air-cooling evaporators are not classified as confined spaces. Certain installation arrangements (e.g. bunker-mounted air-cooling evaporators) may require entry into a confined space in order to access the air-cooling evaporator for operation, inspection, or repair. In those instances, the facility *Confined Space Entry Program* must be adhered to. Refer to Title 29 CFR §1910.146 and Title 8 CCR §5156-5158 for more information.

#### ***Lockout Tagout***

When maintenance or repair must be performed on an air-cooling evaporator, the air-cooling evaporator must be locked out to control hazardous energy contained within the unit. In those instances, the facility *Lockout/Tagout Program* must be adhered to. Refer to Title 29 CFR §1910.147 and Title 8 CCR §3114 for more information.

#### ***Line Break***

When an air-cooling evaporator must be pumped down for repair or alteration, the facility line break procedure must be adhered to. This procedure is available or will be developed as a separate document.

#### ***Facility Entry***

All facility visitors must check in at the front office before beginning work on site. This requirement is enforced through a “meet and greet” policy in which all managers have been trained to introduce themselves to persons whom they do not recognize.

# Training Simplified

Employees must be trained on the  
Process, Procedures, and Response.

# Response

This is actually two trainings that are typically combined:

- Chemical Safety & Awareness
- Emergency Response

Who needs this training?

**All** Facility Employees

# 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



# First Aid Procedures

## Health Effects

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

## Inhalation - First Aid

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.



## Exposure Limits

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





## Exposure Effects

- 100 ppm: irritation to the mucous membranes of the nose, throat and lungs
- 400 ppm: throat irritation and may destroy mucous surfaces from prolonged exposure
- 5,000 ppm: breathing this concentration can cause sudden death
- 30,000 ppm: skin will start to burn and blister after a few seconds of exposure

## AMMONIA SAFETY



**IF YOU SMELL  
AMMONIA**

▶ **IMMEDIATELY LEAVE  
THE AREA**



**IF YOU INHALE  
AMMONIA**

▶ **IMMEDIATELY SEEK FRESH  
AIR AND MEDICAL  
ATTENTION IF NECESSARY**



**IF YOU HAVE  
SKIN OR EYE  
CONTACT WITH  
AMMONIA**

▶ **IMMEDIATELY FLUSH  
AFFECTED AREA WITH  
WATER FOR A MINIMUM  
OF 15 MINUTES**

Note: DO NOT remove clothing exposed to liquid ammonia until thawed by flushing with water.



**IF YOU SEE  
AN AMMONIA  
CLOUD**

▶ **IMMEDIATELY EXIT THE  
BUILDING OR AREA AND  
MOVE TO A DESIGNATED  
LOCATION**

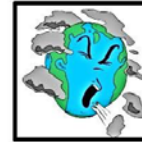
**! IN ALL CASES REPORT TO YOUR SUPERVISOR AND  
FOLLOW YOUR FACILITY EMERGENCY ACTION PLAN**

## SEGURIDAD CON EL AMONIACO



**SI HUELES  
AMONIACO**

▶ **RETÍRESE DE ESA ÁREA  
INMEDIATAMENTE  
BUSQUE AIRE FRESCO**



**SI HA INHALADO  
AMONIACO**

▶ **INMEDIATAMENTE Y ATENCIÓN  
MEDICA DE SER NECESARIO**



**SI EL AMONIACO  
TIENE CONTACTO  
CON SU PIEL U  
OJOS**

▶ **INMEDIATAMENTE ENJUAGUE  
EL ÁREA AFECTADA CON AGUA  
POR UN MÍNIMO DE 15 MINUTOS**

(NOTA: NO REMUEVA LA ROPA QUE HA SIDO EXPUESTA AL AMONIACO LIQUIDO HASTA QUE SE DERRITA AL ENJUAGARLO CON AGUA)



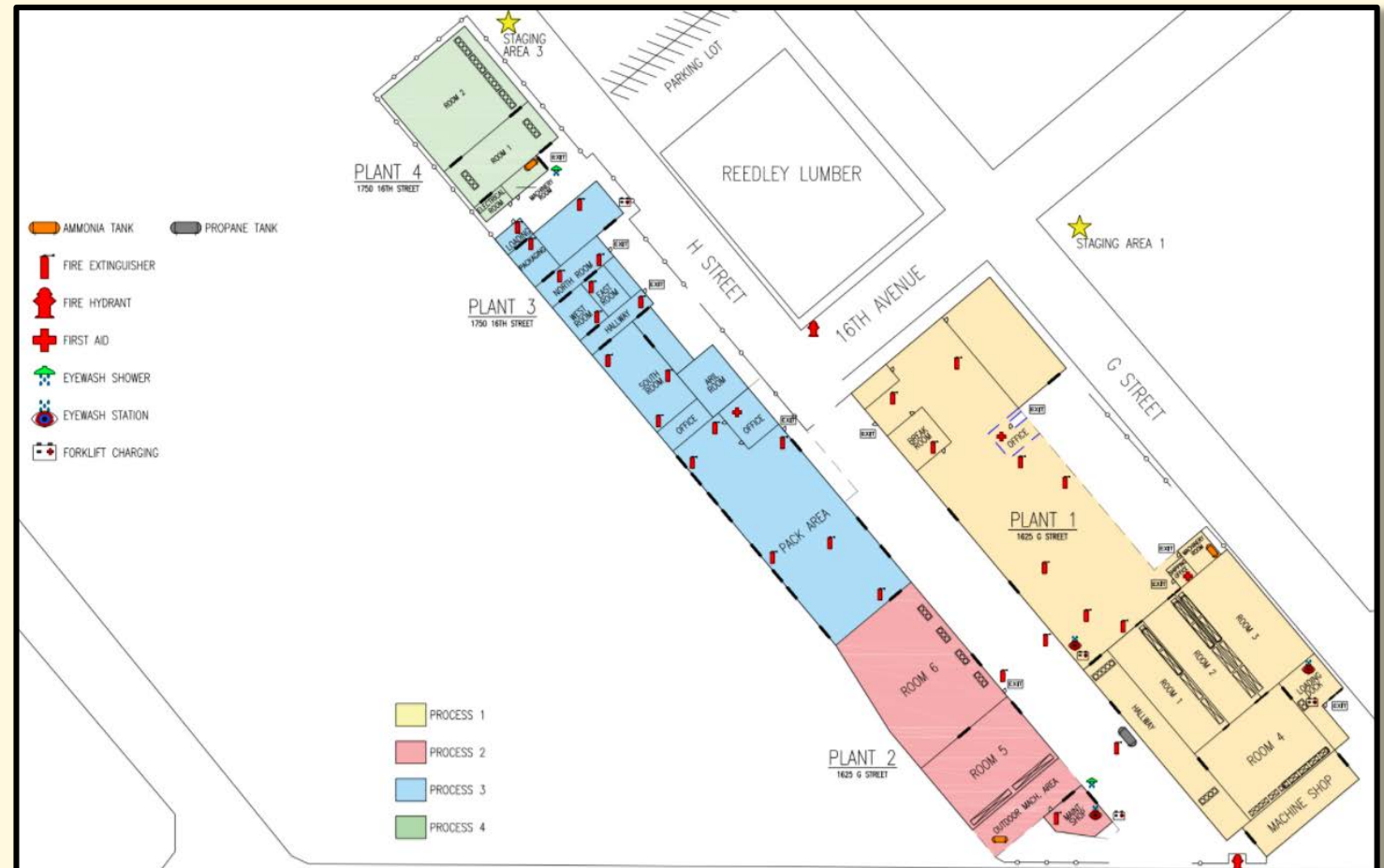
**SI MIRA UNA NUBE  
DE AMONIACO**

▶ **SALGA DEL EDIFICIO  
INMEDIATAMENTE O DEL ÁREA  
Y MUÉVASE HACIA EL LUGAR  
DESIGNADO**

**! EN TODOS LOS CASOS REPÓRTALO A TU SUPERVISOR Y SIGUA EL PLAN DE  
EMERGENCIA DEL EDIFICIO.**

# Evacuation and Notification

- Reporting Emergencies
- Alarms
- Windsocks
- Staging Areas
- Wait to be Counted





# Strategies to Train Employees

1. Do you have someone who coordinates all training for the company?
2. Setup a training schedule
3. Group trainings together (ex. Chemical Awareness & Emergency Response)
4. Train all employees during initial orientation
5. Test for competency




# Creative Training Ideas

← Ammonia Refrigeration 101 ☆

QUESTIONS RESPONSES Total points: 15

1. What should the state of ammonia be in these pieces of equipment? \*



- only high pressure vapor
- mostly low pressure vapor, but some low pressure liquid
- mostly high pressure liquid, but some low pressure vapor
- only low pressure liquid

SEND

+

Tr

?

# Creative Training Ideas

## Scenario 4:

To be completed twice daily	Compressor#1		Compressor #2	
Comp. Hours	42681	Hrs	10130	Hrs
Suction Pressure	6.6	"Hg/psi	6.6	"Hg/psi
Suction Temperature	-11	°F	-11	°F
Discharge Pressure	36	psi	36	psi
Discharge Temperature	241	°F	132	°F
Oil Separator Temperature	10	°F	96	°F
Inlet Oil Filter Pressure	0	psi	56	psi
Inlet Oil Temperature	130	°F	130	°F
Oil Filter Pressure Differential	1	psi	0	psi
Process Temperature	N/A		N/A	
Slide Valve Pos. %	88	%	88	%
Motor Current	187	Amp	187	Amp
Oil Level (top site glass)	top		middle	

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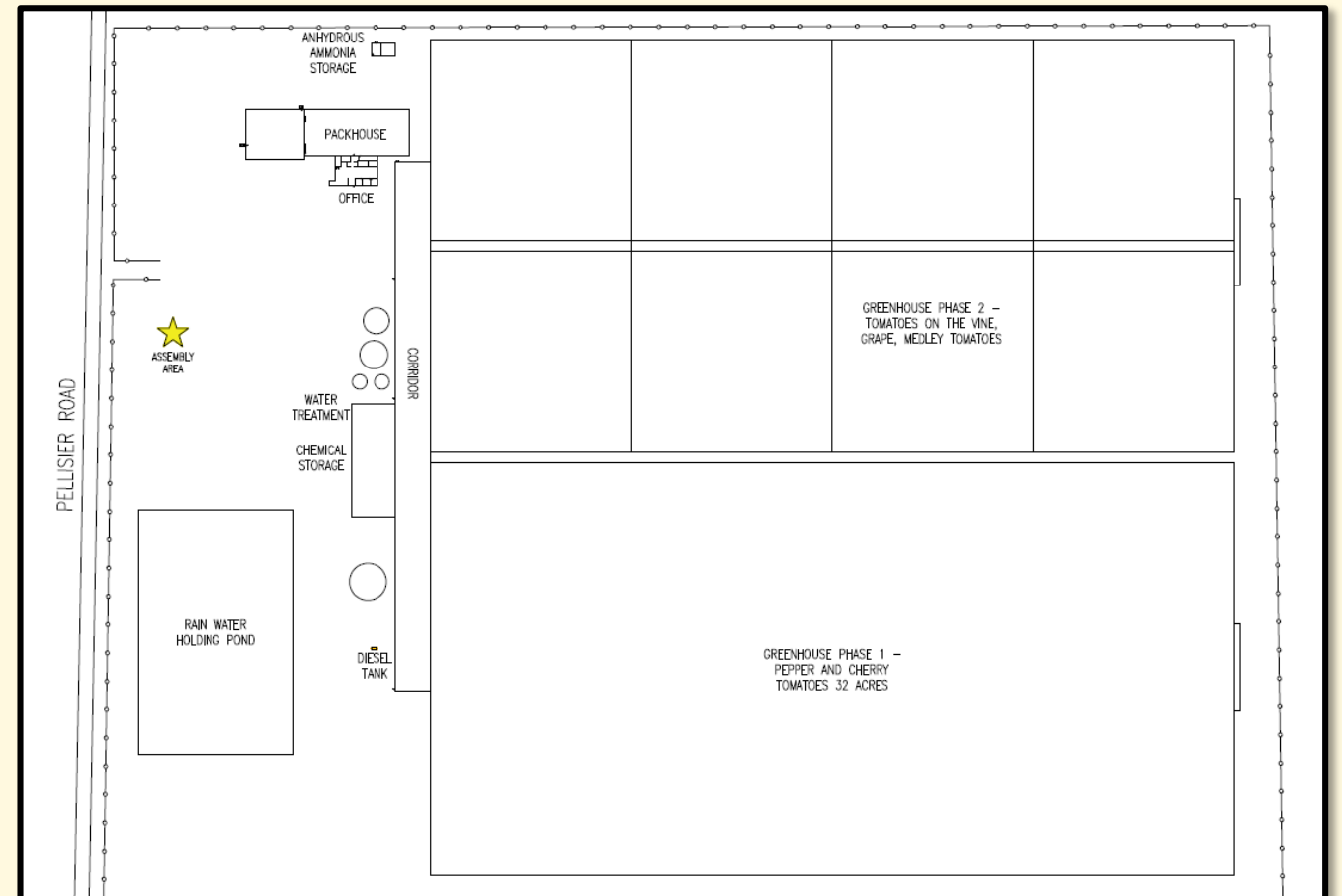
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# Creative Training Ideas

SAFETY SYSTEM	CODE	QUANTITY
 EMERGENCY PRESSURE CONTROL SYSTEM	A	2
 AMMONIA DETECTION SYSTEM CONTROLLER	B	11
 WIND SOCK	C	5
 MAIN WATER SHUT OFF	D	1
 MAIN GAS SHUT OFF	E	1
 MAIN ELECTRICAL SHUT OFF	F	1
 EYEWASH SHOWER	G	16
 PORTABLE EYEWASH STATION	H	1
 AMMONIA DIFFUSION TANK	I	1
 EMERGENCY STOP SWITCH	J	2





# Useful Training Resources

- Chemical Safety Days – [www.cvcasd.org](http://www.cvcasd.org) (Salinas - May 24, 2018)
- Refrigerating Engineers & Technicians Association (RETA) classes and certification – [www.reta.com](http://www.reta.com)
- Local RETA chapters (Central Valley)
- Bakersfield Chemical Safety Day (typically February)
- Resource Compliance Blog – [www.resourcecompliance.com/blog](http://www.resourcecompliance.com/blog)



## Regulations: Simplified

Employees must be trained on the  
Process, Procedures, and Response.

Don't forget your Training Cheat Sheet!

# ***Questions?***

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