The Pre-Startup Safety Review (PSSR) – What You Need to Know

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Session W-A3

Objectives

- Review the regulatory framework behind CalARP PSSR requirements within each program level
- Understand the importance of PSSRs and their context within process safety
- Discuss examples of PSSRs, common issues, and how to resolve them
- Put it into practice!

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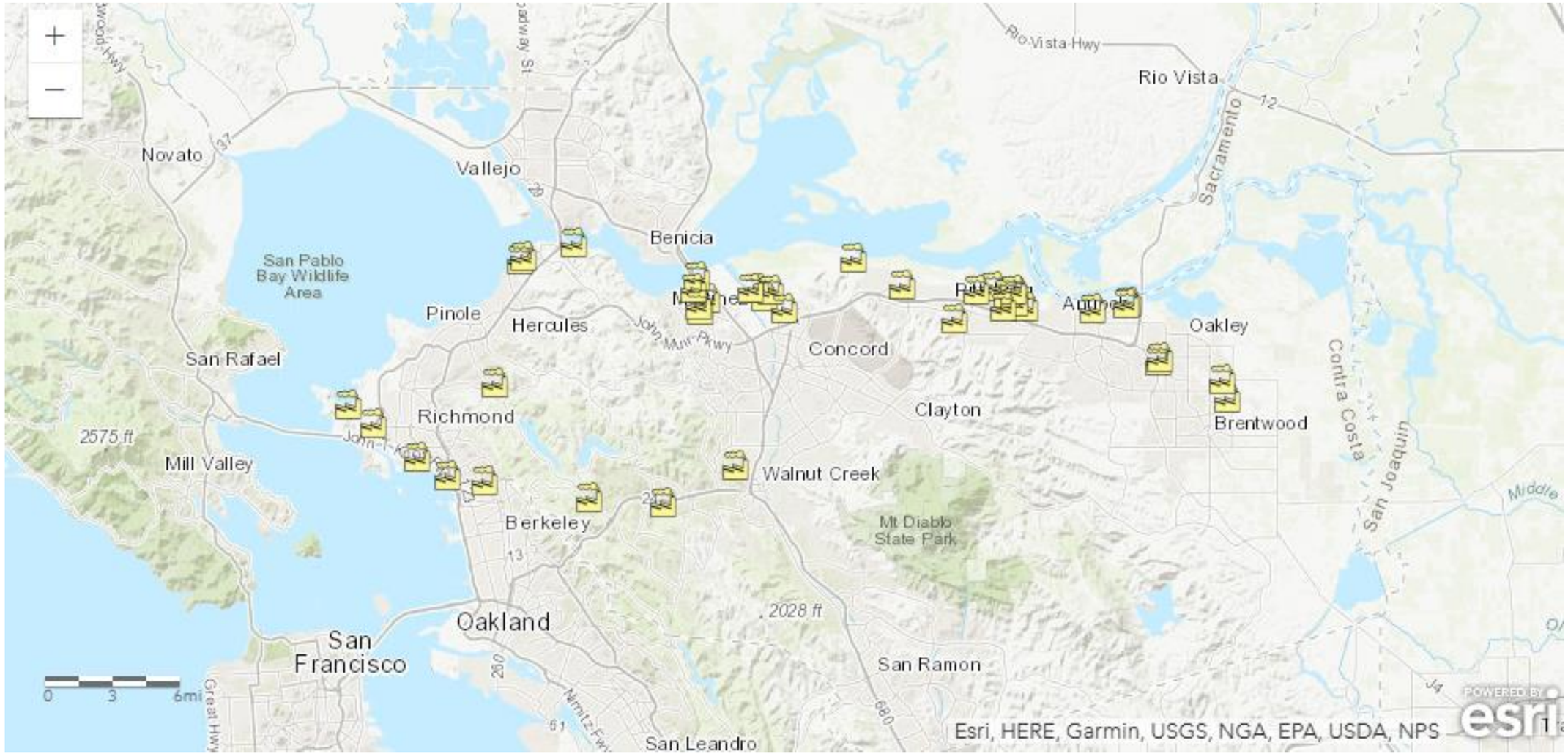
How far from a regulated facility do you live?

Introduction



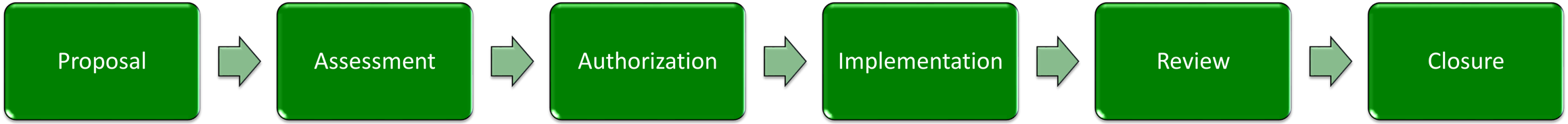
What is your current role in relation to PSSRs / CalARP regulation?

How many years of experience do you have?

Definition of PSSR

- The Pre-Startup Safety Review is a final and ***independent*** check prior to initiating use of process equipment
- For new, modified, and shutdown processes
- Commonly seen at tail-end of Management of Change (MOC) process

Management of Change (MOC)

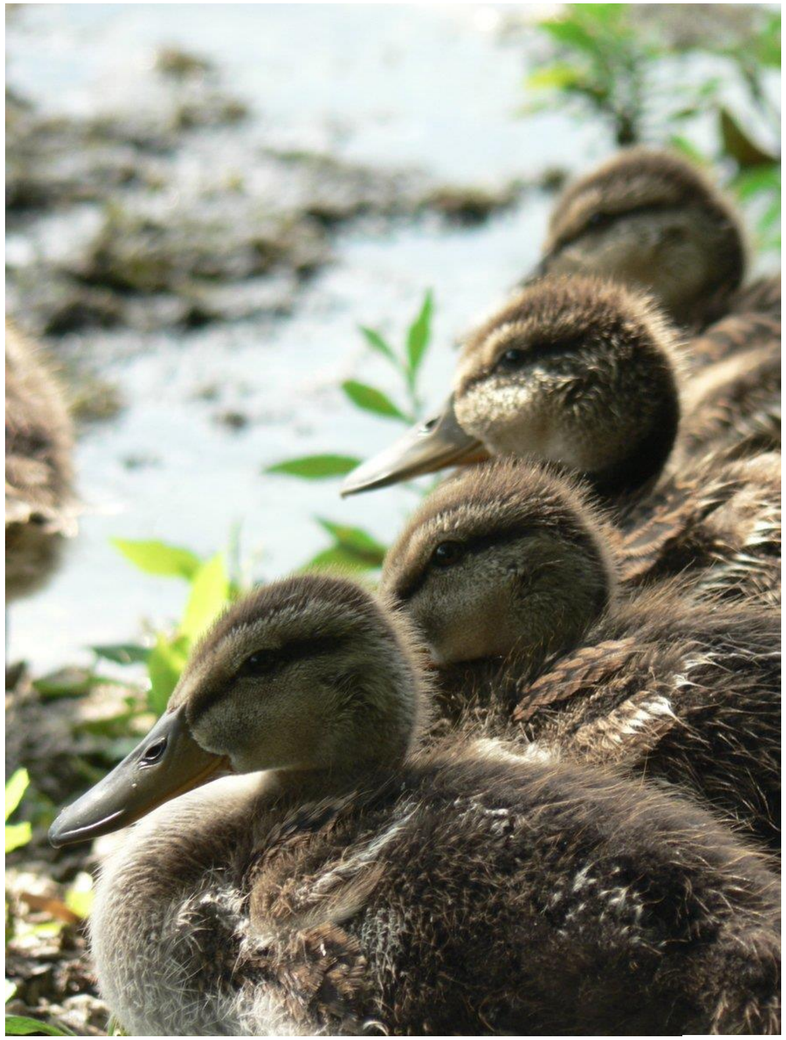


- A systematic approach to dealing with change
- Requires…
  - Supporting technical documentation
  - Identification of potential safety impacts
  - Updates to Process Safety Information (PSI)
  - Time specification
  - Approval/authorization process

CCR 19 § 5100.6 (P3), CCR 19 § 5110.9 (P4)

Why are PSSRs important?

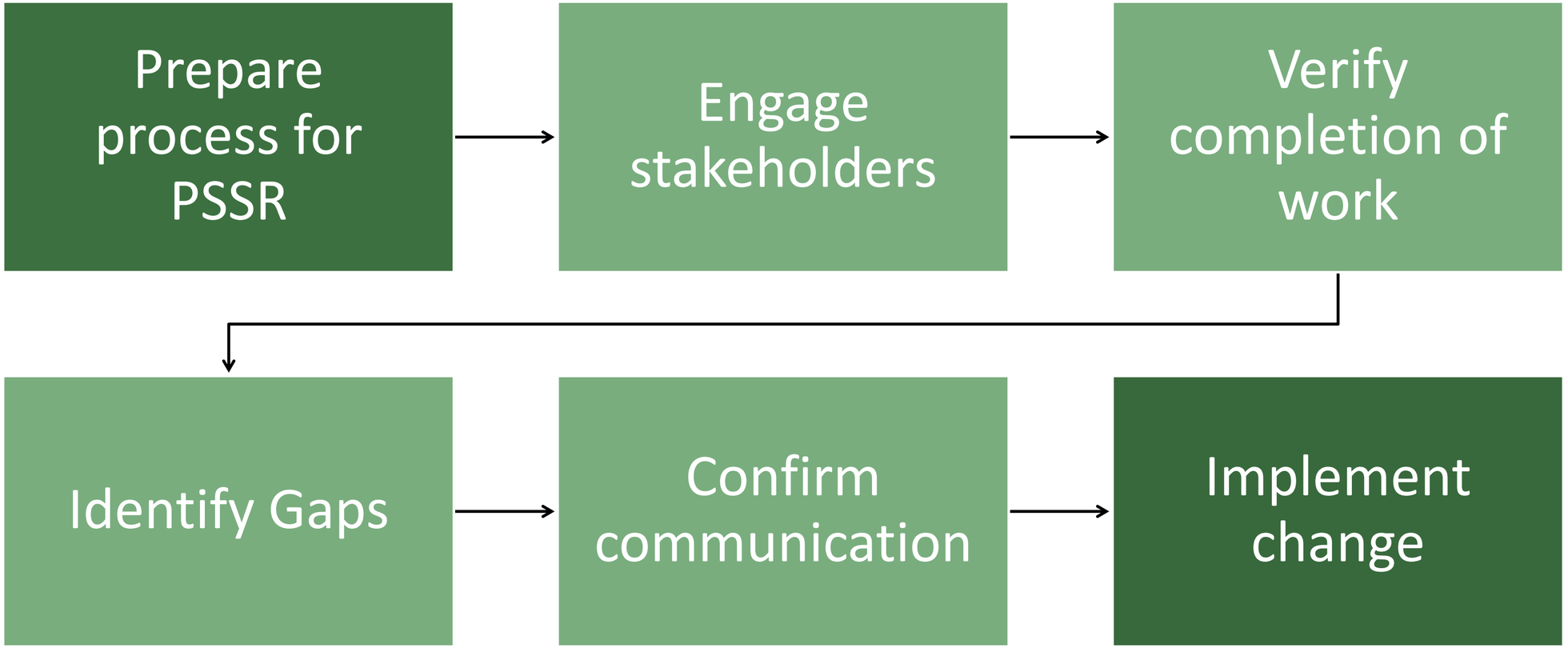
- Transient stages notoriously difficult to manage
- PSSRs provide clear pathway to startup
- Confirmation of operability from start to finish



Starting a PSSR

- Confirmation that PSSR is required
- Involvement of stakeholders
  - Generally managed by MOC owner or manager of process startup
  - Includes cross-functional collaboration
    - Technical SMEs
    - Operations team
    - Maintenance/Reliability
    - Health & Safety & ER
    - QA/QC team
    - Environmental
    - Controls/Automation
    - Contractors
    - R&D

PSSR workflow



Key Elements of PSSR

- Process Design
  - In accordance with design specifications
- Safety Equipment
  - Ensure that safety systems and safeguards are in place (Alarms, pressure relief devices, SIS)
- Operating Procedures
  - Ensure that accurate procedures are in place for safe operations, maintenance, and emergency scenarios
- Training and Personnel Readiness
  - Confirm that operators and personnel are properly trained
- Mechanical Integrity
  - Verify the integrity and functionality of process equipment

Regulatory Framework

- Program 3 (19 CCR § 5100.7)
- Program 4 (19 CCR § 5110.10)
- PSSR not required for CalARP program levels 1 and 2

Program 3

- PSSRs required for:
  - New stationary sources
  - Significant modifications to existing stationary sources
    - PSI changes
- Confirmation of:
  - Construction and design
  - Adequate procedures – safety, operating, maintenance, and emergency
  - Training for each employee involved in operating the process
  - MOC process followed
- For new processes:
  - Completion of PHA
  - Resolution/implementation of all action items
- Completed prior to introduction of substances to a regulated process

Program 4

- PSSRs required for:
  - New stationary sources
  - Significant modifications to existing stationary sources
    - PSI changes
  - Startup following partial and unplanned shutdowns (tricky!)*
- Confirmation of:
  - Construction and design
  - Equipment maintenance*
  - Adequate procedures
  - Training for each operating and maintenance employee affected by the change*
  - MOC process followed

Program 4 (cont.)

- For new processes:
  - Completion of PHA
  - Completion of Hierarchy of Hazard Controls Analysis (HCA)*
  - Completion of Damage Mechanism Review (DMR)*
  - Completion of Safeguard Protection Analysis (SPA)*
  - Resolution/implementation
- Completed prior to introduction of substances to a regulated process
- Must involve employee who currently works in the relevant unit(s) and possesses expertise and experience therein*

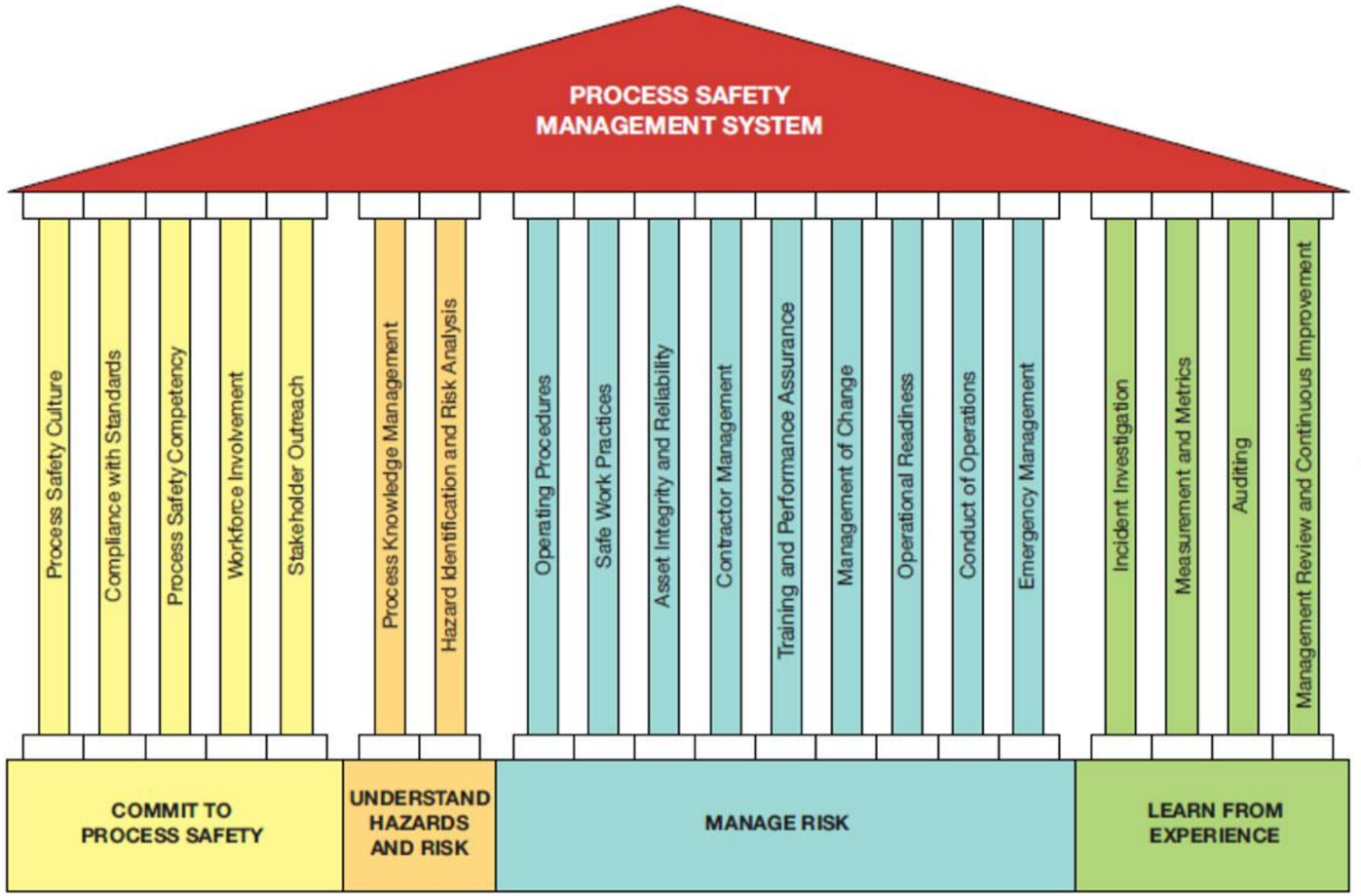
Noticeable Differences

- Program 4 adds:
  - Requirements for PSSRs prior to startup following a partial and unplanned shutdown
  - Verification that equipment has been maintained and is operable
  - Verification that training has been complete for both operating AND maintenance employees
  - Additional requirements for new processes (HCA, DMR, SPA)
  - PSSR must involve an employee who currently works in the unit AND possesses expertise and experience in the process

Additional Notes

- Contract employee training covered under MOC process
- "Significant" modification – when PSI must be changed
  - Hazard info, process technology data, process equipment, and process design
- Affected employees – discretionary (P_4 Training)
- Verification MUST be independent
  - What does independent mean? Separate person vs same person as who did MOC
- Procedures updated and people trained, ready to approve

PSSR in CCPS



Guidelines for Performing Effective Pre-Startup Safety Reviews | AIChE

Break!

Williams Olefins Plant Explosion and Fire

- Williams Olefins Plant Explosion and Fire
- Key deficiencies identified in MOC and PSSR programs

William Olefins Plant Explosion and Fire

New Processes

- PSSR in commissioning/acceptance testing

Modified Processes

- Modification is significant enough to require a change in the process safety information (PSI)

Startup Following a Shutdown

- Program 4 Requirement
  - All turnaround work performed on a process
  - For partial and unplanned shutdowns
- Should be *clearly* identified in company policy
- May practicably look like a modified version of standard PSSR

When are PSSRs not required?

Program 3

- Partial Shutdown
- Unplanned Shutdown
- No updates to PSI
- Procedure Updates ONLY
- MOOC Updates
- Routine maintenance

Program 4

- No updates to PSI
- Procedure Updates ONLY
- MOOC Updates
- Routine maintenance

PSSR Checklist or Example

Field Inspection	N/A	OK	Deficient	Comments
All open screwed connections bull plugged				
Lines, equipment, and steam tracing are identified				
No crosstie between process and utilities; dead spools and double block-bleeds in place				
Proper hose connections provided				
Adequate operating access, escape routes provided				
Operator alarm and shutdown test facilities adequate and have been tested				
Fire and safety inspection performed				
Temporary piping, hoses, tubing and gauges removed				
All primary PSV block valves are car sealed open. Spare PSV block valves are car sealed closed				
All valves designated on the P&IDs are car sealed in correct position and all valves that been blinded temporary or permanent are in the master blind list				
Operating procedures and process discussions updated				
Operator training completed				

Outstanding PSSR Items

- Child MOCs
- New MOCs
- Do another PSSR Checklist
- Fix in field
  - Generally advised against

Document Management

- PSI updates – P&ID updates redlined but not fully updated yet
- Procedure review process – time constraints
- Other barriers to timely document updates
- Electronic vs paper recordkeeping

Other Special Cases

- Pre vs Post startup action items included in PSSR
- Delayed training training/communication for employees who are on leave during initial training
- Training provided during/post-startup
- Emergency MOCs/PSSRs

Documentation

- Training Records
  - Affected employees
  - Notification practices
  - Confirmation of receipt
  - Varying levels of notification (awareness vs. classroom training)
- Process Design
  - Up-to-date design documentation related to the process
- Procedures
  - All procedures are up-to-date and have been revised if affected by the change or startup
- Maintenance
  - Maintenance in process not overdue or below standard
- MOC Process
  - MOC process has been followed in accordance with both facility policy and regulation

In Person Activity #2

Time to Audit the Juice Plant!

- PSSR Checklist – **FILL OUT ALL COLUMNS**
- Piping & Instrumentation Diagrams (P&ID) - **100% CORRECT**
- MOC Report
- Specification Sheet
- Employee List – **100% CORRECT**
- Training Log
- SDS
- Operating Procedure
    - Hint: PSSR Question #6 has the most answers!

PSSR Answer #1

Have all maintenance personnel received appropriate training on the new equipment?

NO

Juice Plant

List of Active Employees

Employee ID	Employee Job Title	Employee Name	Employee Username	Start Date
8871	Maintenance	Isabella Wright	iwright	2/17/2021
9666	Maintenance	Benjamin Lewis	blewis	6/27/1998
4193	Maintenance	Henry Young	hyoung	3/4/2021

Emma Johnson	Contractor	[illegible]	[illegible]
Isabella Wright	Maintenance		
Benjamin Lewis	Maintenance		3/20/25
Henry Young	Maintenance		

PSSR Answer #2

Have all operations pe
received appropriate t
new equipment?

NO

Juice Plant

List of Active Employees

Employee ID	Employee Job Title	Employee Name	Employee Username	Start Date
8425	Operator	Olivia Bennett	obennett	12/15/1997
5318	Operator	Liam Walker	lwalker	3/19/2001
1311	Operator	Sophia Clark	sclark	7/13/2005
8648	Operator	James Miller	jmiller	9/24/2014
1891	Operator	Lucas Allen	lallen	8/9/1995
2231	Operator	Ethan Scott	escott	10/27/2010
8783	Operator	Grace Adams	gadams	7/17/2015

Employee Name	Employee Title	Signature	Date Completed
Olivia Bennett	Operator	Olivia Bennett	3/16/25
Liam Walker	Operator	LIAM WALKER	3/15/2025
Sophia Clark	Operator	Sophia Clark	3/15/2025
Lucas Allen	Operator	Lucas Allen	3/15/2025
Ethan Scott	Operator	ethan scott	

PSSR Answer #3

Have all contract employees affected by the change been adequately trained and notified of the change?

YES

Juice Plant

List of Active Employees

Employee ID	Employee Job Title	Employee Name	Employee Username	Start Date
9354	Contractor	Mason Carter	mcarter	4/22/2024
2874	Contractor	Emma Johnson	ejohnson	5/29/1999

Mason Carter	Contractor	Mason Carter	3/19/25
Emma Johnson	Contractor	Emma Johnson	3/15/25

PSSR Answer #4

Have all operating procedures been updated?

NO

Juice Plant **Job Instruction**

Standard Operating Procedure
SOP112-TT

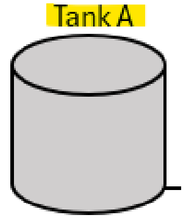
Purpose: The safe management of transferring the juice from the tank to bottling. Tank terminals include tanks 1, 2, 3, 4.

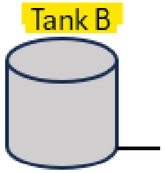
Procedure:

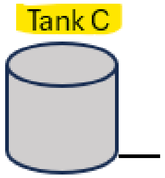
1. Identify the tank number that liquid will be drained from.
2. Check the display screen to see the status of the tank.

**Warning... DO NOT PROCEED WITH PROCEDURE IF TANK IS <25% filled.

3. Put on PPE when going in field (Tyvek suit, safety glasses, gloves).
4. Check in field to confirm tank level percentage.
5. Inspect equipment for any deformities
6. Check valve alignment
7. On display screen select "drain" from the appropriate tank number.







PSSR Answer #6

Has tank terminal been designed and installed according to specification?

NO

Tank Terminal Specification Sheet SPC-0717A

Materials of Construction	Plastic PVC process tankage, piping, and equipment, excluding equipment constructed of PEX, ABS, iron, or stainless steel. Purple pipe primer is prohibited in this process. All fittings must either be pressed or threaded together.
Process Labeling	Pressure relief valves must be labeled and dated. Tanks must be labeled with tank numbers in accordance with the associated engineering drawing/P&ID. Flow direction labeling must be clear in accordance with the associated engineering drawing/P&ID.
Material Containment	Tanks must be covered and within a secondary containment catchment area. Primary containment, including process piping, vessels, and other equipment, must be in operable condition, free from damage/defects.
PPE	PPE must be in safe, clean, and usuable state. In addition to PPE requirements listed in the SDS, operators must also use a Tyvek suit while operating the process.
Pressure Safety Valves (PSVs)	All PSVs must be rated to 40 psi. All PSVs must be inspected every 3 years.
Equipment Status	All valves must be positoned (opened/closed) in accordance the associated engineering drawing/P&ID.

PSSR Answer #7

Has a management of change (MOC) been approved by all approvers?

NO

Approvals	
Technical Expert	Approved 3/1
HSE Manager	Approved 3/7
Document Controller	Approved 3/4
MOC Process Gatekeeper	
MOC Owner	Approved 3/2

PSSR Answer #8

Is all personal protective equipment (PPE) available?

NO

Personal Protective Equipment

Eye/face Protection	Wear appropriat eye and face pr
Skin and body protection	Wear appropria
Respiratory Protection	Follow the OSH 149. Use a NIO are exceeded o
Hygiene Measures	Handle in accor

PPE	PPE must b requiremer while opera

Juice Plant **Job Instruction**

Standard Operating Procedure
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Purpose: The safe management of transferring the juice from the tank to bottling. Tank terminals include tanks 1, 2, 3, 4.

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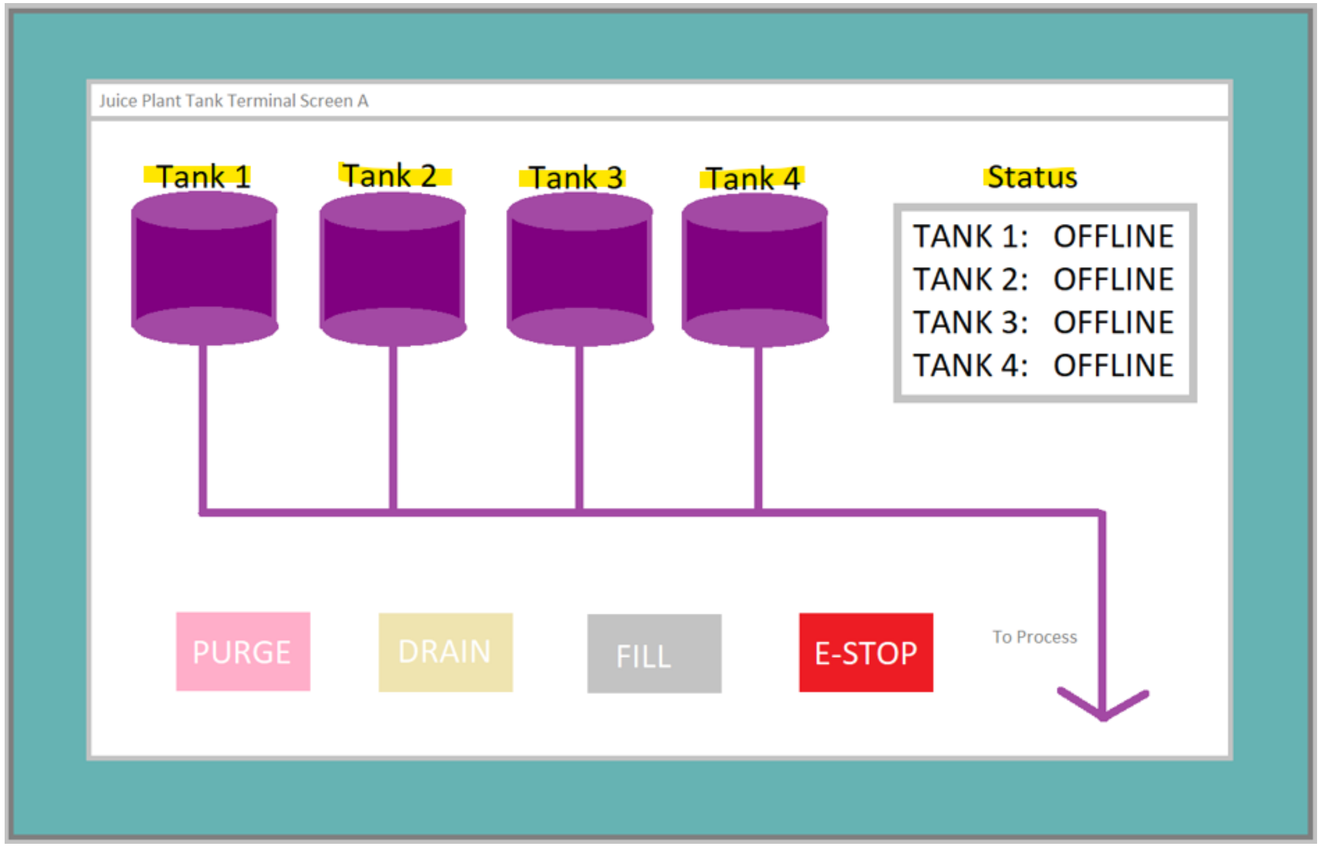
4. Check in field to confirm tank level percentage.
5. Inspect equipment for any deformities
6. Check valve alignment
7. On display screen select "drain" from the appropriate tank number.

PSSR Answer #9

Has all appropriate process technology been updated including alarms and operator work stations?

NO



PSSR Answer #10

Is field labelling correct?

NO

- Tank labelling not correct
- Incorrect arrow direction
- Pressure relief valve is labeled PSV-2A, not PSV-1A

PSSR Answer #11

Is all equipment/piping in working order?

NO

- Damaged sections of pipe
- Damaged caps
- Purple primer used in several fittings
- PEX line

PSSR Answer #12

Are up-to-date safety data sheets available?

YES

SDS for Juice or Puree, single strength to concentrate **Revision Date** 4-Sept-2019

SAFETY DATA SHEET

Creation Date: 21-Jan-2008	**Revision Date**: 4-Sept-2019	**Revision Number**: 5

1. Identification

Product Name **Fruit Juice/Puree, 6-18 Bx, or Fruit Juice/Puree Concentrate, 40-70 Brix**

Catalog Numbers: all relating to juices/purees, or their concentrates; Growers or their customer's numbers

Synonyms Fruit juice, fruit puree, fruit juice concentrate, or fruit puree concentrate, made from any fruit, including Concord grape, Niagara grape, Catawba grape, Fredonia grape, other grapes, apple, blueberry, bilberry, cherry, cranberry, peach, plum, or other fruits.

Recommended Use Blending with water and essence to provide food grade fruit juice or puree.

Uses advised against No information available

Details of the supplier of the safety data sheet

Company	**Entity / Business Name**	Emergency Telephone Number
Growers Co-operative Grape Juice Co	same	For Information US, call: 716-326-3161
112 North Portage St		Emergency number, US: 716-326-3161
Westfield NY 14787		

2. Hazard(s) identification

Classification Under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Based on available data, the hazard classification criteria are not met for any components of this mixture.

Label Elements
None required

PSSR Answer #13

Are secondary containment facilities adequate?

NO

Tank Terminal Specification Sheet SPC-0717A

Materials of Construction	Plastic PVC process tankage, piping, and equipment, excluding equipment constructed of PEX, ABS, iron, or stainless steel. Purple pipe primer is prohibited in this process. All fittings must either be pressed or threaded together.
Process Labeling	Pressure relief valves must be labeled and dated. Tanks must be labeled with tank numbers in accordance with the associated engineering drawing/P&ID. Flow direction labeling must be clear in accordance with the associated engineering drawing/P&ID.
Material Containment	Tanks must be covered and within a secondary containment catchment area. Primary containment, including process piping, vessels, and other equipment, must be in operable condition, free from damage/defects.

Common Issues with PSSRs

- Time Constraints
- Incomplete Documentation
- Lack of Coordination
- Failure to Address Issues

Best Practices for Successful PSSRs

- Early planning
- Team collaboration
- Comprehensive checklists
- Document everything
- Follow-up
- Use electronic databases

Objectives Review

- Review the regulatory framework behind CalARP PSSR requirements within each program level
- Understand the importance of PSSRs and their role in process safety
- Discuss examples of PSSRs, common issues, and how to resolve them
- Put it into practice!

Conclusion

- PSSR is a critical PSM element
- Proper preparation and collaboration are essential

Remember

Safety is a choice you make,

not a chance you take!

Supplemental Regulation

- CalOSHA PSM
- EPA RMP
- Contra Costa County Industrial Safety Ordinance
  - No additional PSSR criteria
    - https://www.cchealth.org/health-and-safety-information/hazmat-programs/industrial-safety-ordinance/iso-guidance-document

Additional Resources

- **Chemical Safety Board**
  - **Incident Investigations, videos, other resources**

  www.csb.gov
- **Contra Costa County HazMat Website**
  - **CalARP Checklists, Guidance Documents, etc.**

  www.cchealth.org/hazmat

Questions?

Thank You!

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https://www.cchealth.org/hazmat